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COVER PHOTOGRAPH: American crocodile (*Crocodylus acutus*). Photograph: Tom Dacey.

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Editorial

Membership to the CSG for the next quadrennium is now being finalised. Thanks to Regional Chairs and Vice Chairs for reviewing their membership and making recommendations to me about which members have been active and which have not. These have now been submitted to the IUCN Species Survival Commission (SSC) for registration. Reappointed members will be contacted directly by the SSC to confirm their contact details. For those members who have not been reappointed, let me take this opportunity to thank you for your support of the CSG.

I have recently appointed Ms Christine Lippai as Regional Vice Chair for West Africa. She will support the Regional Chairman, Samuel Martin, leading up to the proposed 2nd CSG sub-regional meeting in West Africa, planned for Burkina Faso. Samuel and Christine are planning to visit Ouagadougou, Burkina Faso, during the last week of April 2009, and meet with relevant authorities and potential participants from 11 West African countries attending a Masters training program at that time.

Following a CITES Review Mission to Madagascar (November 2006), the CSG sent a project team to Madagascar to work with the Malagasy Government to improve crocodile management in that country and to survey parts of the remaining, remnant wild populations (August 2007, March 2008, August 2008). A detailed report was prepared in cooperation with the Programme Germano-Malgache pour l'Environnement Coopération Technique (GTZ). As a result of the work undertaken by the CSG team and the outcomes of the joint final report, I found it necessary to write to the CITES Secretary General, recommending that the wild population of *C. niloticus* in Madagascar be transferred back to Appendix I as a matter of urgency. Copies of my letter and the report were also sent to the Malagasy Government, and Chairs of the IUCN-SSC, CITES Animals Committee and CITES Standing Committee.

The CSG Student Research Assistance Scheme has commenced in earnest and to date I have approved 9 applications, with a further two under consideration (see page 4 for details). This program is a truly innovative initiative by both CSG members and donors, and I believe it has tremendous potential for the future of crocodilian conservation. These students may well constitute the next generation of CSG members, sustaining our work of the past and building a solid and responsible future.

Rob Stubeing, Helen Kurniati, Ralf Sommerlad and Tarto Sugiarto visited the REA Kaltim Plantations, near Mesangat Lake, East Kalimantan, and report sighting two Siamese crocodiles (one juvenile and one sub-adult), and 4-5 eyeshines of what was probably *Tomistoma schlegelii*. I am happy to report that the proposal to convert much of the area where *C. siamensis* reside to oil palm plantation has been revised, with the company intending to turn the current lease into a permanent conservation area. A highly responsible decision for which we have thanked them.

During March 2009, the Executive Officer visited the Philippines to review progress on the recommendations of the successful Philippine Forum held in early 2007. Real progress is being achieved with higher levels of cooperation between various stakeholders and the new and expanding industry. Further details will be provided later.

Within Australia, cane toads (*Bufo marinus*) have now officially reached Western Australia. In the Northern Territory they have caused >70% mortality in the some resident *C. johnstoni* populations, but it is unclear whether Lake Argyle, with a very large population of *C. johnstoni*, will experience high or low mortality rates. Annual monitoring of both *C. johnstoni* and *C. porosus* populations in Lake Argyle, Lake Kununurra and the Ord River by the West Australian Department of Environment and Conservation (DEC) will no doubt provide some data on the impact of the toads as they become established.

There have been three fatal attacks by *C. porosus* on people so far in 2009 [Queensland (1; February), Northern Territory (2; March, April)], which has prompted public calls for more pragmatic management. The wild population of *C. porosus* in the Northern Territory appears to have been somewhat stable over the last 10 years, although the average size of crocodile in the population continues to increase.

Professor Grahame Webb, <*gwebb@wmi.com.au*>.

Student Research Assistance Scheme Update

The CSG's Student Research Assistance Scheme (SRAS) was launched in mid-2008 [see CSGN 27(2): 17] to encourage and assist students undertaking formal research on crocodilians. In the first quarter of 2009, 9 projects [Australia (1), Asia (1), South America (5), Africa (2)] had been approved for funding of $US1000 each.

- Ruchira Somaweera (University of Sydney, Australia): Minimizing the impact of cane toads on Australian freshwater crocodiles (*Crocodylus johnstoni*) using Conditioned Taste Aversion Learning.

- Matthew Shirley (University of Florida, USA): Crocodile conservation in the Congo Basin - an integrated field and molecular ecological approach to unraveling the mysteries of the slender-snouted crocodile (*Mecistops cataphractus*).

- Melina Simoncini [CIC y TTP (CONICET) and Proyecto Yacaré, Argentina]: Effects of climatic variables on reproduction and hatchling sex (considering TSD) in *Caiman latirostris* in Santa Fe Province.

- Virginia Parachu Marco (Cordoba University and Proyecto Yacaré, Argentina): Effect of red fire ants (*Solenopsis invicta*) on Broad-snouted caiman (*Caiman latirostris*) reproduction.

- Ayari Maria Rojano Marin (Universidad del Atlántico, Colombia): Evaluation of the conservation program for the Babilla (*Caiman crocodilus fuscus*) as a strategy for sustainable use of wetlands in the Department of Atlántico.

- Fang Zhang (Anhui Normal University, China). Conservation of the Chinese alligator (*Alligator sinensis*) based on the community participatory approach.

- Patricia Amavet (Universidad Nacional del Litoral and Proyecto Yacaré, Argentina). Mating system in wild *Caiman latirostris* populations, including analysis of the existence of multiple paternity using primers for amplification of microsatellite markers.

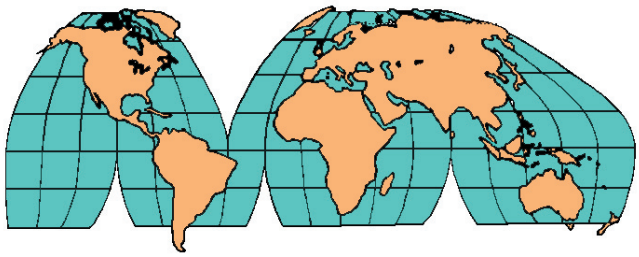
- Pablo Siroski (Universidad Nacional del Litoral and Proyecto Yacaré, Argentina, and McNeese University, USA). Isolation and characterization of antimicrobial peptides (AMPs) in caiman leukocytes.

- Kevin Wallace (Imperial College, UK and University of Stellenbosch, SouthAfrica). Population ecology and human-crocodile conflict of the Nile Crocodile, *Crocodylus niloticus,* in the Lower Zambezi River.

Details on the SRAS are available at: www.iucncsg/ph1/modules/Grants. The CSG encourages students to consider SRAS for projects that meet the criteria for funding.

Tom Dacey, *CSG Executive Officer, <csg@wmi.com.au>.*

Regional Reports



South Asia and Iran

Pakistan

The Mugger crocodile (*Crocodylus palustris*) is fast vanishing in Sindh and Balochistan Provinces due to diversion of water channels and hunting for skins. The results of a study to record the population and distribution of crocodiles in these provinces showed that the major population of crocodiles was concentrated in Sanghar, Khairpur and Nawabshah districts in Sindh, and in four major rivers (including Dasht, Hingol, Nari and Hub) in Balochistan.

Increasing human population, intensification of agricultural practices, hunting, building dams and diversion of water channels for irrigation are considered the major reasons for the decline in the Mugger population. Further degradation of habitat may lead to the extinction of the species in Pakistan.

The total population was estimated as 492 individuals (164 sighted in Sindh; 24 sighted in Balochistan). Captive breeding/farming of crocodiles is being carried out in Haleji, Shamzoo Park and Khar Center.

The role of crocodiles in maintaining the balance of the ecosystem should be realised and the popular misconception that they damage or totally depend on fish populations should be eliminated.

The Chotiari reservoir and wetland ecosystem in Sanghar district of Sindh is also known as the home of Muggers. Chotiari Reservoir is formed by a group of interconnected sub-tropical lakes (Baqar, Akanwari, Tajar, Phuleli, Seri and Sao Naro). These lakes are surrounded by the Nara Canal, which is a major source of water.

Chotiari wetland lakes in Sanghar and in other districts along the left bank of the Nara Canal are home for crocodiles, fish, otters and turtles. A considerable population of Muggers was recorded in the Makhi area in 1997, but they are now rare. Crocodiles were hunted by local fishermen for their skins, but this practice stopped as a result of the prohibition on international trade (CITES).

The Choiari forest was the stronghold of the freedom movement launched by the Hurs against the colonial British during the 1930s. During the uprising, the Hurs would hide

in the forest, and to suppress the revolt the British converted a large part of the woodlands to agriculture. The Chotiari Reservoir area is exceptionally rich in biological diversity and possesses great potential for tourism.

Source: *PPI, 12 January 2009 (http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/Regional/Karachi/12-Jan-2009/Crocodiles-number-declines-in-Sindh-Balochistan)*.

India

CROCODILE CONSERVATION PROGRAM IN ORISSA: A SUCCESS. RESULTS OF ANNUAL (2009) CENSUS OF SALTWATER CROCODILES. The annual census of Saltwater crocodiles (*Crocodylus porosus*) was conducted in river systems inside and outside of the Bhitarkanika Wildlife Sanctuary (BWS), Orissa, from 12 to 18 January 2009, to assess population size and trends, recruitment, migration, survival, etc. The method of census adopted was individual total count by direct day and night time sighting/counting. The river route/area was divided into 17 census units and each unit was entrusted to a census team.

A total 1596 crocodiles were counted, comprising 1484 from the Bhitarkanika Sanctuary and 112 from outside the sanctuary (88 from Mahakalapada Range, 24 from Mantei, Salandi and Baitarani Rivers, etc. under Bhadrak Wildlife Division) (Table 1). The counts reflects a 5.3% increase in the total population since the 2008 census, and an increase of 8.2% in non-hatchlings (Table 2).

The estimated crocodile population in the Sanctuary during the 1976-77 census (prior to the 'rear and release' program) was 95 individuals (61 hatchlings/juveniles, 6 sub-adults, 28 adults). Over 2300 captive reared young crocodiles (approximately 1 m total length) from the Dangmal Crocodile Research Centre have been released into the river systems of BWS in different phases since 1977. There has also been natural recruitment into the wild population annually. Density of crocodiles per km of river/creek has increased from 0.87 (1976-77) to 13.5 (2008-09).

Table 1. Numbers of *C. porosus* counted during the 2009 census inside and outside of the Bhitarkanika Wildlife Sanctuary.

Location	Hatchlings (<50 cm)	Yearlings (50-90 cm)	Juveniles (90-180 cm)	Sub-adults (180-240 cm)	Adults (>240 cm)	Totals	Percentage
Inside sanctuary	516	343	244	136	245	1484	93.0%
Outside sanctuary	22	32	20	12	26	112	7.0%
Mahakalapada Range	*22*	*31*	*12*	*8*	*15*	*88*	
Bhadrak WD	-	*1*	*8*	*4*	*11*	*24*	
Totals	538 (33.7%)	375 (23.5%)	264 (16.5%)	148 (9.3%)	271 17.0%)	1596	

Table 2. Numbers of *C. porosus* counted inside and outside of the Bhitarkanika Wildlife Sanctuary since 1976/77. % Inc.= percentage in different size categories since 2008; NH= non-hatchlings; * = 61 hatchlings, yearlings and juveniles.

Category	1976/77	2001	2002	2003	2004	2005	2006	2007	2008	2009	% Inc.
Hatchlings	*	341	441	484	525	681	657	503	538	538	0.0%
Yearlings	*	277	340	370	303	290	283	368	343	375	9.3%
Juveniles	*	237	187	180	210	169	197	259	231	264	14.3%
Sub-adults	6	36	145	82	100	107	122	135	143	148	3.5%
Adults	28	107	217	192	220	207	203	232	261	271	3.8%
Totals	95	1098	1330	1308	1358	1454	1462	1497	1516	1596	5.3%
Total NH	?	757	889	824	833	773	805	994	978	1058	8.2%

Table 3. Distribution of *C. porosus* counts in different Forest Ranges in 2009.

Forest Range	Hatchlings	Yearlings	Juveniles	Sub-adults	Adults	Totals	Percentage
Kanika	442	283	185	97	173	1180	73.9%
Rajnagar	74	60	59	39	72	304	19.1%
Mahakalapada	22	31	12	8	15	88	5.5%
Chandabali	-	1	8	4	11	24	1.5%
Totals	538	375	264	148	271	1596	

The latest census results indicate:

1. Successful implementation of Saltwater Crocodile 'rear and rehabilitation' program in BWS/National Park since 1975.

2. A 5.3% increase in the total population, and 8.2% increase in the non-hatchling population since 2008 (Table 2).

3. Nesting by released crocodiles [about 65 nests were located during the 2008 nesting season; compared with "over 55" during the 2004 season (Kar 2005)].

4. Kanika Range holds 73.9% of the current crocodile population (Table 3).

5. BWS has at least 12 crocodiles at 4.9<5.5 m (16-18'), 7 at 5.5<6.1 m (18-20') and 3 of about 6.1 m (20').

6. The areas with the highest concentration of crocodiles (main Bhitarkanika River from Khola to Pathasala, Thanapati Creek, Mahinsamada Creek, Suajore Creek, Baunsagada Creek, Kalibhanjadia, etc.) have:

   a. good mangrove cover/fringing mangrove vegetation;
   b. a network of creeks and creeklets;
   c. stretches of undisturbed mud banks favoured for basking;
   d. less human disturbance (little or no illegal fishing activities);
   e. hyposaline condition of water in the creeks; and,
   f. minimum water depth of 1.5 m at the lowest tide.

Literature Cited

Kar, S. (2005). Annual census of saltwater crocodiles in Bhitarkanika Wildlife Sanctuary in Orissa, India. Crocodile Specialist Group Newsletter 24(3): 9-10.

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GHARIAL RETURN TO HOOGHLY. The Indian gharial (*Gavialis gangeticus*) has made a surprise return to the District of Hooghly, West Bengal, after a gap of nearly 30 years. At least 100 gharials are believed to be present in a 150-km stretch between Tribeni and Belun Island in Burdwan, with the highest density along the river coast of Balagarh.

According to Tanmoy Ghosh, President of iRebel (Institute for Research on Ecology and Biodiversity), in early November reports of gharial sightings started coming in from Tribeni, Balagarh, Nabadwip, Patuli, Agradwep, Katwa and Belun. Two were sighted at Kuntighat near Tribeni on 29 November, and then at Katwa and Belun.

Innovative India Tourism Pvt Ltd (IIT) and iREBEL have initiated a social movement in Belun named "In Search of Gharials". They have stopped fishing and the use of boats in two islands in the area until March to provide safe breeding grounds.

Gharials were last sighted in the Hooghly in the 1970s. More than a decade ago, 5000 gharials were released in the Ganga in Uttar Pradesh, but they failed to survive. Ever since, they were thought to be restricted to Chambal in Madhya Pradesh, Shone River in Rajasthan, Kartinia ghat in Uttaranchal and Corbett National Park. While some believe they have migrated from Uttar Pradesh along the Ganga to the Hooghly through other smaller rivers like the Rupnarayan, others feel this could be the residual population that was believed to have been wiped out.

Source: *http://timesofindia.indiatimes.com/Kolkata_/Experts_jubilant_over_Hooghly_gharial/articleshow/4115058.cms; 12 February 2009.*

BHITARKANIKA POSSIBLE CANDIDATE FOR WORLD HERITAGE LISTING. The famous Bhitarkanika National Park (BNP) may well make it onto the list of World Heritage Sites. It is among a list of 7 natural sites the Government of India is proposing to place before UNESCO. Five sites in India (Manas, Kaziranga, Keoladeo, Sundarbans and Valley of Flowers National Parks) were accorded world heritage status between 1985 and 1988, and no site has been listed since.

It is BNP's unique ecosystem that has worked in its favour. After the Sunderbans, it is the second largest mangrove forest in India. It is also home to the country's largest Saltwater crocodiles (*Crocodylus porosus*) - the latest census placed the wild population at over 1500 individuals (Kar 2009). In addition, BNP includes Gahirmatha, largest nesting ground for Olive Ridley turtles in the world.

However, much depends on the Wildlife Institute of India, Dehra Dun, which is entrusted with the responsibility of presenting the case of the natural sites before UNESCO. The role of the IUCN would also come to play during selection in the case of natural sites.

In consideration of its exquisite flora and fauna, the Orissa State Government notified the area as a wildlife sanctuary in 1975, and it was declared a Ramsar site in 2002. A proposal to notify it as a biosphere is underway. The sanctuary spreads over 672 km^2. In 1998, the 145 km^2 core area of Bhitarkanika was declared a national park.

Literature Cited

Kar, S. (2009). Crocodile conservation program in Orissa: a success. Results of annual (2009) census of Saltwater crocodiles. Crocodile Specialist Group Newsletter 28(1): 5-6.

Source: *http://www.expressbuzz.com/edition/story.aspx?Title*

=Heritage+status+for+Bhitarkanika+proposed&artid=GZs1gHJrLPI=&SectionID=mvKkT3vj5ZA=&MainSectionID=fyV9T2jIa4A=&SectionName=nUFeEOBkuKw=&SEO=.

Nepal

RADIO-TRACKING CRITICALLY ENDANGERED GHARIAL Fourteen Indian gharials (*Gavialis gangeticus*) fitted with radio-transmitters on their tails, have been released into the Rapti River in an attempt to identify reasons for the alarming decline in the wild population.

The goal of the tracking study, carried out by the Nepalese Department of National Parks and Wildlife Conservation in collaboration with WWF-Nepal, is to study movement patterns of the gharials, assess survival rates and learn about preferred habitats in Nepal. The 14 gharials will be monitored by Radio Frequency Identification (RFID) technology by a team from Chitwan National Park.

Hunting is no longer considered a threat, but the construction of dams, barrages and irrigation canals, sand-mining and riverside agriculture have all resulted in irreversible loss of gharial habitat. Between 1981 and 2008, 691 captive-bred gharials were released in the Narayani, Rapti, Karnali, Babai, Koshi and Kali Gandaki Rivers, but numbers continue to dwindle. A 2008 survey recorded just 81 individuals in the various rivers, the number probably boosted by the recent release of captive-bred individuals.

Gharial now appears to be confined to the river systems of the Brahmaputra (India, Bhutan), Indus (Pakistan), Ganges (India, Nepal), and Mahanadi (India), with small populations in the Kaladan and the Irrawady in Myanmar. Monitoring of the released gharials will be helpful in formulating a long-term conservation action plan to save them. Long-term actions will include captive breeding, research and monitoring, and safeguarding gharial habitat and prey.

Source: *www.panda.org/news_facts/newsroom/?156321/Radio-tagging-attempt-to-save-critically-endangered-crocodile (11 Feb 2009).*

Latin America & the Caribbean

Venezuela

ORINOCO CROCODILES FROM DALLAS WORLD AQUARIUM SENT TO VENEZUELA. Distributed in Venezuela and eastern Colombia, the Orinoco crocodile (*Crocodylus intermedius*), is one of the most endangered of the world crocodilians. For that reason, 11 years ago the Dallas World Aquarium (DWA) signed an agreement with the Venezuelan Government (PROFAUNA-MARNR) to obtain a pair of adult Orinoco crocodiles for display, with the purpose of sending all resulting progeny back to Venezuela. "Miranda" and "Juancho" are the stars of this story, as they have produced more than 100 hatchlings since 2003. The DWA is the only place in the world where this species is breeding successfully outside its natural distribution.

The process of returning young from this breeding pair to Venezuela has been a long one. The paperwork for this export started 21 months ago. We understood that it would be a long process because of all the permits required (eg CITES import and export, health certificates) and ongoing communication with all the officials involved.

The 55 female *C. intermedius* ranged in age from 20 to 32 months and 915 and 1510 mm total length (mean= 1204 mm). On 6 December 2008, the crocodiles were packed in 12 wooden crates (total weight 900 kg); 6 crates were sent with American Airlines cargo that day, and the other 6 crates were sent on a later flight to Miami, where they remained overnight, arriving in Caracas on 7 December. As the DWA Conservation Biologist and leader of this program, I flew on the same flight to Caracas as the first 6 crates.

The crates were designed by DWA staff based on previous experience and according to IATA regulations. Crates contained either 3, 4, 5 or 6 crocodiles, each housed within a separate compartment with a sliding door (Fig. 1). No tape or rubber bands were used to secure the crocodile's snout, so they were free to thermoregulate.

Figure 1. Plywood crate with 6 compartments; sliding doors are open. Ventilation holes were on the top, front and back. Photograph: Luis Sigler.

The first group of crocodiles arrived in Caracas at 2100 h, and after an hour of paperwork at the AA cargo area -which was secured by the military- the valuable cargo was placed onto a truck and transferred to the "Rancho Grande" Biological Station in the State of Maracay, arriving there the next day at 0300 h. This group was released at 0700 h, and all the crocodiles were fine (Fig. 2). Some hours later they were basking under a beautiful Venezuelan sun for the first time in their lives.

The second group arrived at "Rancho Grande" Biological Station at 2100 h and were released into the ponds immediately, as they had been confined inside the crates for 37 hours.

Figure 2. Luis Sigler releasing one of the largest crocodiles (1.5 m TL) into the second pond at "Rancho Grande" Biological Station. Photograph: Ricardo Babarro.

No problems were noted in the health of the crocodiles. They were in good shape at the DWA and had been fasted and medicated against myopathy (a stress-related disease) a couple of days before shipment. In addition, all had blood samples taken which were analysed for their health certificates. The results were fine, and represent the first standard values published for the species! All crocodiles had been marked immediately after hatching with a numbered metal webbing tag placed between the 3rd and 4th toes of the rear left leg.

The crocodiles were fasted again on Monday but on Tuesday (9 December) they were offered a meal of fresh sardines, and some of them started to eat. The two outdoor concrete ponds at "Rancho Grande" reserved for the Texan Orinoco crocodiles measure 12.5 x 5.5 m and are 0.5 m deep. They have a shady area over the pond and a ramp where the crocodiles are fed.

The proposed release date into the wild is March 2009, which is in the dry season for "Los Llanos Venezolanos" (the Venezuelan flat fields), which would allow crocodiles enough time to adapt and claim a territory prior to the increase in water levels at the end of the year. The best option for a release site is the Capanaparo River, a protected National Park, where a growing population of *C. intermedius* has been studied and where the "new" genes that all the DWA crocodile ladies will bring in the near future will help the recovery of this endangered species.

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Luis Sigler, *Conservation Biologist, The Dallas World Aquarium, <cocodriloblanco@yahoo.com>.*

Brazil

"OUR HIDDEN ENEMY" AND THE IRRATIONAL FEAR OF CROCODILIANS. Problems associated with encounters between humans and crocodilians are well known from the popular media to the scientific literature. Human populations in many countries report incidents with crocodilians. In the southern suburbs of Rio de Janeiro, the coastal lagoons of Marapendi and Tachas and their tributaries are home to the Broad-snouted caiman (*Caiman latirostris*). According to local residents this population appears to have increased in recent years. And concomitant with this and the increase in human population, the incidence of complaints and fear of incidents have risen markedly.

In Rio de Janeiro incidents between caimans and humans are not common, even with the increase of potential interactions. To our knowledge there have been no reported caiman attacks on public paths and cycle tracks. The only registered incidents have occurred when fishermen have stepped on an animal in the water (according to local newspaper reports). It is unlikely that unprovoked attacks will occur, as caimann rarely exceed 2 m in total length.

Broad-snouted caimans eat small mammals, birds and other reptiles, but the diet mainly consists of crustaceans, mollusks and other invertebrates. This seems to be particularly so in urban Rio de Janeiro, due to the scarcity of more diverse prey. Nevertheless, attacks on mammals are not altogether rare. We found hair in the stomach contents of 9 of 130 (6.9%) captures. And we have photographs of a caiman capturing a capybara (*Hydrochaeris hydrochaeris*).

Caiman tend to flee humans and avoid contact whenever possible. However, some local newspapers have distorted this image in various popular articles. An interview entitled "Hidden Enemies!!" ("Inimigos Ocultos!!") and a note "... let's eat at the ABM (Bosque Marapendi Association) today" have incited local residents to believe that the caimans could attack them and eat their pets.

The fear and indignation of the people is certainly a product of lack of correct information about caiman. We have seen people inciting caiman to attack by imitating vocalizations of young during the reproductive season. The caiman, on hearing the calls, ferociously attacked the bank from where the calls were issuing. An attack was also directed at the author (RFFF) who was on the other bank, and who was merely present and not vocalizing. Such incidents cause people to want the removal of caiman from the lagoons.

Environmental education

In spite of the adverse reporting on caimans, many people adopt a positive attitude towards them and feed them and defend them against mistreatment. However, a lack of information can lead to risk of conflict, since the association of people and food could be dangerous for both people and the animals. Our project has given several talks to the public to inform and instruct them how to go about living so close to

caimans. We advise:

1. Not to feed animals so that they will not associate the image of humans with food.
2. To respect the breeding season and not imitate the calls of young to provoke adults.
3. To respect the territory of the animals and not throw objects at them.

We seek to do away with the image that people have of caimans eating their pets on their afternoon bicycle ride. We are trying to find solutions for the harmonious relationships between humans and caimans, who are obliged to live together in the urban environment.

Additional information

There has been a real increase in the caiman population due to inadequate management of the conservation reserves of the region. Caiman from other parts of Rio de Janeiro have been released at the Marapendi and Tachas lagoons because they are reserves. These are animals from other lagoons and wetlands where urbanization and filling have reduced the area of natural habitat and pressed the animals into even closer contact with humans. Recent research suggests that these releases should be controlled, since they have resulted in an imbalance in the sex ratio and a noticeable increase in caiman population density. In spite of uncontrolled management, there is reproduction in both lagoons and we find many young in nightly captures. There is however quite a distorted sex ratio - we find many more males than females.

Lack of information and communication is a serious problem for the conservation of caiman, especially within the urban environment. We need talks for the community and explanatory notice boards at the reserves and perhaps a publicity campaign in favor of the caiman. Even then it can be difficult to counteract sensationalist reporting. Our project has a long way to go, but aims to study the Broad-snouted caiman as a basis for its conservation in the state of Rio de Janeiro, as well as informing the public on the conservation of the species in the urban environment. We believe that the "hidden enemy" can be turned into a flagship species for the conservation of the coastal lagoon environment.

The following links provides further information on the topic:
- www.afolhadobosque.com/marlonbrum;
- www.afolhadobosque.com/a_folha_do_bosque/capa.html (see December 2008 report entitled "Inimigo Oculto")

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East and Southeast Asia

Indonesia

HUMAN-TOMISTOMA INTERACTIONS IN CENTRAL KALIMANTAN, INDONESIAN BORNEO. Tomistoma (*Tomistoma schlegelii*), also known as the Malaysian False Gharial, is one of the least familiar crocodilians. Once found throughout Southeast Asia, it is now restricted to remnant populations in West (Peninsula) Malaysia, Sumatra, Borneo and possibly Java. They are believed to be extinct in Thailand (Ross 1998). Tomistoma can reach lengths of up to 6 m and are easily distinguished from the Saltwater Crocodile (*Crocodylus porosus*), with which it coexists, by their long, narrow snout. The CSG-Tomistoma Task Force describes their diet as "thought originally to specialise on fish like the Indian Gharial, adult Tomistoma actually take a much wider range of prey from relatively small invertebrates to relatively large mammals (monkeys, small deer), birds and reptiles" (TTF 2009). However, there has been no verified case of Tomistoma predation on humans (B. Simpson and M. Auliya, pers. comm.). Here, we describe one such case and another suspected incident, both of which took place at the end of 2008.

In the first incident, which occurred in late November in the area of Pangkut, Kotawaringin Barat District, Central Kalimantan Province, an adult, male, oil-palm plantation worker was swimming across a river, as a short-cut home, when he was taken by a crocodile. After a week-long search failed to find the crocodile, a local pawang (shaman) was called to assist. The pawang, who for many years in the 1970s and 1980s was a professional crocodile hunter, found and caught a 4+ m Tomistoma that he was convinced was responsible for the attack (Fig. 1). However, no human remains were found in the crocodile's stomach.

Figure 1. Adult male Tomistoma believed to be responsible for an attack on a man in late November 2008. No human remains were found in the stomach. Photograph: Bapak Herman/Orangutan Foundation.

In the second incident, which occurred at around 1400 h on 31 December, a 43-year-old man was pushing a raft of small logs along the Sungai (River) Kedipi towards a waiting boat,

when he suddenly screamed and disappeared. The two people with the man searched for him briefly and then returned to their homes to gather a search party. Approximately 100 people joined the search that found some human body parts in the vicinity of the attack, but no sign of the crocodile. The same pawang who caught the Pangkut crocodile joined the search the next day. At around 1600 h, using a combination of electricity and spears, a ±4 m female Tomistoma was stunned and then killed. She was towed back to town and dissected (Figs. 2 and 3). The man's remains were instantly recognisable, as were two monkeys; a Proboscis Monkey (*Nasalis larvatus*) and a Long-tailed Macaque (*Macaca fascicularis*).

The killing of a crocodile of this size, while understandable, is nonetheless upsetting. However, it is a testament to the relationship many rural Indonesians still feel for the natural world that the attack did not unleash wide and indiscriminate hunting of all crocodiles as happened after a 2006 crocodile attack in Sarawak (J. Rubis, pers. comm.); rather only the culprit was sought out.

Figure 2. Adult female Tomistoma captured after attack on a man in December 2008. Photograph: Yatno/Orangutan Foundation.

Figure 3. Remains of the man and two monkeys were found in the stomach of this Tomistoma (see Fig. 2). Photograph: Orangutan Foundation International.

The authors visited the site of the second attack, accompanied by the pawang. Sungai Kedipi averages approximately 12 m width, 2.6 m depth and is typical of the 'black-water' rivers found throughout the lowlands of Kalimantan and Sumatra. These highly acidic rivers (approximate pH 4.5) are fed solely by rainfall and drainage from the surrounding peat-swamps. Visibility in the Sungai Kedipi was just 98 cm deep. The flow rate was approximately 1.5 m/sec.

There were a number of fish traps along the river and fish frequently broke the surface. Despite obvious and sometimes severe disturbance to the forests along the river both Proboscis and Long-tailed Macaque monkeys were seen. Even though the river and its surrounds form ideal Tomistoma habitat, both the authors were surprised that such a large crocodile was found in this river, especially as it was only 13.6 km from Pangkalan Bun, a major local population centre.

From these two incidents the most obvious conclusion that can be drawn is that large Tomistoma should be considered potentially dangerous. That they may not have been previously is probably due to a combination of a paucity of information, immediate suspicion for crocodile attacks falling on Saltwater crocodiles, and a mistaken belief in the Tomistoma's diet being primarily fish.

Deeper analysis of these attacks reveals three other interesting points. Firstly, in both cases, the victims were essentially fully immersed in the water. The pawang said he had never heard of a Tomistoma attacking a boat and there are no records of people being taken from river banks. Secondly, the theory that Tomistoma are opportunistic feeders (Das 2002) is supported by the fact that the Sungai Kedipi crocodile had two monkeys in its stomach; extreme-hunger seems an unlikely motivator for this attack (coincidently, both species of monkeys are known to swim). Finally, casual observations from Tanjung Puting National Park, the Province's most popular tourist destination, indicates Tomistoma habituate to the presence of boats and people. Sungai Kepidi is clearly frequently used for fishing.

The crocodile may therefore have overcome any initial wariness of people and remained in their vicinity and so was ready to attack once the victim was in the water. While this is conjecture, it is certain that human encroachment has increased in the area and this is likely to have put the crocodiles under some ecological and/or behavioural stress. As the behavioural ecology of Tomistoma is still little understood it is hard to predict their response to that stress.

Reporting the loss of human life is never pleasant or comfortable. The authors are entirely sympathetic to the victims' families; however, they close with some remarks in support of Tomistoma. Concern remains high for the future of the species as habitat loss continues across much of its range. The two crocodiles killed were adults and had most likely bred, but without further studies we cannot know if their offspring have or will survive to maturity. More positively, despite the fatalities, from a conservation perspective it is encouraging such large Tomistoma persist. There are literally hundreds of

rivers like Sungai Kepidi across southern Kalimantan, most much further from human habitation. It is to be hoped some retain viable populations of this endangered crocodile.

Acknowledgements

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Literature Cited

Das, I. (2002). The natural history of crocodiles. *In* Man-eating Crocodiles of Borneo, by J. Ritchie and J. Jong. Natural History Publications (Borneo): Kota Kinabalu, Malaysia.

Ross, J.P. (ed.). (1998). Crocodiles: Status Survey and Action Plan. 2nd Edition. IUCN: Gland, Switzerland.

Tomistoma Task Force (2009). http://tomistoma.org/pa/ (March 2009).

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Philippines

SCHOOLGIRL KILLED BY CROCODILE. A large crocodile killed a 12-year-old schoolgirl after attacking the small boat in which she was travelling on 7 March 2009. Rowena Ramono, a member of the ethnic Manobo tribe who live in floating houses in the Agusan Marsh, was heading home at around 1800 h when the crocodile attacked the boat from behind, damaging the boat and causing her to fall into the water - two companions managed to swim to safety.

The girl's headless torso was recovered the following day, and a search was carried out for the crocodile. The school was closed and around 100 people were evacuated from their homes in fear of another attack. Witnesses claimed the crocodile was about 9 m long. Both Philippine crocodiles (*Crocodylus mindorensis*) and Saltwater crocodiles (*C. porosus*) exist in the area. In late January a man managed to escape with minor injuries after being attacked by what many people believe is the same crocodile.

The Agusan Marsh, in southern Mindanao, is one of the country's largest, covering 113,000 ha. It is a sanctuary for many protected species, including softshell turtles and the Philippine crocodile.

Sources: *The Nation, 13 March 2009; Manilla Bulletin, 13 March 2009; Philippine Daily Enquirer, 13 March 2009.*

Cambodia

BIODIVERSITY REPORT OF MEKONG RIVER. A biodiversity report by WWF Cambodia, describing a series of biological surveys and conservation priority-setting for a 130-km section of the Mekong River in northeast Cambodia, conducted between November 2006 and August 2007, is now available (http://www.panda.org/who_we_are/wwf_offices/cambodia/news_publications/?154321/Biological-surveys-of-the-Mekong-River-between-Kratie-and-Stung-Treng-towns-northeast-Cambodia-2006-2007).

The project was a collaborative initiative involving Cambodian Fisheries and Forestry Administrations and WWF. Entitled "Biological Surveys of the Mekong River between Kratie and Stung Treng Towns, Northeast Cambodia, 2006-2007", the report has resulted in a proposal by the Cambodian Government to implement zoning within the site for biodiversity conservation and community landuse. Findings included one undescribed taxon, 24 new records for Cambodian flora and fauna, intact riverine habitats, and some of the largest breeding populations in the Mekong River Basin or globally for a range of threatened taxa.

No crocodiles (*Crocodylus siamensis*) were sighted in the survey area, and information from interviewees indicate no sightings since 2006. Few residents were aware of the potential occurrence of crocodiles, suggesting either local extinction or very low numbers present.

Australia and Oceania

Australia

TWO CHILDREN KILLED IN SEPARATE CROCODILE ATTACKS. On 8 February 2009, 5-year-old Jeremy Doble became the youngest crocodile attack statistic in Australia. The boy disappeared after following his dog into the Daintree River, Queensland. A 4.3 m long Saltwater crocodile (*Crocodylus porosus*) was captured in the area, and the boy's remains were later identified in its stomach contents.

The parents of the boy asked that the crocodile not be harned, and wildlife authorities confirmed that it will be placed into captivity (in an undisclosed facility). The crocodile will not be able to be displayed to the public. This decision resulted in public debate as to whether the crocodile should be destroyed rather than being allowed to live.

Queensland wildlife authorities are currently attempting to capture a 4 m Saltwater crocodile sighted at Fraser Island, south of the southern-most limit of the species' distribution on the east coast of Australia. There are also continuing reports of *C. porosus* along the coast near urban areas further north (eg Pallarenda, Saunders Beach, Magnetic Island). Recent flooding caused by cyclone activity may have contributed to some crocodiles being washed out of rivers onto the coast.

Recommendations of a review of Queensland Environmental Protection Agency's crocodile management program [CSGN 27(4): 14-15] were adopted in February 2009. These recommendations have been incorporated into a new Estuarine Crocodile Management Manual, which informs EPA staff of revised policies, delegations, guidelines and procedures now in place (www.epa.qld.gov.au/nature_conservation/wildlife/living_with_wildlife/crocodiles/crocodile_management_manual).

On 15 March 2009, 11-year-old Briony Goodsell was taken by a Saltwater crocodile as she swam with her younger sister and two friends in a flooded creek at Black Jungle, near the rural suburb of Lambells Lagoon, in the Northern Territory. A massive search later recovered the girl's shorts and parts of her body about 450 m from the site of the attack.

Wildlife rangers continued to search for the crocodile over the next few days, but the search was called off when it was realised that the crocodile had travelled downstream. Due to the nature of the swamp at this time of year (wet season), detection and capture of the specific crocodile responsible was considered impossible. The crocodile is believed to have been 3-3.5 m long.

This latest attack in the Northern Territory has sparked calls for "culling" to reduce the crocodile population. Some 200-240 *C. porosus* are taken from Darwin Harbour each year as part of the Problem Crocodile Program, to enhance public safety around the cty. It is not unusual to find *C. porosus* in upstream, freshwater areas, into which they are able to move easily during the wet season. A satellite tracking study was initiated in late 2005 to study the movement of *C. porosus* into upstream freshwater areas, but the project has been constrained by limited funding. These latest incidents bring the total number of crocodile attacks in Australia since 1971 to 76, of which 30% have been fatal.

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Science

Recent Publications

Borteiroa, C., Gutiérrez, F., Tedros, M. and Kolenc, F. (2008). Food habits of the Broad-snouted caiman (*Caiman latirostris*: Crocodylia, Alligatoridae) in northwestern Uruguay. Studies on Neotropical Fauna and Environment 2008: 1-6.

Abstract: The food habits of the Broad-snouted Caiman (*Caiman latirostris*) were studied in northwestern Uruguay. The most common prey were insects, the shrimp *Pseudopalaemon bouvieri*, the snail *Pomacea canaliculata*, fish and birds. Spiders, crabs, amphibians, snakes, turtles and mammals were consumed less frequently. Arthropods were the most frequent prey for juvenile caiman. Fish and snails were consumed by all size classes. The proportion of stomach contents with invertebrates decreased with increasing caiman size, and that with vertebrates was greater in the diet of larger caiman. Diet composition and ontogenetic shift are similar to that of other crocodilians considered as opportunistic generalist predators.

Borteiro, C., Gutiérrez, F., Tedros, M. and Kolenc, F. (2008). Conservation status of *Caiman latirostris* (Crocodylia: Alligatoridae) in disturbed landscapes of northwestern Uruguay. South American Journal of Herpetology 3(3): 244-250.

Abstract: demographic studies on crocodilians in subject to strong human disturbance habitats are scarce, particularly in the neotropical region. this work provides the first survey data of abundance and population size structure of a neotropical caiman, *Caiman latirostris*, in disturbed habitats of northwestern uruguay (30°S, 57°W). we conducted nocturnal surveys in agriculture impoundments (2-116 ha) of the Ñaquiñá and lenguazo stream basins during summer, from 2001 to 2004. about 81% of impoundments were inhabited by caiman, with relative abundance indices between 2.1 and 4.4 km^{-1}. population size structure in the study area was similar throughout the study period; sub-adults from 50 to119 cm of total length were the most abundant (57-78%), followed by adults (25-33%), and juveniles (6-22%). relative abundance indices suggested that *C. latirostris* is not seriously endangered in contrast to previous local reports. the construction of agriculture impoundments in northwestern Uruguay for irrigation of rice and sugar cane seem to have been favored *C. latirostris*, as indicated by population size structure.

Pierce, S.E., Angielczyk, K.D. and Rayfield, E.J. (2008). Patterns of morphospace occupation and mechanical performance in extant crocodilian skulls: a combined geometric morphometric and finite element modeling approach. J. Morphol. 269(7): 840-864.

Abstract: Extant and fossil crocodilians have long been divided into taxonomic and/or ecological groups based on broad patterns of skull shape, particularly the relative length and width of the snout. However, these patterns have not been quantitatively analyzed in detail, and their biomechanical and functional implications are similarly understudied. Here, we use geometric morphometrics and finite element analysis to explore the patterns of variation in crocodilian skull morphology and the functional implications of those patterns. Our results indicate that skull shape variation in extant crocodiles is much more complex than previously recognized. Differences in snout length and width are the main components of shape variation, but these differences are correlated with changes in other regions of the skull. Additionally, there is considerable disparity within general classes such as longirostrine and brevirostrine forms. For

example, *Gavialis* and *Tomistoma* occupy different parts of morphospace implying a significant difference in skull shape, despite the fact that both are traditionally considered longirostrine. Skull length and width also strongly influence the mechanical performance of the skull; long and narrow morphotypes (eg *Tomistoma*) experience the highest amount of stress during biting, whereas short and broad morphotypes (eg *Caiman latirostris*) experience the least amount of stress. Biomechanical stress and the hydrodynamic properties of the skull show a strong relationship with the distribution of crocodilians in skull morphospace, whereas phylogeny and biogeography show weak or no correlation. Therefore, ecological specializations related to feeding and foraging likely have the greatest influence on crocodilian skull shape.

Shirley, M.H., Oduro, W. and Yaokokore Beibro, H. (2009). Conservation status of crocodiles in Ghana and Cote-d'Ivoire, West Africa. Oryx 43(1): 136–145.

Abstract: The population and conservation status of crocodiles throughout West and Central Africa is poorly known and the IUCN Crocodile Specialist Group's highest priority recommendations are country status surveys and examination of potential threats. This study presents survey data and a review of the conservation status of the Nile crocodile *Crocodylus niloticus*, slender-snouted crocodile *Mecistops cataphractus* and African dwarf crocodile *Osteolaemus tetraspis* at 67 sites throughout Ghana and Coˆte d'Ivoire. No crocodiles were sighted in 31.5% of surveys but, where encountered, densities averaged 0.90 crocodiles sighted km^{-1}. The most frequently encountered crocodile was *C. niloticus* (94% of sightings) with population structure highly biased to individuals ,1 year of age (41.4%). Only 14 *M. cataphractus* were observed. Local informants report that crocodiles were more common 10–20 years ago than at present. There is now little commercial harvest, which includes limited use in the bushmeat and traditional medicine markets, because of the crocodile's scarcity. Habitat encroachment and incidental bycatch in fishing devices appear to be the major threats. Actions needed to improve the conservation status of crocodile populations in both countries, and throughout the region, are discussed.

Stoker, C., Beldoménico, P.M., Bosquiazzo, V.L., Zayas, M.A., Rey, F., Rodríguez, H., Muñoz-de-Toro, M. and Luque, E.H. (2008). Developmental exposure to endocrine disruptor chemicals alters follicular dynamics and steroid levels in *Caiman latirostris*. Gen. Comp. Endocrinol. 156(3): 603-612.

Abstract: Human and wildlife are exposed at critical periods of development to endocrine disruptor chemicals (EDC) that may be responsible for reproductive disorders. To test the hypothesis that in ovum exposure to EDC at a critical period for gonadal organogenesis alters post-hatching folliculogenesis and steroidogenesis in *Caiman latirostris*, we studied the impact of in ovum exposure to 17 beta-estradiol (E2), bisphenol A (BPA), endosulfan (END) and atrazine (ATZ) on gonadal differentiation, follicular dynamics and circulating levels of steroid hormones in neonatal and juvenile caiman. Since *C. latirostris* is a species with temperature dependent sex determination, eggs were incubated at male (33ºC) or female (30ºC) producing temperatures and the effect of EDC was evaluated. Neonatal ovaries exhibited germ cells mainly located in clusters evidencing proliferative activity and type I to III follicles. Juvenile ovaries exhibited germ cells and advanced stages of pre-vitellogenic follicles. Prenatal exposure to the highest doses of E2 (1.4 ppm) or BPA (140 ppm) overrode male temperature effect on sex determination. Neonatal females produced by sex reversion lacked type III follicles, while females prenatally exposed to the lowest doses of E2 (0.014 ppm) and BPA (1.4 ppm) or ATZ (0.2 ppm) showed an increase in type III follicles. Juvenile caiman prenatally exposed to E2 or BPA showed an augmented incidence of multioocyte follicles. Neonatal female caiman exposed in ovum to E2 or BPA had higher estrogen serum levels whereas exposure to E2, BPA, ATZ and END decreased T levels. Present data demonstrates that exposure to EDC during gonadal organogenesis alters follicular dynamics and steroid levels later in life. These effects might have an impact on caiman fertility.

Doody, J.S., Green, B., Rhind, D., Castellano, C.M., Sims, R. and Robinson, T. (2009). Population-level declines in Australian predators caused by an invasive species. Animal Conservation 12: 46-53.

Abstract: The cane toad *Bufo marinus* has been migrating westward across northern Australia since its introduction as a biological control agent in 1935. It has been implicated in the widespread decline of many native frog-eating predators. To investigate the impacts of this invasive species on native predatory reptiles, annual surveys were conducted from 2001 to 2007 to document variation in the relative abundances of three varanid lizards (*Varanus mertensi*, *Varanus mitchelli* and *Varanus panoptes*) and one crocodile *Crocodylus johnstoni* species known to consume toads. In addition, the indirect effects of this variation on one agamid lizard *Amphibolurus gilberti*, a known prey item of *V. panoptes*, were also examined. Surveys were performed at two sites in northern Australia before and after the arrival of *B. marinus*. Significant declines in the relative abundances of all three species of varanid lizard were observed following toad arrival. Declines in the abundance of *V. panoptes*, *V. mitchelli* and *V. mertensi* at the two sites ranged 83-96, 71-97 and 87-93%, respectively. In contrast, *A. gilberti* increased by 23-26%; whereas there were no significant population-level declines in *C. johnstoni* despite observations of individual effects (i.e. several dead crocodiles with *B. marinus* in their stomachs). These findings suggest population-level changes in Australian lizards caused by an invasive species.

Campos, Z., Magnusson, W., Sanaiotti, T. and Coutinho, M. (2008). Reproductive trade-offs in *Caiman crocodilus crocodilus* and *Caiman crocodilus yacare*: implications for size-related management quotas. Herpetological Journal 18: 91-96.

Abstract: Management strategies for crocodilians often include size-selective quotas designed to protect breeding females. However, little is known about among- and within-population variation in size and fecundity in crocodilians. Life-history theory predicts trade-offs between clutch size and egg size. Larger females usually have larger clutch sizes, and if they also produce larger eggs their contribution to reproductive effort may be greater than the number of eggs they produce. We studied the relationships among female size and clutch characteristics for an Amazonian population of *Caiman crocodilus crocodilus* between 2001 and 2007, and a Pantanal population of *Caiman crocodilus yacare* in 1996. Females in the Amazonian population were smaller, and showed significant differences from the Pantanal population for some relationships. Eggs lost weight during incubation in the Amazonian population but not in the Pantanal population. Despite these differences, the effect of egg size accounted for about one quarter of the total effect of female mass on clutch mass in both populations. Size-selective quotas should take into account that large females produce both more and larger eggs than do small females. However, size distributions of breeding females vary greatly among populations and legal size limits will be more effective if based on data from local populations.

La Grange, L.J., Marucci, G. and Pozio, E. (2008). *Trichinella zimbabwensis* in wild Nile crocodiles (*Crocodylus niloticus*) of South Africa. Vet. Parasitol.

Abstract: Recent discovery of *Trichinella zimbabwensis* in crocodiles from Zimbabwe, Lake Cahora Basa, Mozambique, and from lake Abaja, Ethiopia, prompted strict control measures to curb the possible spread of the infection to humans and also to prevent its introduction to other countries, which were considered free of this pathogen. In 2006, the Chief Directorate Veterinary Services of Mpumalanga Province of South Africa launched a survey to investigate the status of wild and commercial breeding crocodiles in the province. To evaluate if *T. zimbabwensis* was circulating in the environments where crocodiles are living in South Africa, 9 fish, 36 reptiles (including 27 Nile crocodiles) and 4 mammals have been investigated to detect *Trichinella* sp. larvae in their muscles. In January 2008, a Nile crocodile from Komatipoort, sampled by means of a tail biopsy, tested positive for *Trichinella* larvae. In June-July 2008, *Trichinella* sp. larvae were also detected in four other Nile crocodiles from the Olifants River Gorge. The prevalence of *Trichinella* infection in the investigated wild Nile crocodiles from South Africa is 38.5%. The larvae were identified as belonging to *T. zimbabwensis* by multiplex-PCR. These are the first reports of *T. zimbabwensis* in South Africa and suggest that the distribution area of this parasite species is wider than that believed in the past.

Nevarez, J.G., Mitchell, M.A., Morgan, T., Roy, A. and Johnson, A. (2008). Association of West Nile virus with lymphohistiocytic proliferative cutaneous lesions in American alligators (*Alligator mississippiensis*) detected by RT-PCR. J. Zoo Wildl. Med. 39(4): 562-566.

Abstract: West Nile virus (WNV) is known to affect captive populations of alligators and, in some instances, cause significant mortalities. Alligators have been shown to amplify the virus, serve as a reservoir host, and even represent a source of infection for humans. This study describes a cutaneous manifestation of WNV in captive-reared American alligators (*Alligator mississippiensis*), previously described as lymphohistiocytic proliferative syndrome of alligators (LPSA), based on the findings of gross examination, histopathologic evaluation, WNV antibody testing, and WNV reverse transcriptase polymerase chain reaction (RT-PCR). Forty alligators with LPSA and 41 controls were examined. There was a significant difference (P = 0.01(-21)) in the WNV serostatus between the treatment group (100%) and the control group (0%, 95% CI: 0-7.3%). In the treatment group, 97.5% (39/40) (95% CI: 92.7-102.3%) of the LPSA skin lesions were positive for WNV via RT-PCR. Of the skin sections within the treatment group that had no LPSA lesions, 7.5% (3/40) (95% CI: 0-15.7%) were positive for WNV. In the control group, all of the skin samples were negative for WNV (41/41) (0%; 95% CI: 0-7.3%). The LPSA skin lesions were significantly more likely to be WNV positive by RT-PCR when compared to control animals (P = 0.07(-20)) and normal skin sections from affected animals (P = 0.08(-16)). There was no significant difference in the WNV RT-PCR results between control animals and normal skin sections from affected animals (P = 0.24). These findings suggest that LPSA is a cutaneous manifestation of WNV in alligators.

Gallegos, A., Plummer, T., Uminsky, D., Vega, C., Wickman, C. and Zawoiski, M. (2008). A mathematical model of a crocodilian population using delay-differential equations. Journal of Mathematical Biology 57: 737-754.

The crocodilia have multiple interesting characteristics that affect their population dynamics. They are among several reptile species which exhibit temperature-dependent sex determination (TSD) in which the temperature of egg incubation determines the sex of the hatchlings. Their life parameters, specifically birth and death rates, exhibit strong age-dependence. We develop delay-differential equation (DDE) models describing the evolution of a crocodilian population. In using the delay formulation, we are able to account for both the TSD and the age-dependence of the life parameters while maintaining some analytical tractability. In our single-delay model we also find an equilibrium point and prove its local asymptotic stability. We numerically solve the different models and investigate the effects of multiple delays on the age structure of the population as well as the sex ratio of the population. For all models we obtain very strong agreement with the age structure of crocodilian population data as reported in Smith and Webb (Aust. Wild. Res. 12, 541-554, 1985). We also obtain reasonable values for the sex ratio of the simulated population.

Viola, L.B., Almeida, R.S., Ferreira, R.C., Campaner, M., Takata, C.S., Rodrigues, A.C., Paiva, F., Camargo, E.P. and Teixeira, M.M. (2008). Evolutionary history of trypanosomes

from South American caiman (*Caiman yacare*) and African crocodiles inferred by phylogenetic analyses using SSU rDNA and gGAPDH genes. Parasitology 4: 1-11.

Abstract: In this study, using a combined data set of SSU rDNA and gGAPDH gene sequences, we provide phylogenetic evidence that supports clustering of crocodilian trypanosomes from the Brazilian *Caiman yacare* (Alligatoridae) and *Trypanosoma grayi*, a species that circulates between African crocodiles (Crocodilydae) and tsetse flies. In a survey of trypanosomes in *Caiman yacare* from the Brazilian Pantanal, the prevalence of trypanosome infection was 35% as determined by microhaematocrit and haemoculture, and 9 cultures were obtained. The morphology of trypomastigotes from caiman blood and tissue imprints was compared with those described for other crocodilian trypanosomes. Differences in morphology and growth behaviour of caiman trypanosomes were corroborated by molecular polymorphism that revealed 2 genotypes. Eight isolates were ascribed to genotype Cay01 and 1 to genotype Cay02. Phylogenetic inferences based on concatenated SSU rDNA and gGAPDH sequences showed that caiman isolates are closely related to *T. grayi*, constituting a well-supported monophyletic assemblage (clade *T. grayi*). Divergence time estimates based on clade composition, and biogeographical and geological events were used to discuss the relationships between the evolutionary histories of crocodilian trypanosomes and their hosts.

Dalla Valle, L., Nardi, A., Toni, M., Emera, D. and Alibardi, L. (2009). Beta-keratins of turtle shell are glycine-proline-tyrosine rich proteins similar to those of crocodilians and birds. J. Anat. 214(2): 284-300.

Abstract: This study presents, for the first time, sequences of five beta-keratin cDNAs from turtle epidermis obtained by means of 5'- and 3'-rapid amplification of cDNA ends (RACE) analyses. The deduced amino acid sequences correspond to distinct glycine-proline-serine-tyrosine rich proteins containing 122-174 amino acids. *In situ* hybridization shows that beta-keratin mRNAs are expressed in cells of the differentiating beta-layers of the shell scutes. Southern blotting analysis reveals that turtle beta-keratins belong to a well-conserved multigene family. This result was confirmed by the amplification and sequencing of 13 genomic fragments corresponding to beta-keratin genes. Like snake, crocodile and avian beta-keratin genes, turtle beta-keratins contain an intron that interrupts the 5'-untranslated region. The length of the intron is variable, ranging from 0.35 to 1.00 kb. One of the sequences obtained from genomic amplifications corresponds to one of the five sequences obtained from cDNA cloning; thus, sequences of a total of 17 turtle beta-keratins were determined in the present study. The predicted molecular weight of the 17 different deduced proteins range from 11.9 to 17.0 kDa with a predicted isoelectric point of 6.8-8.4; therefore, they are neutral to basic proteins. A central region rich in proline and with beta-strand conformation shows high conservation with other reptilian and avian beta-keratins, and it is likely involved in their polymerization. Glycine repeat regions, often containing tyrosine, are localized toward the C-terminus. Phylogenetic analysis shows that turtle beta-keratins are more similar to crocodilian and avian beta-keratins than to those of lizards and snakes.

Bagwill A., Sever, D.M., Elsey, R.M. (2009). Seasonal variation of the oviduct of the American alligator, *Alligator mississippiensis* (Reptilia: Crocodylia). J. Morphol.

Abstract: The annual oviductal cycle of the American alligator, *Alligator mississippiensis*, is described using light and electron microscopy. Previous work done by Palmer and Guillette (1992; Biol. Reprod. 46: 39-47) shed some light on the reproductive morphology of the female alligator oviduct; however, their study was limited and did not report details relating to variation across the reproductive season. We recognize six variable regions of the oviduct: infundibulum, tube, isthmus, anterior uterus, posterior uterus, and vagina. Each area shows variation, to some degree, in the histochemistry and ultrastructure of oviductal secretions. Peak secretory activity occurs during the months of May and June, with the greatest variation occurring in the tube and anterior uterus. During the month of May, high densities of neutral carbohydrates and proteins are found within the tubal and anterior uterine glands. The epithelium of the entire oviduct secretes neutral carbohydrates throughout the year, but many regions lack protein secretions, and the posterior uterine glands show little secretory activity of any type throughout the year. After oviposition, secretory activity decreases drastically, andthe oviduct resembles that of the premating season. This study also provides evidence to support the homology between alligator and bird oviducts. Sperm were observed in glands at the tubal-isthmus and utero-vaginal junctions in preovulatory, postovulatory and postovipository females.

Zheng, J., Hu, N., Zhu, M., Nu, Y. and Liu, Z. (2009). Isolation and expression of a novel alligator gene belonging to the Sox gene family. Biochem. Genet.

Abstract: Sox genes share a highly conserved DNA-binding motif, the HMG (high mobility group)-box domain, and have diverse roles in vertebrate embryonic development. A novel SRY-related cDNA (temporarily called Sox33) isolated from the Chinese alligator (*Alligator sinensis*) is 1,819 bp in length, with an open reading frame from 220 to 1113 bp, encoding a protein of 298 amino acids. Two putative polyadenylation signal sequences (AATAAA) are present upstream of the poly(A) tail in the 3' UTR (at 1255-1260 and 1774-1779). The putative protein contains an HMG-box domain most closely related to hSox12, mSox4, rtSox11, and mSox11 homologs, indicating that alligator Sox33 belongs to group C in the Sox gene family. Alligator adult and developing tissues were tested for Sox33 mRNA by independent Northern blots using a 336-bp probe (at 907-1243) between the HMG-box and the poly(A) site I and a 277-bp probe (at 1477-1754) between the two polyadenylation sites. Two transcripts (1.3 kb and 1.8 kb) in developing brain and one (1.8 kb) in adult brain were identified by the 336-bp probe; only one transcript (1.8 kb) in developing and adult brains was detected by the 277-bp probe. The results suggest that alligator Sox33 may use a different polyadenylation mechanism in the developing

brain and play a role in the development and maintenance of the nervous system.
Pritz, M.B. and Ruan, Y.W. (2009). PAX6 Immunoreactivity in the diencephalon and midbrain of alligator during early development. Brain Behav. Evol. 7391): 1-15.

Abstract: PAX6 expression was examined during early development of the diencephalon and midbrain of *Alligator* using an immunocytochemical methodology. These observations focused on the basal plate to determine whether diencephalic prosomere organization in this region followed a pattern previously identified for alar plate areas. PAX6 expression was also described in alar diencephalic regions and the adjacent midbrain. PAX6 (+) cells in the basal plate were first seen in prosomere 1 at stage 7, in the midbrain at stage 10, and lastly in prosomeres 2 and 3 at stage 11. By stage 12, a nearly continuous column of PAX6 (+) cells extended from the midbrain basal plate through the entire diencephalon. In the diencephalon, PAX6 (+) cells in the basal plate were of greatest number in prosomere 1, least in prosomere 2, and intermediate in prosomere 3. This pattern of PAX6 expression distinguished these individual basal plate prosomeres. These results indicate that basal plate prosomeres follow a pattern similar to alar plate prosomereric organization during the later stages of early diencephalon development. Over a comparable time period of early diencephalon development, similar observations have been made in chick basal plate. In *Alligator* and chick, PAX6 expression in the basal plate is similar in the midbrain and prosomere 1 but different in prosomeres 2 and 3: present in *Alligator* and absent in chick. In alar plate areas of the *Alligator* diencephalon, PAX6 expression follows a similar pattern to that described for chick and mouse. These similarities in PAX6 expression in alar diencephalic prosomeres suggest that this is a common feature of amniotes. Differential PAX6 expression in alar prosomere 1 and the midbrain in *Alligator* is similar to that described for a wide range of species which suggests that these features are common to all vertebrates.

Junker, K., Brooks, D.R. and Boomker, J. (2008). P*roctocaecum gairhei* n. sp. (Digenea: Cryptogonimidae: Acanthostominae) from *Gavialis gangeticus* (Gmelin) in Nepal and a revised cladogram of *Proctocaecum* Baugh, 1957. Syst. Parasitol. 71(3): 229-236.

Proctocaecum gairhei n. sp. is described from the gharial *Gavialis gangeticus* (Gmelin) in Nepal. The new taxon can be distinguished from all other species of *Proctocaecum* Baugh, 1957 by the combination of the following morphological characters: a single row of 23 cephalic spines, lateral anal pores opening at uneven levels, a forebody accounting for 16% of the total body length (TBL), an oral to ventral sucker width ratio of 1:0.7, an oral sucker to pharynx width ratio of 1:0.6 and uterine loops that occupy 59-67% of the TBL. While sharing some morphological characteristics with *Acanthostomum slusarskii* Kalyankar, 1977 from *Crocodylus palustris* (Lesson) in India, *P. gairhei* n. sp. is distinguished from the latter by possessing the solid muscular gonotyl diagnostic for *Proctocaecum*, by the number of cephalic spines, position of the anal pores and egg size. The existing cladogram for *Proctocaecum* was expanded using the character information of *P. gairhei* n. sp. The host range of *Proctocaecum* is now known to include all three families of the order Crocodylia.

Kundrát, M., Janáãek, J. and Martin, S. (2009). Development of transient head cavities during early organogenesis of the Nile Crocodile (*Crocodylus niloticus*). J. Morphol.

Abstract: Three consecutive pairs of head cavities (premandibular, mandibular, and hyoid) found in elasmobranchs have been considered as remnants of preotic 'head' somites-serial homologues of the myotomic compartments of trunk somites that give rise to the extraoccular musculature. Here, we study a more derived vertebrate, and show that cavitation is more complex in the head of *Crocodylus niloticus*, than just the occurrence of three pairs of cavities. Apart from the premandibular cavities, paired satellite microcavities, and unpaired extrapremandibular microcavities are recognized in the prechordal region as well. We observed that several developmental phenomena occur at the same time as the formation of the head cavities (premandibular, satellite, extrapremandibular, mandibular, and hyoid) appear temporarily in the crocodile embryo. These are 1) rapid growth of the optic stalk and inflation of the optic vesicle; 2) release of the intimate topographical relationships between the neural tube, notochord and oral gut; 3) tendency of the prechordal mesenchyme to follow the curvature of the forebrain; and 4) proliferation of the prechordal mesenchyme. On the basis of volumetric characters, only the hyoid cavity and hyoid condensation is comparable to the trunk somitocoel and somite, respectively. J. Morphol.

Ye, C., Wu, X., Yan, P. and Amato, G. (2009). Beta-keratins in crocodiles reveal amino acid homology with avian keratins. Mol. Biol. Rep.

Abstract: The DNA sequences encoding beta-keratin have been obtained from Marsh Mugger (*Crocodylus palustris*) and Orinoco Crocodiles (*Crocodylus intermedius*). Through the deduced amino acid sequence, these proteins are rich in glycine, proline and serine. The central region of the proteins are composed of two beta-folded regions and show a high degree of identity with beta-keratins of aves and squamates. This central part is thought to be the site of polymerization to build the framework of beta-keratin filaments. It is believed that the beta-keratins in reptiles and birds share a common ancestry. Near the C-terminal, these beta-keratins contain a peptide rich in glycine-X and glycine-X-X, and the distinctive feature of the region is some 12-amino acid repeats, which are similar to the 13-amino acid repeats in chick scale keratin but absent from avian feather keratin. From our phylogenetic analysis, the beta-keratins in crocodile have a closer relationship with avian keratins than the other keratins in reptiles.

Waddle, A.R., Kinsella, J.M., Ross, J.P., Rojas-Flores, E., Percival, H.F. and Forrester, D.J. (2009). Nematodes collected

by gastric lavage from live American alligators, *Alligator mississippiensis*, in Florida. J. Parasitol.

Abstract: Nematodes were collected from 151 live American alligators, *Alligator mississippiensis*, from 3 lakes (Apopka, Griffin, and Woodruff) in north-central Florida using a gastric lavage technique. Four species were identified: *Dujardinascaris waltoni*, *Ortleppascaris antipini*, *Brevimulticaecum tenuicolle*, and larvae of *Contracaecum* sp. Of these, *D. waltoni* was the most prevalent species in all 3 lakes and was more prevalent in Lake Apopka than the other 2 lakes. This is the first record of larvae of a *Contracaecum* sp. in the American alligator and the second record of *O. antipini* in the American alligator.

Zhang, F., Li, Y., Guo, Z. and Murray, B.R. (2009). Climate warming and reproduction in Chinese alligators. Animal Conservation 12: 128–137.

Abstract: The Chinese alligator *Alligator sinensis* is a critically endangered species endemic in the world. Like many other reptiles, important aspects of alligator biology such as foraging, timing of hibernation, breeding and the sex ratio of offspring are all affected by temperature variation. We examined the effects of long-term temperature change on oviposition dates and clutch sizes of the Chinese alligator in a semi-natural facility in southern China. Our study focused on two captive generations including an old breeding generation captured from the wild and a generation composed of their F1 offspring. Median oviposition date shifted to earlier in the year and mean clutch size was larger for both generations as the monthly mean air temperature in April increased over the 19 years of data collection. We observed a mean advance in oviposition date of 10 days for the old breeding generation from 1987 to 2005 and 8 days for both generations from 1991 to 2005. Correspondingly, clutch sizes for the two generations also increased during this period. There were no differences in median oviposition dates and clutch sizes between the two generations from 1991 to 2005. Our results suggest that Chinese alligators have responded to increasing global temperatures. Our findings also suggest that recent increasing global temperatures have the potential to have a substantial effect on Chinese alligator populations in the wild, thus prompting an urgent need for field monitoring of the effects of global warming on this endangered alligator species.

Jensch, B., Baur, M., Brandstätter, F., Friz, T., Schmidt, F., Kölpin, T., Voigt, K. and Sommerlad, R. (2009). Mindestanforderungen an die artgerechte Haltung von Krokodilen in privaten Terrarien und zoologischen Einrichtungen. Der Zooloogische Garten N.F. (in press).

[English: Minimum Requirements for the Appropriate Husbandry of Crocodilians in Private Holdings and Zoological Institutions]

Summary: The minimum requirements for the keeping of crocodiles in private and public institutions are set up by a collective of authors. Important aspects such as the design of enclosures, secure handling and keeping, thermoregulation, protection of animals, feeding, behavioural enrichment and diseases and their prophylaxis are important topics. The authors critically deal with existing guidelines and give suggestions on how crocodiles can be kept appropriately and according to existing laws at the same time. Special attention is given to the aspects of current legislation. It is stressed that there should be given proper attention to the qualification of the keeping institution as to the biology of the animals aswell as to security aspects. A table of species completes the text with a short array of important features to be considered in the keeping of crocodiles.

AZA Crocodilian Advisory Group Education and Fundraising Report

The Education and Fundraising committees of the Association of Zoos and Aquarium's (AZA) Crocodilian Advisory Group (CAG) have been working hard to attend community events to promote educational awareness and raise funds for crocodilian conservation. In the past three years, these events have included:

2006: "Croctober" at The Philadelphia Zoo consisted of month-long crocodilian activities for patrons. The CAG attended a "Members Day" where Mei Len Sanchez-Barr, Meredith Whitney (The Maryland Zoo) and the Philadelphia Zoo's own Steve Binning, Greg O'Neill and education staff, interacted with patrons through activities, bio-facts, and a close encounter with a juvenile alligator. The event raised over $600.

2007 and 2008: North Carolina Aquarium on Roanoke Island hosted an annual "Reptile week". The week consisted of activities, bio-facts, arts and crafts and live animal encounters and a CAG table. Presentations were made by Bruce Shwedick (Crocodile Conservation Services). Lori Watkins led the event and raised over $1100.

2007: "Croc Week " at The Maryland Zoo. On 16-21 July the Maryland Zoo hosted "Croc Week", coordinated by Mei Len Sanchez-Barr and Meredith Whitney (Fig. 1). The week was filled with educational activities, animal encounters, training demonstrations and croc expert presentations. The week ended with a Gala fundraiser evening featuring Dr. Brady Barr (National Geographic TV) as guest speaker. Expert presentations were provided by Bruce Shwedick, Flavio Morrissiey and Mei Len Sanchez-Barr, ending with Chinese alligator interactions/photos.

The crocodile exhibit area had Aquarium on Wheels (AOW) students from National Aquarium in Baltimore along with CAG members and zoo staff all week to help with the CAG booth, activities, bio-facts, arts and crafts, face-painting, and raffle ticket sales to win an American Crocodile skull casting. Demonstrations of behavioral training sessions with an African Slender-snouted crocodile were presented by Meredith Whitney and other zoo staff.

Figure 1. Mei Len Sanchez-Barr and Aquarium on Wheels Students at The Maryland Zoo "Croc Week".

"Crocs' Galore First Annual Gala Fundraiser" at The Maryland Zoo's Mansion House, 21 July. Dr. Brady Barr was the featured guest speaker. Guests enjoyed food and drinks along with a live auction and silent auction table with impressive donated items such as crocodilian artefacts, professional and artistic crocodile photos and art, National Geographic merchandise, behind the scenes tour of Smithsonian Networks taping and premier event, and other donations. About 100 adults and children attended the event and were entertained by arts and crafts, croc trivia scavenger hunt, face painting, live Chinese alligator encounter (Fig. 2), and a CAG table with bio-facts.

Special thanks to The Maryland Zoo for hosting the event, as well as to all our sponsors and donors. The week wouldn't have been possible without the help from Maryland Zoo staff specially Meredith Whitney and volunteers, National Aquarium in Baltimore Aquarium on Wheels students, Lonnie MC Gaskill (Disney's Animal Kingdon), Bruce Shwedick, Michael Shwedick, Flavio Morrissiey (Alligator Adventure), John Brueggen (CAG Secretary), Dr. Brady Barr, and Dr. Kent Vliet (CAG Chair). Overall, the evening was a great success and raised over $3500.

2008: "Herp Day" at North Carolina Museum of Natural Sciences. With visitor expectations of 12,000-15,000 in one day, the CAG participated in a booth along with a myriad of other herp-related booths that included live animals, information, activities, and artifacts (Fig. 3). The day also included featured guest speaker National Geographic's Dr. Brady Barr. North Carolina Aquarium, National Aquarium in Baltimore, and North Carolina Zoo employees and volunteers staffed the booth and raised over $350.

Croctober Halloween Event at North Carolina Museum of Natural Sciences. With crocodilians as the focus of this event, the CAG was the featured guest. Ken Alfieri of Alligator Adventure presented live animal shows throughout the day. Activities and presentations included crocodilian crafts for the kids, face painting, a crocodilian biofact table, live crocodilians, a raffle, "Crocodilian Conservation" slide show by John Groves (North Carolina Zoo) and a photo opportunity with an albino alligator with John Brueggen of the St. Augustine Alligator Farm Zoological Park. Staff and volunteers from the North Carolina Aquarium on Roanoke Island, North Carolina Zoo, Alligator Adventure, North Carolina Museum of Natural Sciences and the St. Augustine Alligator Farm made this event possible, attracting over 3500 visitors and raising more than $1200.

Figure 2. The Maryland Zoo fundraiser.

Figure 3. Lori Watkins and Bruce Shwedick at North Carolina Aquarium "Herp Day".

All proceeds collected at these events are deposited in the CAG's John Behler Crocodilian Conservation Fund maintained at the Toledo Zoo and are used by the CAG to help fund crocodilian conservation projects.

WANTED: Any institutions that are willing to host an educational/fundraising event and/or to make a donation (either monetary or for an auction) - please contact Lori Watkins (lori.watkins@ncmail.net).

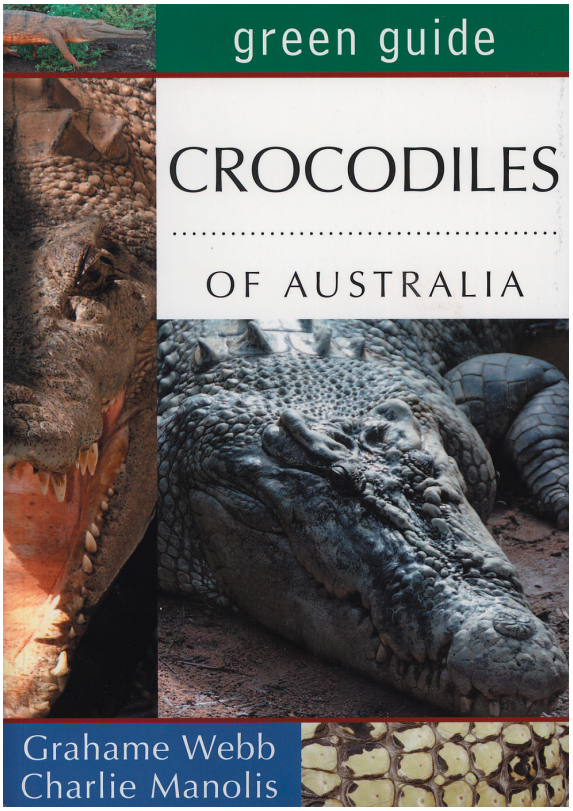
Mei Len Sanchez- Barr *(National Aquarium in Baltimore and CAG Education Liaison, meilens@aol.com)* and Lori Watkins *(North Carolina Aquarium on Roanoke Island and CAG Fundraising Chair).*

Tomistomine Fossil in China

In October 2008 I saw a fossil Tomistomine skull and dinosaur nest with eggs on display in a shop in Kunming, the capital of Yunnan Province, China. The Tomistomine skull was ~45 cm long, and the manager said it was purchased from Guangdong Province. The sale price was around $US680. The dinosaur nest, which was in good condition and rather amazing, was not for sale.

Mark Bezuijen, <*bezuijen@dodo.com.au*>.

Green Guide - Crocodiles of Australia

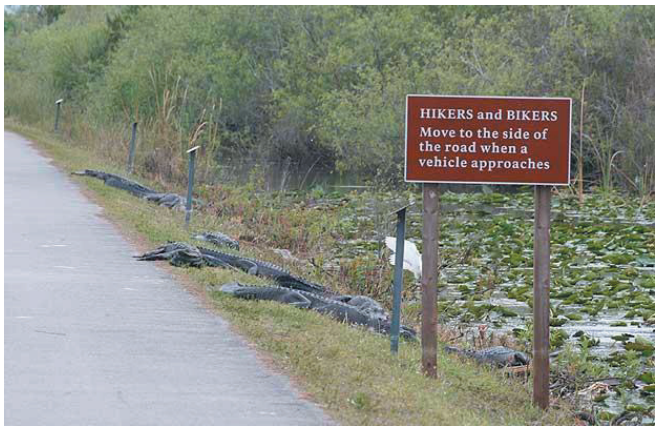


The latest addition to the Green Guide series is "Crocodiles of Australia" by Grahame Webb and Charlie Manolis. The culmination of over 30 years of experience, the book presents information on the biology and management of Australian crocodiles in simple text and loads of images. The Green Guide series includes Mammals, Snakes & Other Reptiles, Spiders and Sharks & Rays.

The CSG has secured copies of the Green Guide to Crocodiles of Australia, and these are available to CSG members and associates outside Australia for $AUD30 (includes postage and handling) (approximately $US20 or 15 euros).

Please contact Tom Dacey (csg@wmi.com.au) for details and order forms.

Who Says Florida Alligators Can't Read!



Steering Committee of the Crocodile Specialist Group

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