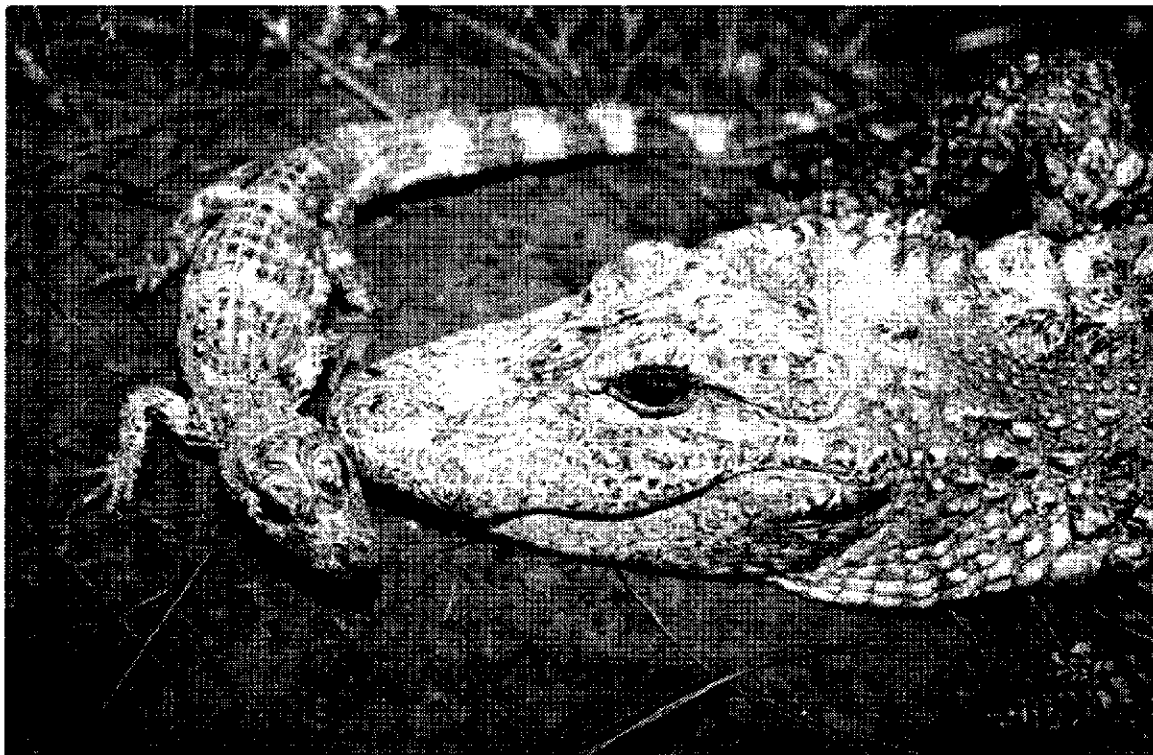


CROCODILE SPECIALIST GROUP

NEWSLETTER

VOLUME 20 No. 3 ■ JULY 2001 – SEPTEMBER 2001



IUCN - World Conservation Union ■ Species Survival Commission

CROCODILE SPECIALIST GROUP --- NEWSLETTER

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IUCN•The World Conservation Union
Species Survival Commission

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COVER PHOTO. Chinese alligator, *Alligator sinensis*, adult and juvenile, Anhui Breeding Center, P.R. China. G. Webb photo.

The CSG NEWSLETTER is produced and distributed by the Crocodile Specialist Group of the Species Survival Commission, IUCN – The 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

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Editorial

CHAIRMAN'S REPORT ON CHINA MEETINGS. The following is the letter sent by the CSG Chairman to the Director General of IUCN:

Dr. Achim Steiner, Director General IUCN
Dear Dr. Steiner:

In September, the Crocodile Specialist Group attended a series of workshops in China to address the conservation of the critically endangered Chinese alligator (*Alligator sinensis*).

You will recall that your predecessor initiated official high-level contact with the Chinese State Forestry Administration on this issue in April 2000 following our request for IUCN's support for this critical conservation issue. This contact resulted in very cooperative exchanges between the Chinese authorities and our SSC Specialist Group and resulted in the approval of a Chinese resolution at the World Conservation Congress in Amman. That resolution called for increased cooperation and interaction between international conservation interests and Chinese interests for conservation of the Chinese alligator.

The workshops held during September were a direct outcome of these contacts and I am pleased to report back to you on the very positive results reported to us there. Funding for the workshops was raised from several international bodies totaling US \$47,000 and the State Forestry Administration (SFA) of China provided an approximately equivalent amount in in-kind and organizational resources. We have therefore established a pattern of co-equal fiscal responsibility for this conservation program as envisaged in the resolution.

CSG members joined many Chinese colleagues in the inspection of ten potential alligator reintroduction sites and assisted in the technical evaluation of a draft Chinese Plan for the Conservation and Reintroduction of Chinese Alligators into the Wild. The participation of the

national authority (SFA) three provincial wildlife agencies, the municipality of Shanghai, the Chinese CITES Management Authority, The China Wildlife Conservation Association and Chinese private sector interests is compelling evidence of the very serious commitment to conservation action in China that has followed IUCN's intervention. We were informed that China now considers the alligator a national wildlife treasure on a par with the panda and Pere David's deer. The first pilot reintroduction of captive bred alligators into restored and protected natural habitat is planned for early next year.

At the final workshop, 98 participants, including 35 overseas CSG members, further discussed the plan and strongly congratulated the Chinese for their extensive and well directed efforts. Significant advances were also made in establishing the concept that commercial use of crocodylians in China must be structured in a way to support conservation both of the endemic alligator and of species occurring outside China that may be impacted by trade. A full Proceedings of these workshops is in preparation.

I feel that this represents very significant progress from the situation of just a year or two ago. Of course, this process has only just begun and we anticipate at least a decade of activity before the Chinese alligator might be considered secure. However, we have clearly catalyzed the initiation of a process in China that has excellent potential for success. At the request of our Chinese colleagues we will continue to place the expertise of CSG members and all of our international support and advice at their disposal. There remains a need for long term and significant funding to ensure the project's continuity. While our Chinese colleagues indicated their national commitment to significant funding, the responsibility for the international community to assist them, as declared in the Amman resolution, remains an important, and as yet unrealized need.

I would like to thank IUCN, and particularly SSC coordinator Dr. Sue Mainka, your predecessor and your self for the most important support that opened the door through which we are now operating. I look forward to reporting to you additional concrete success in the future. It would be entirely appropriate if you would reinforce this excellent progress on implementing the resolution by direct contact again to SFA (Administrator, Mr. Wang Zhibao)

congratulating them on current activities and plans. I must also acknowledge the very significant support of IUCN member the Wildlife Conservation Society which is our significant partner in this endeavor.

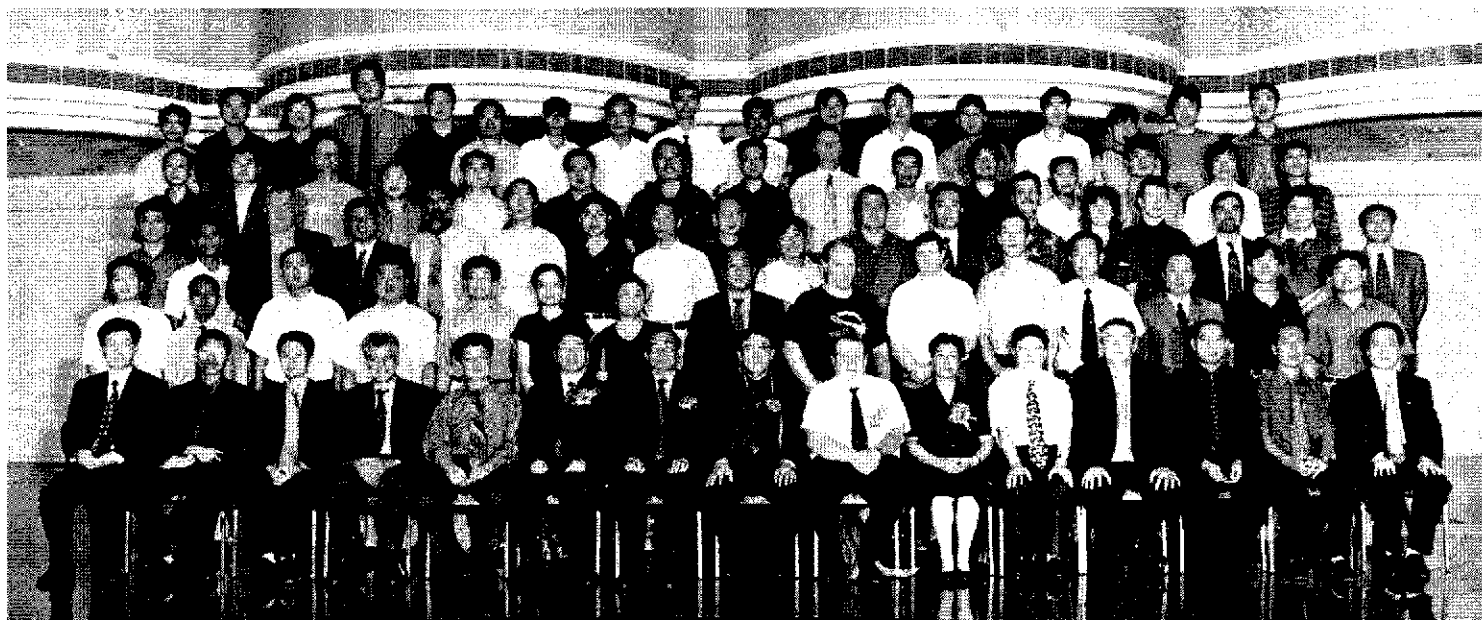
IUCN can look on this as a significant conservation success and we are coordinating with the IUCN and SSC public relations arm to properly publicize these events. A critically endangered endemic species was identified to be in crisis and prompt action at many levels now seems almost assured to arrest that process and restore the species in the wild. Combined efforts of the IUCN family, the Crocodile Specialist Group as SSC's technical arm, partner NGO's and national and local authorities in China are now addressing the issue in a serious and effective manner. We are often in need of good news in conservation, and while it is premature to claim success, I think we can legitimately claim together to have turned the tide on this one.

Sincerely,
Professor Harry Messel
Chairman Crocodile Specialist Group

Steering Committee

CROCODILE SPECIALIST GROUP, STEERING COMMITTEE MEETING, 30 AUGUST 2001, GUANGZHOU, CHINA. Present: H. Messel (Chairman), P. Ross, D. Jelden, G. Webb, J. Thornbjarnarson, A. Larrierra, H. Jenkins. Observers: T. Dacey, C. Manolis, A. Matsuda, S. Platt. The meeting opened at 6.40 p.m. and short agenda of items proposed and accepted.

Finance report. Revenues to 30 June 2001, totaled \$60,486 of which \$20,000 was special project funding received for the global economics trade study. Expenditures in the same period totaled \$52,818 of which \$15,000 was for the trade study. In period 1 July - 30 September an additional \$32,577 of revenues received. This has enabled funds to support the Executive Officer position through June 2002 to be advanced to the University of Florida and sufficient reserves remain to cover anticipated expenses for the forthcoming year. Thus, for the first time, the CSG is able to solicit funds for future years, rather than a short term hand-to-mouth raising and spending of funds. After questions on minor aspects of the report, it was accepted.



Participants at the International Workshop on Captive Breeding and Commerce Management in Crocodylia and Regional Meeting of the Crocodile Specialist Group, Guangzhou.

Program for the Regional Meeting. A draft program for the meeting August 30 - September 3 was presented and modifications agreed with the Chinese organizing committee earlier in the day explained. The funding of Hefei and Guangzhou workshops from several sources (WCS \$20,000, WWF-China \$10,000, CSG Chinese Alligator Fund \$8,000 and China - Australia Council \$5,000) was reported and the distribution of funding for the two workshops discussed. The requirements for accountability to donors and the need to apply funds directly to Chinese alligator conservation were discussed. Each donor will pursue its own accountability needs directly with the organizers. The need to provide appropriate reports from the two workshops and proceedings of results in both Chinese and English was noted and detailed discussions with the organizers on this point recommended.

A summary report of the Hefei workshop was presented by Dietrich Jelden (see page 51 below) and the overall tremendous advances and success of Chinese efforts for conservation of Chinese alligator noted. The successful strategy of careful encouragement to Chinese authorities, multiple contacts at all levels, was resulting in the development of continuing relationships of trust and cooperation. Of particular importance is the coordination of several provincial efforts under the direction of the central authority within China and the development of successful

partnerships of overseas supporters. The framework for preventing extinction of the Chinese alligator in the wild appears firmly established. A draft action plan for Chinese alligator conservation will provide guidelines for provincial and central government actions in the short and medium term.

CSG Task Force on Market Driven Conservation. D. Jelden presented a summary report of accomplishments of this program since its inception in 1998.

- A case study presenting conservation incentives of crocodylian sustainable use was complete and presented to OECD.
- The global economic study of crocodylian skin trade by consultant James McGregor under the direction of Jon Hutton had submitted a first draft report that was undergoing internal review. Completion is expected by December this year.
- A more rigorous examination of CITES report data and infractions had been developed by Don Ashley in conjunction with World Conservation Trade Monitoring Center and included in the current International Alligator and Crocodile Trade Study covering the period up to 1998.
- A draft resolution for CITES on personal exemptions for legally produced crocodylian products had been prepared and discussed. Discussions were presently underway to recruit CITES parties to sponsor the draft

and introduction to the next CITES CoP (November 2002) under multiple sponsorship was anticipated.

Two proposed actions, development of certification of legal products ('Green labeling') and CSG promotion of legal trade had received no action. Dietrich proposed that a final report of the task force would be prepared and submitted at the end of the year after which the task force could be dissolved.

Paraguay yacare harvest. Alejandro Larriera briefed the meeting on recent events and media reports of yacare harvest in the Pilcomayo region of Paraguay. The great complexity and conflicting reports on this situation were presented and discussed. Obdulio Menghi later provided additional detail and reported that following several interventions of the CSG and his organization, the Minister of Environment had requested CSG Steering Committee member Lucy Aquino to visit the Pilcomayo region and evaluate the situation. It was concluded that the invitation of the Paraguay CITES Authority for CSG to conduct a fact-finding mission should be accepted. Alejandro Larriera and an appropriate other CSG representative were proposed to undertake this mission and invite the Paraguay authority to provide necessary funding.

Cambodia. Continued collection of wild crocodiles (*C. siamensis*) to stock farms in Cambodia was reported by J. Thorbjarnarson and S. Platt based on their recent field inspections. The history, background and nature of this trade were summarized. After discussion it was concluded that this trade represents a current threat to the depleted populations of this critically endangered species and constituted a clear violation of the intent and spirit of the CITES farm registration process under which six Cambodian captive breeding facilities operate. It was decided that CSG would alert the Cambodian authorities to our concerns, with copies to CITES Secretariat. John Thorbjarnarson and Perran Ross were asked to draft a letter.

The short agenda of this ad-hoc meeting being complete, the meeting closed at 8.20 p.m.

On Saturday, 1 September, the Steering Committee reconvened in a public session held in conjunction with the CSG Regional Meeting. The same steering committee members and numerous observers were present. The meeting opened at 14.10 p.m. Minutes from the previous session were read and accepted.

Paraguay. Obdulio Menghi advised the meeting that CSG Steering Committee Member Lucy Aquino had been contacted by the Paraguay Minister of Environment and requested to inspect the Pilcomayo region and report on the situation. Lucy is in the field on this mission. We noted that this issue had little conservation consequence, but provides a platform to encourage Paraguay to restore effective implementation of CITES control of caiman skins. CSG will defer action until her report is received.

Cambodia. A draft letter was presented and approved.

Funding. The Executive officer announced that he had received a request from the Chinese meeting hosts for a special grant of \$4,000 to support production and distribution of the meeting Proceedings and this would be forwarded to AZA in USA for consideration.

Steering Committee Meeting. The Chairman announced that after discussion with members, he wished to hold steering committee meetings at least once a year, electronic communication having proved not completely effective for the discussion of complex issues. He stated that "The steering committee must meet in order to steer." A steering committee meeting place and venue in the first half of next year will be announced.

NEW BUSINESS

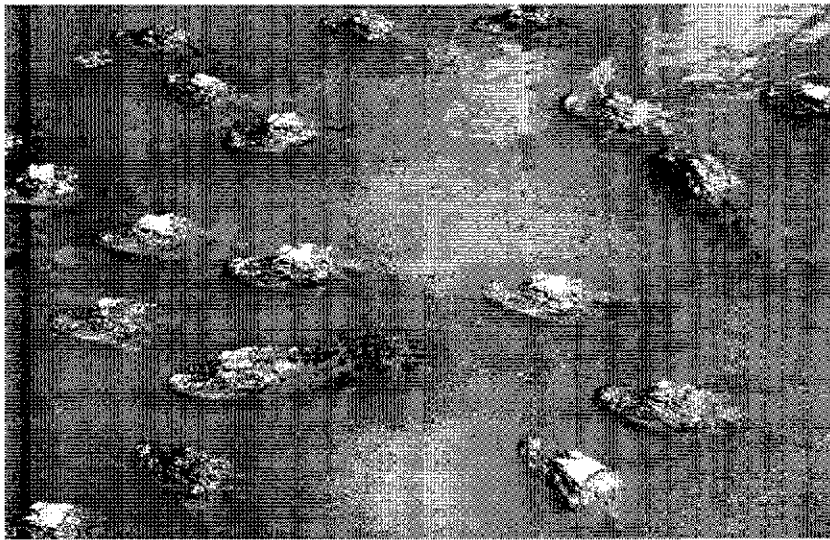
Philippine crocodile. Updated information on current activities in the Philippines was presented at the regional meeting. While the formation of a national task force, development of a national management plan, and discovery of new populations were encouraging, the species remained critically endangered. Known wild populations are very small, highly fragmented and still subject to constant attrition by people. The long-term commitment of CSG to conserving this species and the cooperative efforts of JICA, CFI and Philippine government were noted.

The excellent efforts of Chris Banks and Melbourne Zoo in developing the Action Plan were congratulated and a letter of thanks will be sent to Chris. However, implementation of the plan was seen to be impeded by internal political and personality problems in the Philippines. The situation is perceived to be at least as grave as the former concern about the Chinese alligator, but in China the government was acting decisively in response to the problem. Detailed

discussion followed on possible role of the CSG to promote implementation of the action plan and cooperation and coordination between research groups. CSG's role could be to assist the national recovery team develop specific actions and timetables to implement the plan.

Mr. Takehara of Japan Reptile Association will lead a mission to the Philippines to discuss marketing of *C. porosus* skins produced by licensed growout facilities of hatchling *porosus* provided by CFI (now PWRCC). He agreed to raise the *mindorensis* problems at that meeting. CSG will send a letter of congratulations to the PAWB and offer its assistance on implementing the plan.

Chinese Alligator. Professor Messel formally and for the record, thanked the Chinese authorities for their efforts in initiating conservation action for the Chinese alligator. He also thanked the organizers and sponsors for making this regional meeting possible. He additionally expressed thanks to Grahame Webb for his great efforts in the issue and to John Thorbjarnarson and WCS for their invaluable support.



The Anhui Centre for Chinese Alligator Reproduction and Research currently holds around 10,000 Chinese Alligators. G. Webb Photo.

Hank Jenkins inquired if the CSG should prepared a press release. Mr. Wang Weisheng responded for the SFA agreeing that communication of current activities to the world community would assist their efforts and attract technical and financial support. The widely distributed article in the New York Times preceding the meeting was noted. John T, Hank

and Grahame were asked to prepare a draft and consult with Chinese colleagues to produce a suitable press release that would be disseminated through all available channels.

Wan Ziming of Chinese CITES Authority noted that additional detailed technical advice would be needed to implement the draft action plan and conduct proposed release and conservation activities and hoped that this kind of assistance could be obtained from CSG. Prof. Messel strongly re-iterated the CSG's complete responsiveness to requests of this kind and suggested that they should best be channeled through appropriate CSG members for direct response.

Mr. Xie, Director of the Anhui breeding center, summarized their plans to quickly conduct a pilot restocking experiment on a small scale to establish the suitability of different areas. He requested technical advice on animal marking and monitoring. A discussion of tagging and radio tracking techniques followed. Grahame Webb noted that this experiment could produce a wide variety of most valuable results if it was carefully designed.

Mr. Wang suggested that SFA might establish a volunteer expert advisory committee that could provide rapid response to technical questions. He suggested SFA could establish a liaison officer to coordinate. This proposal will be returned to SFA for consideration. He also advised of the possibility of funding through IUCN based on previous contacts.

Discussion followed on the current need for more habitat surveys, available funding from Chinese sources for local work (thought to be good) and the excellent infrastructure and scientific capacity available in China and applied to the problem.

Mr. Wang and other Chinese observers elaborated on the strategy proposed for pilot re-introduction. The option of detailed study to define and identify the ideal habitat was

expensive and time consuming. Instead, noting the huge reserve of captive alligators available in China, it was thought more efficient to test habitats operationally by releasing marked alligators and 'letting the alligator survival be the test of suitable habitat'. This approach was endorsed by the meeting, however, the CSG suggested that such an experiment would require careful design adequate funding and long term follow through. We suggested that China take full advantage of well-known technical and scientific information available in the field.

The current developments for Chinese alligator conservation seem to be well grounded in such careful principles and procedures and effective consultation. Professor Messel expressed his hope that development of commercial captive breeding of other species in China would proceed with similar caution. He noted that there were many examples around the world of unduly rapid development of captive breeding without adequate expert consultation leading to technical inadequacy and great economic loss. This phenomenon is not restricted to crocodylians, e.g. ostrich farms and chinchillas. Expert advice helps avoid this problem. He further noted that in a commercial setting, expert advice must be paid for at commercial rates. However, the cost of adequate expert advice was far less than the great cost of delay or failure of effective commercial production.

Siamese crocodile. Dr. Jenny Daltry of Fauna and Flora International (FFI) outlined the activities and constraints on her program for assisting in conservation of Siamese crocodiles in the Cardamom mountain area. She requested CSG support for habitat protection and recommended that CSG take the lead in crocodile farming and trade issues.

Tomistoma. Prof. Messel advised the meeting of current survey of *Tomistoma* in Sumatra by Mark Bezuijen to evaluate effects of recent devastating forest fires and deforestation on the *Tomistoma* population. The financial support of FFI for this project was gratefully acknowledged. Prof. Messel stated his firm conviction that Kalimantan contained significant populations and needed a survey focussed on key areas where earlier inspection by Jack Cox and Andy Ross indicated the species was present and abundant. Such a survey could also assess Siamese crocodile status. Funding support for a

competent and experienced technical team to conduct this survey is being sought.

Jenny Daltry asked if any information was available on reports of *Tomistoma* in Ujan Kulong Park in west Java. No information was available.

John Thorbjarnarson asked if a re-introduction of *Tomistoma* into suitable protected areas in Thailand (where it is thought extirpated) was feasible. Discussion followed on sources of *Tomistoma* in Thailand and institutional and practical constraints on such a plan. Uthen Youngprapakorn advised that he had been successfully breeding *Tomistoma* in his new facility Utairach Farm. He produced 87 hatchlings last year and expected around 100 this year from eggs in incubation. Total current stock was over 300 captive-bred juveniles. He advised that anticipating CSG interest he had examined the possibility, but was concerned that inadequate protection of any potential release sites would make such a reintroduction unsuccessful. He proposed a more actively managed re-introduction into more controlled semi-natural situation. Discussion followed on the importance of addressing the public relations issue and post release follow-up. Crocodylian conservation in Thailand continues to be unnecessarily constrained by internal rivalries and lack of capacity, but the current interest of several groups, and ongoing-introduction program for Siamese crocodile may provide avenues to overcome these constraints. The possibility of private/commercial sponsorship of protected habitat for crocodile re-introduction was suggested.

After thanking participants and observers for their usual frank, open and vigorous discussion, professor Messel closed the meeting at 4.30 p.m. — Perran Ross, *rapporteur*.

REPORT ON THE INTERNATIONAL WORKSHOP ON CONSERVATION AND REINTRODUCTION OF THE CHINESE ALLIGATOR, 25-28 AUGUST 2001. The meeting, which was hosted by the Department of Wildlife Conservation of the State Forestry Administration (SFA) of the People's Republic of China, and co-sponsored by the IUCN-SSC Crocodile Specialist Group (CSG), Wildlife Conservation Society (WCS), Australia-China Council, and World Wide Fund for Nature-China (WWF), was attended by about 50 representatives of the Central government SFA,

provincial governments of Anhui, Jiangsu and Zhejiang provinces and the municipality of Shanghai. Overseas participants were C. Manolis, J. Thorbjarnarson, G. Webb, H. Jenkins, D. Jelden, J. Behler and Akira Matsuda.

Prior to the meeting, G. Webb, C. Manolis, H. Jenkins, A. Matsuda, John Behler and J. Thorbjarnarson had undertaken field visits to the various sites (20 – 24 August) to look at sites where alligators still occur or that might be candidates for reintroduction in the future. The results of these field trips were presented during the meeting and these are appended as appendixes to this report.

The main focus of the meeting was an outline of PR China's plan to protect and reintroduce Chinese alligators in the wild. Several presentations focused on proposed reintroduction schemes and reconstruction of suitable habitat in the provinces of Anhui, Jiangsu and Zhejiang and in the Shanghai area. It was quite obvious that since the Second World Conservation Congress in Amman, Jordan, where a resolution was adopted to conserve the Chinese alligator, the central government and respective provincial governments had taken action and had made great efforts to advance scientific research in many aspects important for the conservation of this species. In addition, plans for detailed release programs have been significantly advanced. A number of potential reintroduction sites will be chosen in Anhui, Zhejiang, Jiangsu and Shanghai with the intention to release alligators as soon as the sites have been evaluated for their suitability.

During a field trip on 26 August to the Anhui Research Center for Chinese Alligator Reproduction two potential release sites at the Jingxian County Canal and wetland at Gaojingmiao of 200 and 250 ha respectively were visited. Both of these seemed to be very promising sites and plans have already been made at the provincial level to reconstitute these in order to reverse man-made influences at these sites.

At the end of the meeting, China's draft action plan was discussed in a very open and constructive manner. This plan will serve the Central as well as Provincial governments as a guideline on how to further conservation action for the Chinese alligator in the short and medium term. After suggestions by the CSG representatives, the plan was returned to the SFA for final consideration and approval. Overall the

meeting was a great success and all the government delegations involved have perceived the serious situation of the Chinese alligator. Initiatives have been taken at all levels to stop the negative population trend and to re-establish viable populations in the wild. — D. Jelden, *Deputy Chairman CSG.*

ASSESSMENT OF POTENTIAL REINTRODUCTION SITES FOR CHINESE ALLIGATOR IN ANHUI PROVINCE

1. Approach. Ten sites for Chinese Alligator, *Alligator sinensis*, in the National Chinese Alligator Reserve (five protection sites with existing populations of alligators and five new sites) and were inspected for their suitability as potential sites for re-introducing the species back into nature. Two sites could not be inspected due to rain-damaged roads.

The Anhui Research Center for Chinese Alligator Reproduction (ARCCAR), as the source of animals for the reintroduction program, was also inspected.

With the exception of Shuangken (site 9) and Sanyuanzhen (site 13), all locations represented artificial habitats resulting from man-made water impoundments for agricultural irrigation.

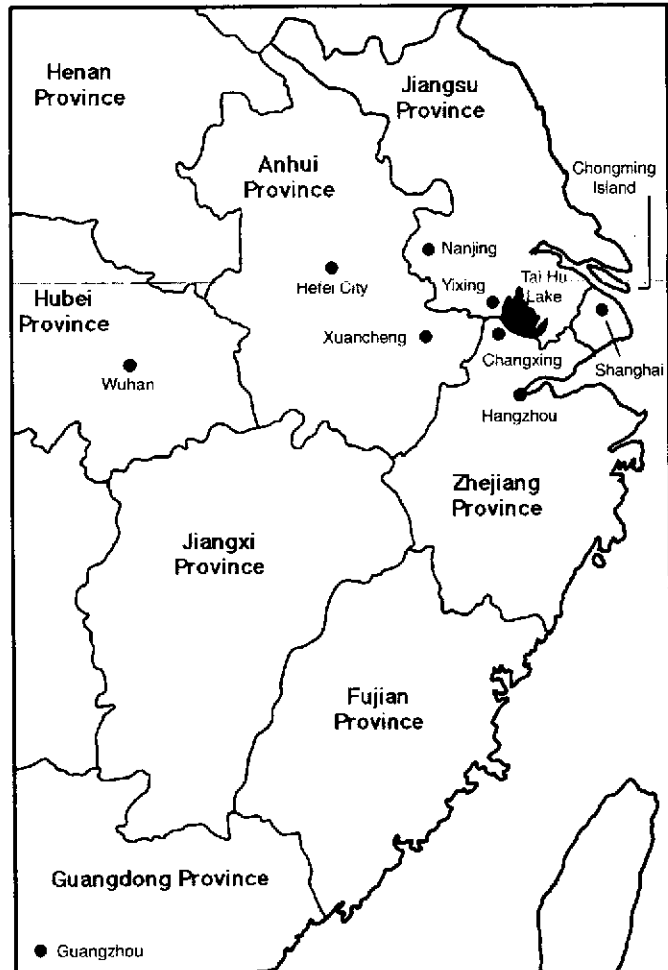
Site assessments differentiated between those where small populations of the species were known to persist and those where the species had been extirpated. The suitability of each site was assessed on the basis of its: size, suitability of fringing vegetation as nesting habitat, availability of food species, security of adequate water (level of use), tenure and surrounding land-use management.

2. Conclusions.

- Protection sites supporting extant populations of *Alligator sinensis* were accorded a low priority as potential sites for augmentation because of likelihood of sub-optimal habitats and uncertainties of adverse social interactions with resident animals.
- Existing wild populations of *Alligator sinensis* should be subject to regular monitoring.
- The date and location of all wild nests should be recorded by forest rangers and be given maximum protection against destruction and predation. Unless there are compelling reasons, eggs should NOT be removed. In

the event that eggs are harvested for incubation, the resulting hatchlings should be liberated back into the pond from which the eggs were removed.

- Skills training in survey methodology for ARCCAR, Anhui Normal University researchers and DOF officers.
- All captive-bred animals selected for release into the wild should be screened by a qualified veterinarian to ensure each individual is disease-free and does not harbour a foreign pathogen.
- No captive-bred animal should be released into existing wild populations until the level and affect of social interactions is better understood.
- Existing populations of *Alligator sinensis* should continue to be protected and suitable propaganda material made available to local communities to increase awareness and acceptance of the presence of alligators.
- The DOF should design innovative strategies for the conservation of alligators occurring in man-made impoundments owned by collectives that link the commercial production of animals with benefits to local households.
- The characterization, assessment and prioritization of each site are summarized in Table 1. Each potential reintroduction site had been prioritized by the Anhui DOF on the basis of size of area, tenure and suitability of habitat.
- In the absence of any extensive data on the ecology of naturally occurring populations of *Alligator sinensis*, the re-introduction program should be approached as an experiment in which each activity is fully documented and subject to adequate monitoring and evaluation.
- Population genetics and the risk of "genetic pollution" should not be a major consideration or an obstacle to implementing a re-introduction program for a species



Locations of Provinces and main towns through which visits to potential reintroduction sites were facilitated, and workshops held.

which is ecologically extinct throughout most of its range.

Descriptions of the habitat, land tenure, land use and relative priority for reintroduction follow.

Hongxing rice, pine forest and thickets. Village collective (100 households) surrounded by intensive agriculture - plans to resume and expand. Low Priority.

Zhucum rice, pine forest and thickets. State-owned forest pond owned by collective. DOF plans to acquire upstream rice areas and develop series of ponds for alligator. Medium-low priority.



Participants of Workshop 1, Hefei City, Anhui Province. G. Webb photo.

Site	Total Area (water area)	Connecting Ponds	A. <i>sinensis</i>	nesting (yr)
Hongxing	8.5ha (4.6ha)	•	Y	Y (1996)
Zhucum	3.5ha (1.3 ha)	5 small upstream	Y	Y (1996)
Huagu	75ha (1.3ha)	3 small upstream & series below dam	-	-
Gaojingmiao	225ha (5ha)	Numerous small ponds in 4 upstream valleys	-	-
Fenghuangchong	150ha (7ha)	smaller ponds in upstream valley	-	-
Jinqxian Co Canal	40.5 km Average width 50m	Numerous bays, inlets and swamps	?	?
Shuangken	3.4ha (2ha)	series of 5 ponds	Y	Y
Zhongqiao	136ha (4ha)	4 small ponds in two upstream valleys	Y	Y (2000)
Changle	5.5ha (1.5ha)	natural stream approx 50m from pond	Y	Y (1995)
Sanyuanzhen	70ha (5ha)	4 ponds	•	•

Huagu rice, pine forest and thickets, state-owned (DOF). DOF plans to excavate series of ponds up- and downstream of main pond. Medium priority.

alligator habitat. Medium-low priority.

Detailed descriptions of the site visits and analyses were prepared.

Gaojingmiao relatively open water body with rice, grasses and limited thickets. State-owned land ponds and rice paddies owned by collective. High priority.

Fenghuangchong rice, grasses, forest and limited thickets, village collective (50 households). Pond and upstream valley embodied in 2000 ha protection forest. Medium priority.

Jinqxian Co. Canal grasses, rice, thickets and forests. State-owned protected area of 40.5km among dwellings and agriculture. High priority.

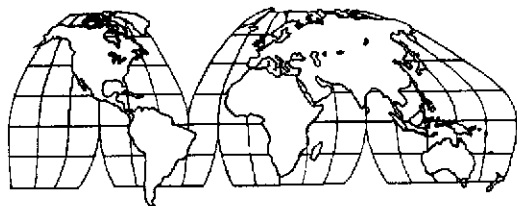
Shuangken intensive rice growing, owned by collective (15 households). Ponds are an alligator reserve. Medium-low priority.

Zhongqiao grasses, thickets and pine forests, state-owned forest. Pond owned by collective (60 households). Medium-low priority.

Changle rice and houses - island with bamboo thicket, owned by collective (30 households). Intensive agriculture and human dwellings. Low priority.

Sanyuanmzhen narrow border of grasses separating ponds and stream from rice paddies village collective, DOF plans to restore the land and convert rice paddies to

Regional Reports



Africa

Kenya

CROCODILE / HUMAN CONFLICTS WORKSHOP HELD. This workshop was convened at Kenya Wildlife Services Training Institute, Naivasha, Kenya, 28–29 June 2001 to examine a case study recently carried out and to gather perspectives from community leaders, the wildlife management authority and the crocodile production industry.

The aims were to:

- explore socio-economic, policy and institutional issues that contribute to the conflict or its management
- identify ways in which communities can become involved in managing the conflicts
- explore the realities of communities becoming involved in commercial utilisation programs
- look at possibilities for private sector involvement in resolving the conflict
- make policy recommendations as a result of these points

The meeting gathered about 30 people, mostly community leaders from all over Kenya and KWS staff from areas where conflict between crocodiles and humans is particularly severe. Richard Ferguson attended to represent CSG as well as the private sector.

Clearly the problem exists in Kenya on a similar or greater scale than we discovered in Tanzania. The politics of wildlife utilization in Kenya are intense and continually changing but there appears to be little resistance to continuing and expanding the commercial utilization of the wild crocodile population. There is also a desire among rural communities to become involved in both crocodile ranching and the harvesting of problem animals. There is, however, very little

knowledge of the physical, financial and expertise requirements for either of these. The private sector can be involved through educating communities about utilization options and joint ventures in harvesting.

The recommendations of the workshop were:

- the provision of alternative sources of water to rural communities currently at risk
- empowerment of communities through education on utilization options, sensitizing communities and authorizing community wildlife groups to utilize crocodiles
- establishment of a cropping program for crocodiles in the worst affected areas
- transfer of technology on ranching from private sector to communities
- make policy changes regarding the export and trading of crocodile products, compensation for victims and the licensing of communities to undertake utilization

From a conservation perspective the most disturbing point that became clear was the almost complete lack of survey data on wild populations. A crocodile working group comprising KWS, Museums of Kenya, private sector and community representatives is being established now to provide the expertise and the impetus to get these surveys done.

Overall this was a most productive gathering and Kenya Wildlife Services (Community Wildlife & Wildlife Utilization offices) are to be commended for having taken the initiative. — Richard Ferguson, *Vice Chairman Africa, P.O. Box 10160, Bamburi, Mombasa, Kenya.*

Tanzania

SUCCESSFUL WILD CROCODILE HARVEST. During the 11th Conference of Parties to CITES held in Gigiri, Kenya, in 2000, Tanzania presented a proposal for maintenance of her populations of *Crocodylus niloticus* in Appendix II, subject to an annual quota of no more than 1600 wild crocodiles. The proposal was endorsed by parties and hence allowing Tanzania to have an annual export of no more than 1600 wild specimens (including 100 hunting trophies).

During the 2000 hunting season a total of 150 applicants applied for crocodile hunting operations. The Wildlife Division scrutinized the applicants by using special criteria through which the division managed to get 13 companies,

individual groups and one Community Based Organization known as Jukumu Society.

The successful applicants were authorized to hunt 1500 crocodiles as a problem animals control program. A total of 1424 crocodiles out of the 1500 allocated were hunted. The balance of 76 crocodiles were not harvested due to logistical problems.

Priorities for crocodile hunting operations were focused on areas where there were record numbers of incidences of problem animals, particularly in lakes, dams and rivers. Authorized companies were licensed to operate in different areas reported to have higher incidences of human crocodile conflicts. Supervision of the hunting in the field was done by game officers in the respective districts. Crocodile hunters were also, required to observe the following conditions.

- The hunting period is between 1 July to 31 December.
- Hunters are accompanied by an official of the Wildlife Division who will ensure adherence to the quotas and will affix field tags and record harvest details.
- The minimum size of the skin allowable for export is 60cm belly width.
- Only crocodiles of 2.4m total length (i.e., from tip of the mouth to end of the tail) and above should be targeted for harvest.
- All hunters must possess a trophy dealer's license (TDL).
- Hunting operations (returns) must be supported by a detailed report following a format specified by the Division.
- All hunters must report to respective regional and district game officers and the relevant village leadership before hunting commences.

Hunting operations for the 2000 season contributed over 45 million Tanzania Shillings (approx. \$50,000 US) as government revenue. The amount is in turn used in crocodile conservation in Tanzania. The hunting of problem animals has shown considerable positive impact to the communities as follows:

Employment. More than 250 villagers were employed temporarily by hunting companies as hunters, skimmers and porters.

Acquisition of skills. Villagers involved in the hunting operation had the opportunity to acquire relevant skills regarding crocodile hunting and skinning.

Reduced incidences of human-crocodile conflicts. Information on problems that crocodiles cause to humans and livestock does not reach the appropriate authorities in time due to remoteness and sparsely distributed human population. It is sometimes difficult to report levels of incidences of human crocodile conflicts at a given time interval. However, there is significant evidence from some reported incidences which show decline in human crocodile conflicts. However, it is too early to make a general conclusion unless the Wildlife Division concludes the exercise to collect information on crocodile attacks from other areas of the United Republic of Tanzania.

The Wildlife Division has also, received reports from some Communities, e.g., around the Ugalla and Malagarasi rivers, who commended the government for allocating crocodile hunting companies to their areas. They also confirmed that the crocodile hunting program has reduced levels of crocodile-human conflicts in the area. This is a good gesture for the assurance of protection of both livestock and people.

Under the present circumstances, harvest and trade in Nile crocodile in Tanzania has no negative impact on the wild population, since consumptive and non-consumptive use of crocodiles are undertaken in accordance with the existing wildlife laws. Management of crocodiles and forms of utilization depend on the status of a specific category of protected area as follows:

(a) In all National Parks, Crocodiles are fully protected and aquatic habitats managed to maintain their numbers or encourage their increase as appropriate. Utilization of Crocodiles within National parks is solely devoted to game viewing.

(b) In Game Reserves and Forest Reserves Crocodile are protected and aquatic habitats managed to maintain their numbers or encourage their increase as appropriate. However, populations may be utilized mainly through the collection of eggs or possibly hatchlings not exceeding 50cm in total length for ranching purposes.

(c) In Game Controlled areas and in open areas Crocodile protection is encouraged. However, populations may be utilized through ranching or sport hunting. Control of Crocodiles is allowed when there are genuine conflicts between crocodiles and legitimate interest

There are a few problems related to community benefit sharing. However, in the course of undertaking future operations, we believe, there will be some possibilities of improving these operations to benefit more the local communities. Some of the possible avenues for improvement could also include the regulations for the establishment and Management of Wildlife Management Areas (WMAs) now being concluded. — *From PERFORMANCE REPORT ON HARVESTING PROBLEM CROCODILES FROM THE WILD - 2000 HUNTING SEASON. Wildlife Division, Dar As Salaam, Tanzania.*

Asia, Oceania and Australia

Cambodia

WATER SNAKES FED TO CROCS ON FARMS. A report investigated by the Wildlife Conservation Society personnel and published in the TRAFFIC Bulletin, indicates that a reported decline in fish harvests from the Tonle Sap, Cambodia, has created a new demand for an alternative inexpensive food for people and for captive crocodilians reared commercially around the lake. Beginning about three years ago, an extensive fishery for water snakes of the colubrid subfamily Homalopsinae, involving at least five species of snakes, has developed to serve this demand. Additionally, ova of at least one homalopsine species are sold as a human food delicacy, and the skins of two species are exported to Thailand and specimens are exported alive for food to Vietnam and China.

Data on the harvest gathered in 1999 and 2000 estimate that harvest rates at the peak of the wet season may reach 8,500 snakes/day and may represent the greatest exploitation of snake species reported in the world. Potential demand for snake carcasses for crocodile food were estimated to be 6,300-18,900 kg per week and are similar to reported volumes landed in local ports. Of particular conservation concern is the heavy exploitation of *Enhydris longicauda*, a species endemic to the Tonle Sap. Snakes are captured by gill net and sometimes by spearing, noosing and electro-fishing equipment.

The impact of this recent increase in snake harvest is not known, but is suspected to be unsustainable. Further monitoring and estimation of snake densities and production are recommended. The current density of water snakes in Tonle Sap may be artificially elevated by the removal of snake predators such as large fish, waterbirds and crocodiles and the effects on the whole ecosystem remain unclear.

Monitoring of the harvest and trade is urgently needed. The water snake harvest is an economically important fishery that has an inverse relationship to the fish harvest and provides protein for both people and commercially important crocodile farms. The harvest presents an opportunity to collect useful biological data from the large samples of homalopsine snakes. Useful information could be obtained on fecundity and life history to evaluate the sustainability of the harvest. An educational campaign to encourage fishermen to release the endemic *Enhydris longicauda* alive is also recommended. — *Extracted and summarized from Stuart, B., J. Smith, K. Davey, Prom Din & S. Platt. 2000. TRAFFIC Bulletin, Vol. 18 no.3:115-124.*

Western Asia

INDIA

GHARIAL RELEASE. On March 28, thirty-three 5 to 7 foot captive raised Gharials (*Gavialis gangeticus*) were released into the wild as the final chapter of a successful headstarting / reintroduction program in Katerniyaghat Sanctuary, in the State of Uttar Pradesh India. This was the last group of Gharials to be released from the Katerniyaghat rearing facility, in the hope that the wild population can now sustain itself.

Near extinction in the mid 1970's, the Gharial population in the reserve is now estimated to be over 100 individuals with natural breeding occurring. The sanctuary was formed in 1976 and is located on the border of Nepal and India. It encompasses more than 425 sq. km and serves as vital habitat for Gharials as well as Gangetic dolphin, tigers, and leopards. The successful reintroduction program was overseen by Dr. R. L. Singh, Chief Wildlife Warden of Uttar Pradesh, assisting was CSG member Dr. B.

C. Choudury of the Wildlife Institute of India, whose Gharial expertise added greatly to the success of the program. I was invited to be a part of the gharial release by Dr. Singh and Dr. Choudary who were both present in the field for the reintroduction. National Geographic Television was on hand to document the historic occasion. — Dr. Brady Barr, *National Geographic Television, 1145 17th St. NW, Washington, DC 20036, USA.*

ORISSA BEAUTY CRAVES MOTHERHOOD. Gouri, the beauty of Dangmal, is finally going to be a mother... albeit with a slight twist in the tale. The authorities at the Dangmal Crocodile Project, Orissa, India, her abode for last 26 years, have reportedly decided to present her a baby to end her lonely and barren existence. Reckoned among the rarest of the rare albino reptiles, the alabaster-skinned Gouri has been a recluse since she grew up, consistently refusing to accept mates. Though still violently opposed to mating, the urge to have a baby is apparently building up inside her.

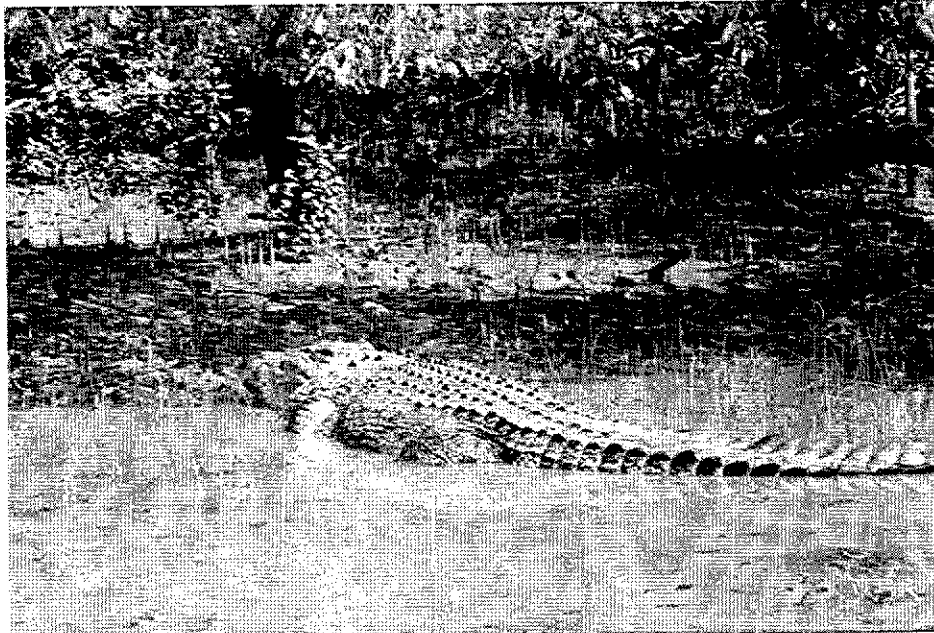
Project authorities after having noticed an unmistakable sign of craving for motherhood, decided to gift her with a hatchling. Like any other crocodile, Gouri had been spending the monsoon months laying eggs, covering them with branches and twigs and waiting for hatchlings to emerge. Alas, she has never seen a single hatchling coming out of her barren eggs. Little does she realize that eggs cannot be fertilized without mating. Dubbed "Shankhua" by the locals because of her unique skin, Gouri has been a male-hater right from the beginning. Several attempts to provide her with a mate in the past have failed as she invariably turned hostile towards the prospective partners. One of her more enterprising suitors had to pay with his life forcing the authorities to stop making such experiments. Gouri has been the pride of Dangmal, the crocodile farm on the edge of Bhitarkanika Wildlife Sanctuary, ever since she grew up to full size in the wild creeks and rivers of the area. Of the hundreds of hatchlings released by the authorities in the creeks she was the only one to have developed a beautiful skin.

A freak albino, she has been everyone's pet. However, fiercely independent, Gouri rarely ever sought the company of others of her ilk. She also fought fierce battles and in the process incurred a big scar on her otherwise flawless skin. Now everyone is waiting for her to become a perfect mother. — Ashutosh Mishra/Bhubaneswar, *The Pioneer Newspaper, Lucknow, India submitted by Ralf Sommerlad, Alexander Str. 11, Frankfurt am Main 60489, Germany.*

ANNUAL CENSUS OF SALTWATER CROCODILES IN BHITARKANIKA WILDLIFE SANCTUARY. The annual census of *C. porosus* was conducted in the river systems of Bhitarkanika Wildlife Sanctuary and associated rivers and creeks from 6 – 16 December 2000. The entire river system/habitat was divided into 8 units and the census was conducted in both day and night time.

The result was very encouraging, with a total of 1,098 crocodiles comprising 341 hatchlings (<2 feet estimated TL), 277 juveniles (2'-6' estimated TL), 136 sub-adults (6' – 8' est. TL) and 107 adults (8' and above). This result suggests at least 341 wild hatchlings from August 2000 nesting season have been recruited and suggests that as many as 30 females are laying eggs in the wild.

Another interesting observation is that 85% of the total sightings were restricted to just 40% of the area (from the Kholra-Brahmani to the Pathasala-Bhitarkanika river confluence). This area has the least disturbance, good riverbank mangrove cover and adequate basking and nesting areas. In this area one can see a minimum of 10 crocodiles (all sizes) per km whereas in other areas it is unusual to see even 1-2 crocodiles/km. Accumulation of this concentration of crocodiles in a restricted area of 40% of the sanctuary may pose a serious management problem in the future. These crocodiles and their habitat continue to need rigid protection and the remaining 60% of the sanctuary also requires protection, habitat restoration and removal of fishing activities. — Sudhakar Kar, *Research Officer, C/o Chief Wildlife Warden, Orissa, Nilakantha Nagar, BDA Building 5th floor, Bhubaneswar, 751012, Orissa, India.*



Crocodylus porosus, adult male about 5m TL, Bhitarkanika. Sudhakar Kar photo.

Latin America

Brazil

RIO PURUS EXPEDITION: SOCIAL AND BIOLOGICAL SURVEY. An expedition to the Rio Purus, Amazonas State, Brazil, was conducted during the first two weeks of June (1st-15th). The Rio Purus runs through approximately 2,642 km in the State of Amazonas, until its confluence into the Rio Solimões, 170 km West of Manaus. The expedition brought together 24 participants including scientists, technicians and the vessel crew, in an integrated effort between IPAAM (Institute of Environmental Protection of the Amazonas State), IDSM (Mamirauá Institute of Sustainable Development), INPA (National Institute of Research of the Amazon), UA (University of Amazonas) and FUNASA (National Health Foundation). During the fieldwork, data on the social situation of local human populations were gathered (L. Ciro Marcano – Clark University, USA; Eduardo Martins Venticinque and Ana Albernaz, INPA/Smithsonian Institution; Augusto da Silva,

FUNASA; Antônio Martins, Oscarina dos Santos and Raimundo dos Reis-IDSM) as well as biological data from a 390 km-long stretch of the river. The biological surveys sought caimans (RDS – INPA/IDSM), freshwater dolphins, giant otters

and manatees (Fernando Rosas and Renata de Sousa Lima – INPA), fish (LRP and CPD – INPA), and reptiles and amphibians (Marcelo Gordo – UA). On the 3rd of June we were able to undertake a flight to conduct an aerial survey, supervised by Bill Magnusson (INPA), with the participation of Artemisia Souza doValle and Marcelo Garcia (IPAAM), in order to estimate vegetation types and some species of fauna and flora.

Black caiman (*Melanosuchus niger*) and spectacled caiman (*Caiman crocodilus crocodilus*) were observed in all the 20 sites (140 km) sampled at night. Schneider's dwarf caiman (*Paleosuchus trigonatus*) was observed in just one site, and Cuvier's dwarf caiman (*P. palpebrosus*), although not encountered during these surveys, is strongly believed to be a resident of this area as well. Some caimans were captured, measured and marked. Muscle tissue samples from the caudal scales were removed for permanent marking and for DNA analyses as part of a project in collaboration with Izeni Farias (UA) and John Thorbjarnarson (WCS). One of the *Melanosuchus* captured was found with a porcupine (*Coendou* sp., Erethizontidae, verified by Maria Nazareth F. da Silva) spine stuck to its tongue, suggesting a quite 'unedible' meal.



Paleosuchus trigonatus, caught by hook, Suraré, Rio Purus, Brazil. R. Da Silveira photo.

Fresh caiman meat was found to be sold in 3 small villages. One of these villages, Cuiuanã, comprised more than 62 floating houses, a small Amazonian "Venice". In the villa of Suraré, we had the opportunity to examine two recently slaughtered caimans. One of them, a male of *P. trigonatus* had the following measurements: SVL = 92.5 cm, TL = 162.5 cm and 16.5 kg, and the other, a female of *M. niger*: SVL = 87.3 cm, TL = 180.4 cm, and 18.5 kg. Local hunters stated that on the Lower Rio Purus, the caiman meat with bones is salted and sold at US\$ 0.25/kg to the Pará State markets. The meat is traded in for food and motor oil, all of which are very expensive, which means that the hunters profits are halved in relation to what the money could buy in Manaus. This was the first record of commerce with *P. trigonatus* meat in the Brazilian Amazon.

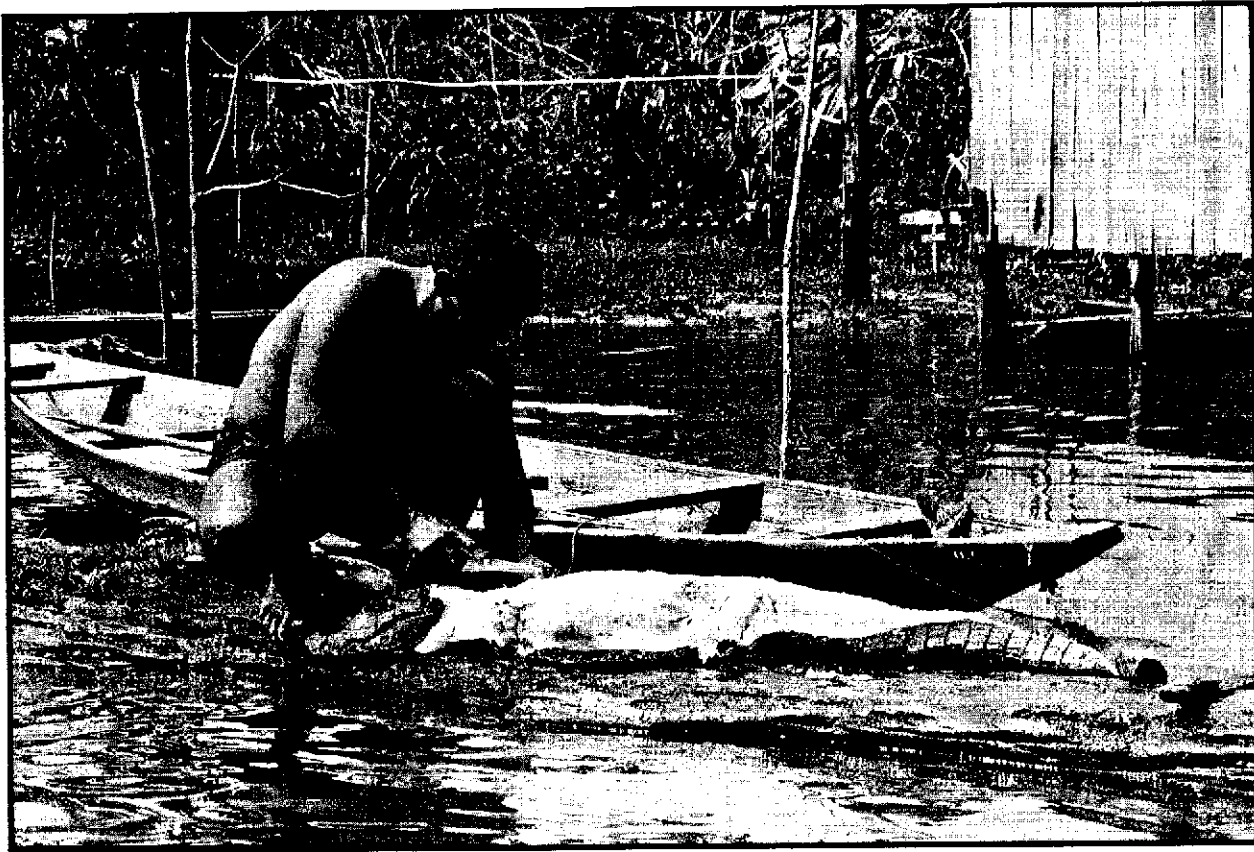
With the high level of the river, caimans were dispersed in the flooded forest and captured with harpoons, as frequently used in the Brazilian Amazon (Da Silveira and Thorbjarnarson 1999) was not possible. The caimans examined were captured with hooks (see figure) baited with fish

(jaraqui - *Semaprochilodus insignis*, Prochilodontidae). Large hooks to 'fish' caimans are considered too expensive by the locals, so they craft hooks out of large nails or spikes, by bending them (Fig. 2). This method is may be more damaging to natural caiman populations, as it may capture males and females unselectively. Captures with harpoons at low water selectively take males in the Mamirauá Reserve (Da Silveira and Thorbjarnarson 1999).

Informal interviews with caiman hunters revealed that 'hooks' are used only during high water, harpoons are used during low water. Thus, illegal exploitation of caimans happens throughout the whole year in the area. The information gathered suggests, as a first approximation, that caiman populations in the area must be huge and, as stated by Bill Magnusson, "No doubt it is manageable to hunt thousands of caimans per year in this area with such a complexity and abundance of habitats."

Currently, an official proposal for the creation of a Sustainable Development Reserve of 1,800,000 ha in the Lower Rio Purus, following the Mamirauá model, is being elaborated to be presented to the Governor of the State of Amazonas, Amazonino Mendes. In this kind of reserve, following the SNUC (National System of Units of Conservation) regulations, it is possible to manage the fauna extensively, and caimans are primary candidates due to their natural abundant population and level of scientific knowledge already available (Larriera 2000, Newsletter CSG 19-4: 17-18).

The Purus Expedition was thoroughly documented by the photographer Paulo Santos (Interfoto/Belém). Funds for the expedition were made available by Márcio Ayres (IDSMS Director), granted by the Department for International Development (DFID-UK), Wildlife Conservation Society, and Brazilian Ministry of Science and Technology. Aerial survey was made possible by Estevão Monteiro de Paula (IPAAM President), who also provided a satellite mobile phone. Research licenses to work in the area were provided by Fernando Dal'Ava (IBAMA - DF). - Ronis Da Silveira, *Instituto de Desenvolvimento Sustentável Mamirauá & Coordenação de Pesquisas em Ecologia/INPA*, ronis@inpa.gov.br, Cláudia Pereira de Deus and Lúcia Rapp Py-Daniel, *Coordenação de Pesquisas em Biologia Aquática, Instituto Nacional de Pesquisas da Amazônia, CP 478, 69011-970, Manaus-AM, Brasil.*



Local inhabitant butchering *Paleosuchus trigonatus* for meat, Suraré, Rio Purus, Brazil. R. Da Silveira photo.

Europe

Iceland

VILLAGE WANTS WASTE DISPOSAL CROCODILES. A fishing village in Iceland may import crocodiles as living waste disposal units. The crocs would chomp their way through the waste products of the fishing industry in Husavik, north east Iceland. The Mayor, Reinhard Reynisson, is thinking of importing the crocodiles and believes they'd be an added tourist attraction. "People mostly laugh at the idea, but for us it's more than a joke," Mayor Reinhard Reynisson told the BBC. "We are actually looking into it seriously."

He was inspired after reading a magazine article which described a Colorado waste disposal scheme using crocodiles. "They have hard winters, snow and frost and so on, but have access to geothermal water," Mr. Reynisson said. "So, circumstances there are a bit similar to ours here in Husavik." The warm ground water - that is used for domestic heating and to produce electricity in the town - would be a perfect environment for the crocodiles. "It's more

environmentally friendly to use animals in the food chain to eat [the waste] than to dispose of it in other ways," he said. "They would have a lot to do and, as in Colorado, we expect that they would also attract tourists, just to see them." —
From Ananova: Wednesday 5th September 2001 submitted by Ralf Sommerlad Alexander Str. 11, Frankfurt am Main 60489, Germany.

Meso-America

Jamaica

TRAINING WORKSHOP FOR CROC CONSERVATION. The conservation and management of the American crocodile (*C. acutus*) has been addressed in many parts of its range, with Jamaica as an exception. During the last working meeting of the CSG, Richard Nelson, a representative from the Jamaican government made an official request for assistance in the implementation of a crocodile monitoring program. Since that time, there has been an ongoing dialogue between members of

the CSG and the Jamaican government. The opportunity to provide assistance presented itself when NGT (National Geographic Television) contacted Perran Ross, Executive Officer of the CSG, for possible ideas for filming projects. A training workshop, sponsored by National Geographic Television, the Crocodile Specialist Group, Frank Mazzotti of UF (University of Florida) and the NRCA (Natural Resources Conservation Authority) of Jamaica was one of the results.

During the workshop we shared our experience and knowledge related to survey, capture, and handling techniques used in crocodilian research with our Jamaican colleagues. Simultaneously, various aspects of the course were filmed for the NGT program, "Crocodile Chronicles". University of Florida instructors Michael Cherkiss and Geoff Cook, Brady Barr from NGT, Richard Nelson and Mark Tyndale from NRCA, as well as other Jamaican participants met in the St. Elizabeth Parrish of Jamaica.



Participants in the Jamaica training workshop test their skills on *Crocodilus acutus*, M. Cherkiss photo.

The survey training program was held in Black River, Jamaica from the 25th through the 30th of June 2001. This workshop was intended to aid the Jamaican crocodile survey team in the creation of a monitoring network and to provide them with the tools and knowledge to complete this task. The immediate goal of the Jamaican government is to gain an understanding of the current condition of the crocodile population throughout the country. This will be accomplished through extensive surveys for crocodiles throughout the island resulting in a relative index of the current crocodile population. This will aid in identifying critical habitat for crocodiles that meet all life stage requirements.

The course consisted of lectures and practical field sessions. During the first portion of the course we reviewed basic capture techniques such as noosing, walk-through snares, hand capture, and treble hooks. These techniques were successfully used to demonstrate the appropriate methodology for capture of various size classes of animals in a variety of habitats. After each animal was captured proper data collection techniques, both of the animal and the environment, were stressed in order to facilitate the construction of a crocodile database. A marking system also was initiated for mark recapture and growth studies.

We also reviewed several crocodile survey methods such as eyeshine surveys, aerial surveys, and surveys for artifacts such as tracks and tail

drags, followed by various nesting survey techniques. This session stressed the importance of repeatability and replication during consequent surveys. During the practical sessions we were able to couple the newly learned survey techniques with the previously reviewed capture and data collection techniques.

Upon our return to the classroom we focused on the implementation and development of a capture database. We focussed on maintaining a standardized database that is comparable with other researchers working with *C. acutus*. Once the Jamaican researchers begin monitoring throughout the island, population status and comparisons with other populations can be assessed.

During the week, we managed to work in a number of different locations that crocodiles inhabit within the St. Elizabeth Parrish. We facilitated discussions with the NRCA to determine which areas of the country were considered more critical to crocodile conservation and survival. The course resulted in a comprehensive monitoring plan that will allow for the documentation of the status of *C. acutus* across the island.

We equipped the Jamaican research team with the skills and equipment necessary to initiate a successful monitoring program. Among other equipment donated to the NRCA by NGT and UF were: a laptop computer to be used for database management, various sized nooses to be used in captures, scales and tape measures for collecting biometric data and a GPS unit to aid in the surveys being completed by Mr. Nelson and Mr. Tyndale of the NRCA.

By weeks end the Jamaican researchers were well-equipped and well-skilled in both crocodile survey and capture techniques. We were able to make recommendations regarding survey routes, frequency and duration and to establish immediate and long-term goals for the Jamaican crocodile monitoring program. By determining the status, distribution and habitat relations of *C. acutus* throughout the island, the groundwork can be laid to meet the long-term goals already determined in meetings with government officials by, Frank Mazzotti and John Thorbjarnarson. These goals would provide secure habitat for crocodiles, while creating public education, problem crocodile and crocodile use programs in Jamaica. — Michael Cherkiss (Mcherkiss@aol.com) and Geoff Cook (gscCook@ufl.edu), University of Florida Fort

Lauderdale Research and Education Center,
3205 College Ave, Fort Lauderdale, Florida
33314, USA.

North America

Mexico

CROCODILIAN EARTHQUAKE. The following events took place while we were doing a research visit to the breeding center "El Tanque" ("the tank"), located at La Palma municipality in the state of Nayarit. This visit was in relation to a research project to know the relationship between physical factors of the environment and reproductive events of *C. acutus*.

On 20 February 2001 several reproductive behavioral patterns were observed such as head slapping, roaring or sub-audible vibrations, defense of territory (females) (Garrick and Lance, 1977) and even a pair mating!

During lunch time we were in front of pool Number 5 (100 m² total area with a 25 m² pool of 90 cm in depth) in which a couple of "caimans" inhabit. We, the crew (Jesús Romero, Diana Ponce, Sara Huerta and Paulino Ponce) were sitting in plastic chairs a couple of meters away from the pool. The border of the pool is about one meter from the wire fence.

All day long we observed the male ("Firulais" LT 3.24 m, & 175 kg) inside the pool and the female ("Griselda" LT 3m & 153 kg) outside, in her nesting area. Griselda frequently had behavior patterns of territorial defense, she even hit the fence with her mouth, either when we passed by, or when tourists or the farm's personnel did so.

At 3:40 PM, local time, Firulais was located in the corner of the pool closest to us. He rose his head and after the tail making an arch above the water and opening the mouth slightly; took some air and showed his back above the water. Immediately after we began to hear a muffled sound, very low in pitch and volume; Firulais's body started to vibrate and sink slowly, the water over his back squirted and agitated a few centimeters and then a shaking was felt in the ground.

Garrick and Lang (1977) mentioned that sub-audible vibrations, that travel through water, can be produced by several species such as *Alligator mississippiensis*; *C. niloticus* and *C. acutus*.

Veterinary Science

According to the studies of reproductive behavior, crocodylians present different complex processes that are used in courting, either visual signals or others transmitted through water or air since they have evolved in sub-aquatic environments. Even though such behaviors are similar to all crocodylians they can vary depending on the species.

According to our observations, we could verify that infra-sound is very potent and can travel through ground as well as through water and air.

Griselda, the female was originally seen in the estuaries of San Blas, Nayarit. In 1990 was taken from her owners in the port of San Blas and brought to the breeding center, the reason for this is that she was in a stone locked-in area of 1.2 by 2 m with no water. According to her previous owners she was 17 years old, she was 2.70 m long and weighted no more than 100 Kg. In 1991 she nested for the first time and has continued year after year, with an average of 40 a 45 eggs per nesting.

Firulais is male from the estuaries in San Blas. In 1989 he was already part of the collection of the breeding center. At that time he was somewhere between 1.6 m and 1.8 m in length and was about 6 years old. Firulais was always a distinctive dominant male.

History of the couple: Griselda had previously been with other males, but she was remarkably aggressive with them once the mating season was over. Nevertheless, from the moment when Griselda and Firulais were put together in the same pond they mated, and they have been together since then.

Acknowledgements We are in debt to Shaun K. O'Neil, Paty Ascencio, Alan Heinze and all the Crocodile Breeding Center staff (El Tanque, in Nayarit), also we thank our friends in SEMARNAT, Nayarit. — Paulino Ponce & Sara Huerta. *Bosque Tropical, A. C. Apartado Postal 5-515, Guadalajara, Jalisco, 45042 MÉXICO. bosquetropical@email.com.* and M.V.Z. J. de Jesús Romero Villaruel, *Responsable de Especies Prioritarias, Área de Vida Silvestre, Subdelegación de Medio Ambiente, SEMARNAT, Nayarit. Av. Allende 110 Ote, Zona Centro, Tepic, 63000 Nayarit, MÉXICO.*

FLAXEDIL - GOOD NEWS. Flaxedil (gallamine hydrochloride), the drug of choice for immobilizing Nile crocodiles and some other crocodile species, had been taken off the market a couple of years ago, as it was replaced in human surgery by more modern drugs. This caused considerable consternation amongst crocodile vets and farmers. So now here is the good news: Flaxedil is available again. It is produced by a South African company as and when required, but can be obtained on prescription only. Direct inquiries to The Big Five Pharmaceutical (Pty) Ltd., P. O. Box 12780, 0110 Onderstepoort, South Africa, Fax: 27 12 5465066, phone 27 12 5465005 <bigfive@jl.co.za>. — F. W. Huchzermeyer, P. O. Box 12499, 0110 Onderstepoort, South Africa <crocvet@mweb.co.za>.

CAN NEWCASTLE DISEASE VIRUS CAUSE DISEASE IN CROCODILES? Nile crocodiles in Zimbabwe were found to be seropositive after they had been fed with domestic chickens, which had died in an outbreak of Newcastle disease (NCD) (Thomson 1972). Similarly Huchzermeyer *et al.* (1994a) found particles morphologically resembling paramyxovirus by transmission electronmicroscopy in negatively stained faecal matter from farmed Nile crocodiles in South Africa, which had also been fed fowls from an outbreak of NCD. These latter cases were associated with mortality, but spread over a considerable period of time, and it was not possible to link the mortalities or any symptoms to the NCD virus.

In poultry, NCD often causes upper respiratory infection as well as encephalitis, and such a syndrome with conjunctivitis has been reported in farmed spectacled caimans as a recurrent problem (Villafañe *et al.*, 1996). Another paramyxovirus, "La Piedad Michoacan" or "Blue Eye" paramyxovirus has been linked to encephalomyelitis and corneal opacity in piglets in Mexico (Stephan *et al.*, 1988). Like the NCD virus, this virus also causes a pneumoencephalitis, but the corneal opacity is not a sequel of conjunctivitis.

Chlamydial infections are a common problem in Nile crocodiles, not only causing acute death

with hepatitis (Huchzermeyer *et al.*, 1994b) but also commonly chronic conjunctivitis (own unpublished observation). However, Nile crocodile hatchlings with chlamydial conjunctivitis do not show nervous symptoms, and chlamydiae have not yet been found in any other species of crocodiles.

Mycoplasmas have been identified in Nile crocodiles and American alligators (Mohan *et al.*, 1995; Clippinger *et al.*, 1996), but not associated with either conjunctivitis or encephalitis. Mycoplasmas do however cause infectious conjunctivitis ("pink eye"), particularly in sheep and goats (Egwu 1991).

Investigations into the conjunctivitis syndrome of caimans have been hampered by the lack of culture systems (cell lines) for the isolation of crocodilian viruses. However, it is suggested that survivors of such an outbreak should be tested serologically for NCD antibodies. This is a very simple test which can be carried out by any poultry laboratory. Obviously, if the syndrome is caused by the NCD virus, it should also be possible to isolate the virus in embryonated chicken eggs.

NCD virus strains differ in their ability to infect various avian species and can even cause conjunctivitis in people. Likewise it is possible that crocodilian species vary in their susceptibility to NCD virus infections. There is no doubt that the virus can replicate in Nile crocodiles and therefore it is quite possible that it could also cause disease in another crocodilian species. In future a decision could well have to be made, that it is not such a good idea to feed dead poultry to crocodiles. — F. W. Huchzermeyer, P. O. Box 12499, 0110 Onderstepoort, South Africa, <crocvet@mweb.co.za> and G. H. Gerdes, Onderstepoort Veterinary Institute, Private Bag X05, 0110 Onderstepoort, South Africa

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ALLIGATORS AS PETS. [Editors note, *Manuela Gardener, a graduate student in Vancouver, Canada, recently found a safe home for her research project's alligator, but at the editors request prepared the following cautionary note.*]

I feel very privileged to be able to work with these unique animals and enjoy every moment of it. Having a crocodilian as a pet is very tempting. They are just amazing. However, I would not keep an alligator or any crocodilian as a pet. To give these animals a good quality of life means years of commitment and a place that provides an adequate environment for these animals. Very few people are able to do this without harm to the animal or themselves.

Alligators are amazing and unique animals. When mature, these animals are very efficient top predators that can live for up to 80 years. Alligators can reach a length of about 3 to 5 meters and mass up to 200 kg. A variety of food that is supplemented with vitamins is required to maintain a healthy state. If kept inside, these animals need full spectrum lights to ensure long-term health. If some of these needs are not met the animal can become stressed and ill.

Stress alone can cause the animal to become very sick and possibly die. In my many years of maintaining alligators, I have found that a stressed alligator may stop eating and can be prone to infection. Handling alone can introduce anxiety. In addition to the animals' welfare, the caretakers' safety must be a concern. Even daily handling does not ensure a bite-free alligator due to habituation. An alligator can and will bite. After frequent handling for over two years, a usually calm alligator bit me by surprise. I had not taken the precaution of taping her mouth due to her normally docile demeanor. This resulted

in a rather nasty bite even though she was less than 1 meter long. This is just one example of the unpredictable nature of these animals.

I spent months looking for a quality home for one large female alligator that had outgrown our facility at the University. The zoo we found is able to provide a good quality home for the alligator and provide for her long-term care. Often people that adopt young crocodilians as pets fail to plan ahead for the long life span and special needs of the adult animal. All too often crocodilians are abandoned because owners can not or will not provide for them any longer. Crocodilians deserve our respect and admiration and should not be treated as disposable pets. — Manuela Gardner, *Department of Zoology, University of British Columbia, 6270 University Blvd., Vancouver, BC V6T 1Z4, Canada.*

ZOOS



PARENTAL CARE IN SIAMESE CROCODILES (*CROCODYLUS SIAMENSIS*). Last year the St. Augustine Alligator Farm decided to do things a little differently. Typically when our alligators or crocodiles lay eggs in the exhibit, the keepers collect the eggs and put them in an incubator. There are several reasons for this. The success rate of hatched eggs is usually higher, the sex of the animals can be controlled by incubation temperature, and it keeps the larger animals in the enclosure from eating the hatchlings. Though mother alligators are usually very good parents, some literature implies that male American alligators, *A. mississippiensis* tend to be unconcerned with their offspring, or worse yet, have been known to eat the hatchlings. Maybe this is because any given American alligator clutch may have been created by a female mating with several male alligators. It is possible the males don't even know which babies are theirs.

Information about American alligator behavior is fairly well documented, but the same information for crocodile species is often a complete unknown. Sometimes we assume that

alligators and crocodiles, or even different species of crocodiles, have the same habits and behaviors. However, our recent experience with a pair of Siamese crocodiles has opened our eyes to Siamese crocodile parenting.

On 21 May 2000 our female Siamese crocodile built a beautiful nest right in the front of her exhibit. We decided to leave the nest for visitors to see. We had no idea what would happen. There are any number of things that could have gone wrong. The nest could have been too dry, fire ants could have claimed the eggs, or the father could have eaten all of the young as they came out of the nest. We just had to wait patiently. It turns out the nest was built over a sprinkler head which kept the inside of the nest plenty moist. Ants were seen several times at the nest, but were controlled. And when it came time to prove Dad's intentions, he performed admirably.

We are unsure exactly when the female actually laid the eggs in the nest mound. One week after the mound was built, we gently opened the top of the nest and removed the top three eggs. They were nicely banded and we put them in our incubator, just to make sure some of the clutch would survive.

At 7:30 am, on 13 August, eighty four days after nest construction, the female was seen laying on the nest mound with her head cocked sideways as though she were listening to the nest. By 8:30 am eight hatchlings were out of the nest and eggshells were noticed floating, or laying on the bottom of the pool. As we watched, the female slowly used her front legs to pull dirt away from the top of the nest. When she uncovered a hatchling, she gently picked it up in her mouth and carried it to the water. If she uncovered an egg that was not yet hatched, she gently broke the egg with her mouth, scooped up the baby and again carried it to the water. Sometimes the hatchlings were still attached to the egg by their yolk and both baby and egg would be carried to the water. One little guy had quite a struggle as the egg he was attached to started to fill up with water and began to drag him under. He was pulled partly under water before he managed to wiggle his way free.

By 12:30 pm the female got out of the pool and started to bask. There were seventeen hatchlings all huddled together at the edge of the pool, and it was assumed that this would be all that would hatch. But, at 2:45 pm the female

returned to the nest and removed four more hatchlings.

The adult male stayed in the water during this entire procedure, and was quite curious as the female brought the babies to the pool. He swam over to almost every new release and watched as things went on. He never made an aggressive move toward any of the hatchlings.

On several occasions the female brought whole, unopened eggs to the water and released them. The eggs floated, and she left them, with no apparent interest in their future. The adult male bumped into one of these eggs as he was patrolling the pool. He gently picked it up in his mouth. At first, it looked as though he swallowed it, but he rolled it around on his tongue for almost a minute, and then gently broke it open. He then rinsed the shell out of his mouth, but the egg was infertile. There is no way of knowing for sure, but it appeared that he was trying to open the egg and release a baby, just as the female had done. After opening the first egg, he seemed to patrol the pool more diligently, even diving to the bottom of the pool and gently breaking open what was left of hatched eggs. The male never went to the nest to retrieve eggs or young, but did open several of these infertile eggs. His basking site is near the nest mound, and twice during the day he crawled out and basked near the nest.

One week after hatching, the baby crocodiles started chasing and eating crickets and mealworms that were tossed into the exhibit. They are fed worms, crickets, and gator chow every two or three days. On 25 August 2000, twelve days after hatching, many of the babies were seen basking on the backs of the parent crocodiles. This has been a common sight on warm afternoons ever since. When in the water, babies tend to congregate around the parents' heads, some even resting on the adults' heads as if they were a floating island.

The goal of leaving the nest alone was to allow our visitors be able to see the nest, the hatching, and now a family unit of crocodilians on display. It has been a great success. Visitors who take the time to look carefully can see many of the baby crocodiles usually, lined up at the edge of the pool. This is not the first time that the St. Augustine Alligator Farm has hatched Siamese crocodiles, but it is the first time that we have allowed the parents to do all of the work. The three eggs that we put in the incubator from the nest hatched three days after the eggs in the

exhibit hatched. We have since introduced these three babies back to the exhibit and they have been accepted into the family unit.

As long as we had this unique setup, we decided to try a couple of experiments. First, three yearling crocodiles were added to the exhibit to see how the parents reacted. These yearling crocodiles were offspring from the adults, but had never seen their parents, as they were artificially incubated and raised separate from the adults. The adults accepted these juveniles in the exhibit as well, and all are living comfortably together.

Secondly, we introduced hatchling American alligators. This introduction was very interesting as well. The alligators did not seem to mind being with the crocodiles their own size, but were intimidated by the adults. While the juvenile Siamese crocodiles would congregate around the adults (even the yearlings), the juvenile alligators would swim away from them. Early on, there were several occasions that the alligators were seen around the adult crocodiles, but the alligators seemed shocked when the adults moved, and they swam away quickly. This test was performed to see if the parent crocodiles could distinguish between hatchling species. It is accepted that some crocodilian species will guard their offspring in nurseries. In other words, one female may guard offspring from several females in the area. One of the hatchling alligators did not survive in the exhibit. It appeared to have been accidentally crushed by a basking adult. However, one American alligator can still be seen, almost a year later, swimming, feeding, and basking with its surrogate family. — John Brueggen, *St Augustine Alligator Farm, P.O Drawer 9005, St. Augustine, FL, 32085, USA.*

Publications

NEW CROCODILIAN RANGE MAPS. Adam Britton has been working with Rodolfo Ferioli to produce new and improved range maps for the world's crocodilians. They have created more detailed and considerably better-looking maps than the previous ones, complete with country boundaries. These maps are still based upon existing information and published maps, such as those in the Second edition 1992 of the

Crocodile Action Plan and other published sources.

The more detailed such maps become, the higher people's expectations of accuracy, although the maps will be accompanied by a statement below each map stating that the ranges are approximations only. At this stage, the maps still show broad areas indicative of the overall range of each species, and it is not yet possible to note individual sites and records.

Adam and Rudolpho are very interested in trying to increase the level of accuracy in these maps. For example, some species like *Alligator sinensis* have more accurate data generated by recent surveys and site examinations. The authors will be trying to produce a "higher resolution" version of this and other species soon.

Generating first class and accurate range maps for crocodilians could become a group project of the CSG using the combined knowledge of the members. You can see the new maps on the CSG web page sorted by region at: <http://www.flmnh.ufl.edu/cnhc/csl-maps-species.htm> and sorted by family at: <http://www.flmnh.ufl.edu/cnhc/csl-maps-species-f.htm>. Click on each map to enlarge it.

These sites have no direct link from the CSG pages- you have to type in the address. They should be treated as scientific works in preparation and distributed for review and the authors should be given the courtesy of proper citation as 'in prep'.

Members are invited to review these maps and check and see if you can see any major flaws. Individuals who are interested in helping create far more detailed maps for any species should contact Adam. He and Rudolpho are keen to get maps created that are readily accessible on the web and that the CSG and its members can use which everyone is happy with.

— Adam Britton, *Wildlife Management International*, Box 830, Sanderson NT Australia, <abritton@crocodilian.com>



Meetings

16TH WORKING MEETING OF THE CROCODILE SPECIALIST GROUP. GAINESVILLE FL, USA 7 – 11 OCTOBER 2002.

MEETING PROGRESS. The host consortium of Florida Fish and Wildlife Conservation Commission, University of Florida Cooperative Wildlife Research Unit, Florida Caribbean Science Center of the USGS-BRD, and Florida Museum of Natural History have been joined by the Florida Wildlife Federation. They have proposed dates for the meeting that are the least disruptive of both northern and southern hemisphere field work. The weather should be pleasant, and we hope that recent disruptions of travel due to security problems will be resolved by this time next year.

The proposed venue is the Gainesville Sheraton Hotel which lies adjacent to Biven's Arm Lake (which supports a good population of alligators as well as abundant other wildlife). The location is on the outskirts of Gainesville but there are restaurants and bars within easy walking distance. A special room rate is being negotiated for the meeting. The organizers are making arrangements for direct credit card payments of registration costs and hotel reservation payments. International air connections through Orlando Tampa, Jacksonville should provide economic air travel rates.

Currently, the organizing committee is seeking additional sponsors to ensure the financial stability of the meeting, local alligator producers are being invited to participate, preliminary plans for social events are being laid and the plans to solicit papers for the scientific program are underway. The first registration notice is anticipated with the next Newsletter issue distributed early next year.

SECOND INTERNATIONAL WORKSHOP ON DNA IN CROCODILIANS, 7 – 10 November 2001, in San Diego Zoo, San Diego CA, USA. The meeting is organized by Valentine A. Lance, Llewellyn D. Densmore, and Travis C. Glenn and hosted by San Diego Zoological Society.

Sessions are planned for discussions focusing on:

- Major Classes of DNA Markers
- Use of DNA Markers in Research and Management of Wild Crocodilians
- The Crocodilian Genome
- DNA Markers for Research and Management of Captive Crocodilians

For up to date information see:
<<http://baddna.srel.edu/CrocDNAWebPages/CrocDNAWorkshop01.html>> If you lack internet access, you can obtain printed copies of the information from the web site by contacting — Travis Glenn, *Savannah River Ecology Lab, P.O. Drawer E, Aiken, SC 29802, USA.*

Personals



Dr. Richard Fergusson, CSG Vice Chairman for Africa has moved with his family to

Kenya and can be contacted at *P.O. Box 10160, Bamburi, Mombasa, Kenya. Tel: 254 1148 6448, Fax: 254 1148 6459, E-mail <fergfam@swiftmombasa.com>*

Alvaro Velasco Deputy Vice Chairman for Latin America. announces his working address and contact is now *Salas a Caja de Agua, edif Atures apto 8-C, Parroquia Altigracia, Caracas 1010 Venezuela. Tel: 58 212 860 4108 <velascoalvaro@tutopia.com>.*

Nikhil Whitaker, *P.O. Box 168, Northern Territory University, Darwin Nt. 0815, Australia "Nikhil Whitaker" <kachuga21@hotmail.com>* has moved to Australia for a prolonged training and academic sojourn. He expects to be there a year or two gaining experience and qualifications to continue his reptile work.

Phil Steele, *Crystal River Alligator Farm Inc. P.O. Box 518, Crystal River FL, 34423, USA, Phone 1 352 563 2082*

<CunliffeSteel@aol.com> has finally moved from his Harley Davidson Motor Cycle franchise in Chatanooga, Tennessee, to take up residence near his new alligator farm. The farm features state of the art temperature control and an experimental recycling waste water treatment system that utilizes natural bacteria and aeration to achieve State standards for discharge water. A full report is expected.

Dr. Yoshio Kaneko advises a change of address for Global Guardian Trust, *Nishishinbashi 3-25-47, Minatu-ku, Tokyo 105-003, Japan "global Guardian trust" <gtrust@wa2.so-net.ne.jp>*

PROCEEDINGS OF THE 15TH WORKING MEETING OF THE CSG, VARADERO, CUBA, JANUARY 2000.

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