Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Minutes

The meeting opened at 0930 h.

SC members present in person: Charlie Manolis, Alejandro Larriera, Christine Lippai, Allan Woodward, Alvaro Velasco, Cathy Shilton, Christopher Brochu, Christy Plott, Colette Adams, Curt Harbsmeier, Enrico Chiesa, Eric Langelet, Fabian Schmidt, John Caldwell, Kent Vliet, Lonnie McCaskill, Luis Bassetti, Matthew Brien, Matthew Shirley, Paolo Martelli, Rainier Manalo, Rosanna Mangione, Simone Comparini, Thomas Rainwater, Valentine Lance, Yoichi Takehara, Yusuke Fukuda, Sally Isberg

SC members present by Zoom: Emmanuel Amoah, Pablo Siroski, Marisa Tellez, Gowri Mallapur, Nathalie Kpera, Howard Kelly, Carlos Piña

Observers present in person: Alice Langelet, Ambra Dolfi, Amy Spragge, Annabelle Olsson, Branden Darlison-Hoskin, Charlotte Leyshon, Clare Pearce, Csaba Geczy, Daksh Pandhi, Danie Mulhall, Dave Woods, Deirdre Slawski, Dinouk Perera, Emily Moyes, Erin O'Brien, Garry Lindner, Hallie Cowan, Harada Koki, Irene Chipo Mvere, Jailabdeen Ajji M, James Perran Ross, Juergen Arnold, Katie Sherar, Lauren Lim, Marco Costagli, Maysayanan Thungsen, Noboru Ishii, Pablo Sinovas, Paul Beri, Payton Prosser, Prem Kunwar, Robby McLeod, Savannah Boan, Sebastian Brackhane, Shawn Heflick, Simon Booth, Stefano Pieroni, Steven Leeder, Sukenao Iida, Surathin Wannawatanapong, Somkiat Wannawatanapong, Tim Clancy, Tyson Francis, Mitsuko Takehara, Terry Cullen

SC member apologies: Sen Rith, Xiaobing Wu, Xander Combrink, Hesiquio Benítez, Laura Porras

Other apologies: Bruce Shwedick

Agenda: The agenda papers for the Steering Committee (SC) meeting, together with these Minutes, have been posted on the CSG website (in Publications, CSG Steering Committee Meetings).

1. Executive Reports

1.1. Chairs' Report

The Chairs opened the meeting by observing a minute's silence for the 14 members/colleagues who have passed since the Chetumal meeting in July 2022, being: Wayne King, Angel Alcala, James Aparicio, Juana Pena Flores, Pedro Vasquez Ruesta, Hank Jenkins, Toby Ramos, George Saputra, Tran Van Nga, Goff Letts, Alistair Graham, Luon Nam, Paul Weldon and Chen Bihui.

Alejandro Larriera mentioned that this is the first time that the CSG has been co-chaired, adding that both he and co-Chair Charlie Manolis have been involved in the Executive Committee (EC) for a very long time and have a long institutional memory. Charlie Manolis noted that Grahame Webb stepped down as chair in October 2023 and, at the same time, Perran Ross stepped down from the CSG; the Chairs expressed their thanks for their efforts over the years and looked forward to continuing to access their extensive institutional knowledge.

The Chairs highlighted the following:

- The Bullying, Harassment and Discrimination Policy for CSG-endorsed Events and associated Resolution Procedures documents had been distributed to SC members for their review, and all comments received were assessed and integrated into the versions that are now available on the CSG website.
- The Future Leaders Working Group that was formed in 2014 was morphed into the Future Leaders Program (FLP) in 2018. Whilst the initiative has continued to build the capacity of CSG members (eg sending members to CITES CoPs), the funding required to achieve its goals has not been easy to raise.
- The EC has decided to establish an "Executive Advisory Group" (EAG), to sit between the EC and the SC, and which it hopes will achieve some of the FLP's goals, but also act as a group that can work more closely with the EC at a more strategic level. A tentative list of people has been decided and this will be discussed with those individuals over the coming days. The Chairs stressed that the EAG will not diminish the role of the SC but, as it will address specific issues, the EAG will be expected to draw on the relevant skills and expertise from within the SC as well as the broader CSG membership.
- Changes to the SC are being made where members have asked to step down. Some regions, such as SAI and ESEAsia have country representatives (focal points) on the SC to assist the Regional Chairs. However, other regions (eg WCA, ESAfrica) have very little representation at the country level. Matt Shirley responded that for the WCA, there are difficulties in identifying and retaining people due to issues of funding, programs, etc. This will be discussed throughout the Working Meeting to determine if there is any other way to encourage individual country involvement.
- Terms of Reference for Regional and Thematic Group Chairs will be drafted, to clarify roles and responsibilities with regard to communication, not only with their members, but also with the EC. Similarly, a revised CSG Membership Nomination Form is being drafted. A few Regional Chairs and Vice-chairs have expressed frustration at the lack of communication or responses to e-mail requests from their regional members. Whilst the IUCN operates on a quadrennium cycle, we appreciate that not all CSG members remain currently active, nor wish to remain active, in the crocodilian space. This revised nomination form will obtain current contact information, particularly for long-term members, but also try to capture an effective membership that is actively contributing in the crocodilian space. These documents will be forthcoming.
- Alejandro Larriera clarified the misunderstanding within the CSG membership regarding how the new Chairs were selected. The selection of Grahame Webb in 2004 through an election process within the SC was a one-off situation sought by the CSG and approved by the then SSC Chair. The "normal" process is for the SSC Chair (SSC Executive) to select and appoint Chairs of all specialist groups.

Action 1: EO/EC to finalise and distribute: Terms of Reference for Regional and Thematic Group Chairs; and, revised CSG Membership Nomination Form

1.2. Minutes from SC Meeting, Chetumal

Sally Isberg introduced the item. As there were no action items to report against, the report was noted.

1.3. Executive Officer Report

Sally Isberg introduced the item.

SI thanked Tom Dacey for his work as the previous Executive Officer (EO), as well as the EC and wider CSG membership for their support since she took over the EO role.

SI confirmed that under the current arrangement, her annual remuneration is $AUD25,000 which includes all statutory on-costs including superannuation, workers compensation and other insurances, as well as office equipment. A timesheet is maintained and submitted with invoices.

With regard to CSG membership, SI noted that, as of 15 April 2024, there are 732 CSG members from 82 countries listed in the CSG database, comprising a net increase of 22 members and 12 countries since the last SC report. The current SC is composed of 71 members. A Zoom link has been provided to enable those who are not able to attend this meeting in person, and a recording will be distributed at a later date.

SI informed the meeting that she continues to maintain the CSG database, adding that when e-mails are returned as undelivered, efforts are made to contact members via alternate means, generally through the regional chair. However, as instances occur where alternative contact details are not available, SI requested all members to inform the EO whenever member contact details change.

Other highlights in the report include:

- Since the last SC meeting, a review of the "Modelling population dynamics of estuarine crocodiles on Queensland's northern populated east coast" was conducted and CSG members were attendees at CITES CoP19 held in Panama in November 2022. There have been two successful SSC grants secured, both in 2023, to Marisa Tellez and Matt Shirley. It should be noted that while the CSG is supportive of its members applying for these funds, it is the responsibility of those individuals to fulfill the reporting requirements and the CSG will assume no liability or responsibility for the agreed deliverables. She stressed that CSG members who obtain such grants must be diligent in their acquittal and report to the IUCN/SSC in order that other CSG members are not precluded from applying for further funding rounds.
- the Bullying, Harassment and Discrimination Policy for CSG-endorsed Events and associated Resolution Procedures, as mentioned in the Chairs report. Considerable time and negotiation were required to develop these and ensure alignment with other IUCN policies.
- continuing to develop a communications strategy. The social media team (see 1.3.1 below) has been trialling different ways to increase our engagement of the crocodilian and wider community. The review and redesign of the website is being discussed.
- innovative ways to increase engagement and inclusiveness, as well as deliver the messaging of crocodile conservation and CSG mission. For example, an e-mail list of SRAS recipients will be developed to receive CSG correspondence for the duration of their project. A strategy to create a "interested persons" e-mail list is also underway for people who may not meet the criteria for CSG membership but their interest and involvement in crocodilians may assist us on many levels and is an inclusiveness strategy.
- developing crocodilian conservation priorities.
- The CSG Newsletter is still the primary source of communication.
- The Student Research Assistance Scheme supported 12 projects in 2022, 15 in 2023 and there have been 6 applications so far in 2024. CSG members who are aware of students working with crocodilians are encouraged to let these students know about this scheme so that the CSG can continue to encourage people working with crocodilians.

The report was noted.

1.3.1. Social media

Jen Bruggen gave an update on developments within the social media space, noting the following:

- Most of the social media has been around member awareness, project awareness and increasing the profile of crocodilian conservation. Newsletter items are also now being shared.
- Facebook following is 6.8K and Instagram is 1.8K. The CSG also has LinkedIn and YouTube accounts but needs to better define its goals for the different platforms, which have different reaches for different demographics, etc. For example, do we want to share IUCN best practice guidelines, better awareness of crocodilian conservation issues, etc.

Matt Shirley noted that the CSG's social media strategy should consider integration with other groups such as the International Crocodile Farmers Association (ICFA), People for Wildlife, Louisiana Alligators, etc.

The report was noted.

Action 2: EC to ensure Communication Strategy considers: review and re-design of the CSG website; better defined goals for social media platforms; inclusion of SRAS students in CSG communications; and, development of a list of interested people to receive CSG communications.

1.4. CSG/IACS Financial Reports

Reports were noted and accepted.

1.5. IUCN Membership 2021-2025

Reports were accepted and noted.

Charlie Manolis clarified that the nomination process for CSG members ultimately lies with the Chairs, but the preference is that members are nominated through their Regional Chairs and Vice-chairs.

2. Regional Reports

2.1. East and Southern Africa

Christine Lippai introduced the item, highlighting:

- South Africa:
  - has been developing a biodiversity management plan (BMP) for crocodiles.
  - Non-detriment finding (NDF) has been developed for trade in skins that could impact on the survival of the species in the wild yet there is no wild offtake as the skin industry in South Africa is all closed cycle.
  - genetic admixture is a concern regarding potential reintroduction with facilities housing crocodiles from different drainage basins within the same pens. A study has been initiated to determine this.
  - interest has been expressed for a regional meeting in South Africa and could be integrated with the proposed 28th Working Meeting discussed in item 7.
- Networking within the region continues to be an issue.

Matt Shirley noted that there were parties looking for *Mecistops leptorhynchus* in Zambia. It is unlikely they are present but there are rumours that this is being followed up.

The report was noted.

2.2. West and Central Africa

Matt Shirley introduced the item, highlighting:

- Christine Lippai stepped down as Regional Vice-chair and thanked her for her efforts.
- Engagement of regional members has been a major priority along with capacity building. Emmanuel Amoah has a program (THRESCOAL) dedicated to this purpose.
- Red List assessments are progressing slower than desired. A *C. suchus* Red List assessment team has been formed.

- *Osteolaemus* likely has the largest wild meat offtake in the wild and is under no management plan. A SSC Internal Edge grant has been obtained to hold a workshop to develop the Red List and Action Plans for *Osteolaemus*. Taxonomic divisions of *Osteolaemus* are progressing.
- No *Mecistops* were found in a recent reconnaissance trip to Eastern Senegal.

The report was noted.

2.3. East and Southeast Asia

Lonnie McCaskill introduced the item, highlighting:

- Laos (*C. siamensis*):
  - World Conservation Society (WCS) headstarting program operates in two villages - Tan Soum (10 years) and Dogyanong Villages (recent construction) - and there are currently 152 crocodiles in the program. 37 were released in March 2024 adding the to previously released 78 individuals from 2022-2023.
  - Lao Conservation Trust for Wildlife, previously the Laos Zoo, has identified pure Siamese crocodiles within their stock and the main goal is to support *in-situ* conservation through captive breeding. 10 captive-bred individuals have been donated to the WCS Tan Soum village project for release.
- Cambodia (*C. siamensis*):
  - WCS - since 2021, nests have been found but they have been infertile.
  - Rising Phoenix has released 19 animals since March 2022. In 223, six nests located but none were fertile.
  - Fauna & Flora (FF) has found stable population numbers in the Cardamom Mountains but infertility and embryo death from flooding mean juvenile recruitment is negligible to poor. Ten crocodiles were released in late 2022, totalling 146 in total since 2012 with more planned in the near future.
  - FF work closely with 26 crocodile community wardens that patrol areas in the Cardamom Mountains. Wardens use the SMART patrol system within their sites to monitor, evaluate and respond to threats. Staff have been provided intensive two-day training courses on using the SMART Mobile App for field and photo-based patrol data collection.
  - Captive breeding at Phnom Tamao Wildlife Rescue Centre continues producing 60 hatchlings in 2022 and 78 in 2023. DNA analysis is identifying purebred versus hybrid individuals.
  - Surveys within the Virachey National Park have revealed unsuitable habitat for releasing crocodiles.
- Thailand (*C. siamensis*):
  - There have been 3 release programs implemented since 2000 but have had little contribution to the wild stock regarding the number of viable populations. The main obstacles are suitable habitats and multi-agency cooperation. Each government agency (Department of Fisheries and Department of National Parks (DNP)) has its own master plan to manage the habitat and the species. Still, the capability has been built up within these agencies to successfully restock the species in the future.
  - WCS Thailand published a survey report on the status of wild populations in Kaeng Krachan National Park (KKNP) and plans to secure funding for the first reintroduction program soon.
  - A nationwide survey ended in 2020, with an estimated number of wild populations of less than 100 individuals. No additional surveys were conducted in 2023, except that of KKNP and another in Bueng Borapet Reservoir. Officials and tourists often observed a few guarding mothers and their hatchlings.
  - Thai Crocodile Farm Association (TCFA) is actively involved in the ongoing reintroduction and monitoring programs in six protected areas in Thailand, which requires permission.
- Indonesia (*Tomistoma schlegelii*):
  - Masters project in Berbak National Park has defined adult home range size using satellite tracking.
- China (*Alligator sinensis*):
  - Suitable habitats have been expanded and existing habitats have been restored including re-construction of *A. sinensis*' food chain.

- 1300 of the planned 1500 have been reintroduced with an 80% survival rate one-year post-release. In 2023, 400 eggs were found in 17 nests, with 250 resulting hatchlings.

Rainier Manalo provided the Philippine item, highlighting:

- The Palawan population of *C. porosus* has been downlisted to Appendix II, with a zero export quota, at the last CITES CoP.
- Three *C. mindorensis* were repatriated from Cologne Zoo for reintroduction.
- Recent surveys have indicated approximate 300 wild *C. mindorensis*.

Charlie Manolis provided information on Malaysia, highlighting:

- In Sarawak and Sabah, and neighbouring Brunei, human-crocodile conflict (HCC) has increased in frequency, creating anti-crocodile sentiments.
- For states such as Sabah, crocodiles are returning to areas where they have not been seen for decades, and the human population has lost all links to crocodile cohabitation.
- State Governments are looking for removal processes and resolutions with a workshop to be held in Sabah next month.

The reports were noted.

2.4. Latin America and the Caribbean

Alejandro Larriera introduced the item, highlighting:

- Commercial programs are declining in Latin America, with the exception of Brazil, and the long-term outcomes of this could be detrimental to crocodile conservation as the livelihood benefits of sustainable use are lost.
- Despite this, there are more people working on research and a representative in Cuba (Gustavo Sosa Rodriguez) has recently been identified.

Alvaro Velasco delivered a further report on behalf of Pablo Siroski, highlighting:

- Recently, updated information has been received about the caiman populations in Suriname and Guyana.
- There has been a report about a drastic decline in crocodiles and caiman captive breeding initiatives in Colombia.
- Student groups are working in Colombia, along with the development of a strong science-based reintroduction program for *Crocodylus intermedius* at the Roberto Franco Station.
- The El Salvador Government has shown interest in hosting an event either in late-2024 or early-2025, with the participation of NGOs and the National University, aimed at fostering collaboration among government representatives, NGOs and universities involved in crocodilian projects across the region.
- Discussions have begun regarding the formation of a working group, or task force, comprising representatives and researchers from countries conducting studies on *Melanosuchus niger*. The goal is to broaden the pool of stakeholders with updated information across the species' distribution range.

The reports were noted.

2.5. South Asia and Iran

The report was noted.

2.6. Australia and Oceania

Matt Brien introduced the item, highlighting:

- Australia:

    - Review of "Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles" is currently underway.
    - Genetic studies are ongoing in both the Northern Territory (NT) and Queensland (QLD).
    - Both QLD and NT are currently updating their management programs. The NT continues to harvest wild eggs and QLD changed its legislation in 2018 to allow wild harvest and there is currently one operator.
- Palau - small, stable population with HCC rare
- Papua New Guinea - Crocodile Trade Act is being updated to reflect changes within the industry, particularly around licencing, to ensure the conservation and management of the two crocodilian species.
- Timor-Leste - increasing HCC, particularly in the number of fatalities.
- Solomon Islands - country wide surveys in 2019 to develop the national crocodile management plan, although this has not yet been released.

The report was noted.

2.7. Europe

Fabian Schmidt introduced the item, highlighting:

- Thomas Ziegler has stepped down as Chair since the last working meeting; Fabian Schmidt and Rosanna Mangione as Regional Chair and Vice-chair, respectively, have added diversity to the European region in terms of both captive and wild crocodilian work.
- Regional collection plan has been developed for crocodiles held in Europe. Little has changed, with the same species included and no change in staffing overseeing these.

Rosanna Mangione highlighted:

- In collaboration with the EO, the membership list has been updated to increase the communication within the region.
- Even though Europe is not a range state for crocodilians, there are many people working in zoos, in welfare as well as in the field in non-European countries.

The reports were noted.

2.8. North America

Allan Woodward introduced the item, highlighting:

- *C. acutus* continue to recover with increased nesting and survival. However, HCC issues are increasing with about 200 complaints in Florida each year. The majority are resolved easily but 20-30 require translocation annually.
- *A. mississippiensis* is expanding its range into northern states. Most states have developed a harvest program (commercial and/or hunting).
- Wild harvest skin prices have declined over the last decade placing pressure on the solvency of the businesses that harvest from the wild. The wild harvest contractors also aid in problem alligator removal but with less income from skin sales, the price paid to the contracts has had to increase, placing financial strain on the governmental agencies who administer these.
- Wild egg harvest price has remained quite stable with the quality of the skin determining the viability of the ranching program.

The report was noted.

3. Thematic Group Reports

3.1. Industry

Christy Plott introduced the item, highlighting:

- Industry and crocodile conservation are intricately linked. However, the overproduction of crocodilian skins, along with a shrinking consumer base, has reduced demand leading to reduced prices.
- Californian law 6530 has been found to be unconstitutional but is still creating some confusion. Caiman lawsuit has also been successful and is now legal for trade again.
- Attacks on industry, even when unsuccessful, have long-standing effects. For example, when Chanel removed its support of reptile skins, this was a household name that had a reputational damage on exotic leathers. Retailers, such as Nordstrom, then followed suit.
- The combination of oversupply and demand reduction has seen prices fall, and it is especially challenging for smaller farms. Measures are underway to try to regain consumer confidence. One example of this is the International Crocodile Farmers Association (ICFA), which was established by farmers to initiate research into science-based welfare items (eg darkness, density) and to ensure traceability and transparency in the supply chain.
- In early 2023, Mexico had a trade ban imposed based on its failure to produce a satisfactory management plan for the Totoaba. Whilst unrelated to crocodilian programs it is an example of how conservation programs can be vulnerable to the impacts from non-related species. Mexico produces a lot of different products, including boots, from *Caiman* species.

A brief discussion was held between the SC participants about how sustainable use is no longer working as a stand-alone story. Consumers want to know more details around the functioning of habitat protection, carbon sequestering, etc.

The report was noted.

3.2. Trade Monitoring

John Caldwell introduced the item, highlighting:

- The International Alligator and Crocodile Trade Studies (IACTS) continues to be produced annually and latest report can be found on the CSG website.
- CITES reports from Parties are still lagging for some key countries. If a country fails to produce an annual report for three years, they can face a trade ban.

Alvaro Velasco commented that the CITES report is based on international trade and not necessarily representative of the number of skins traded within countries.

The report was noted.

3.3. Veterinary Science

Paolo Martelli thanked the Mexican CSG Working Meeting hosts for holding the veterinary workshop at the last meeting in the absence of the Veterinary Chairs. He informed the meeting that a workshop had been held the day prior to the current SC meeting with wild crocodiles available for necropsy, which allowed real life applications of veterinary science to be discussed.

PM introduced the item, highlighting:

- Communications with members continues to be an issue and perhaps can be resolved through communication with the CSG Executive Officer.
- Still a number of regions without good representation (eg West and Central Africa).

The report was noted.

3.4. Zoos

Kent Vliet introduced the item, highlighting:

- Collette Adams was appointed as a Vice-chair of the zoo group since the last meeting.
- Report is focused on American zoos as European zoos were covered within the Europe regional report.
- AZA is moving away from the Species Survival Plans (SSP) programs towards a SAFE model. Earlier this year, the eight crocodilian species listed under SSP have been re-evaluated and six have been reduced to studbook programs. *A. sinensis* and *Tomistoma* are still SSP programs. There is concern because the emphasis is now placed on ex situ conservation (ie just keeping enough diverse genetic stock in zoos) rather than *in situ*. This may create fundraising issues and import permit issues without SSP labels.
- CrocFEST continues to be a great initiative now having raised over $US900,000 for *in-situ* conservation efforts.
- Croc School continues to be successful after 20 years and over 400 graduates but is now being run by the St Augustine Alligator Farm Croc School.
- Cologne Zoo repatriated three Philippine crocodiles in early 2023.
- Zoos Victoria (Australia) has continued to support the Mabuwaya Foundation's conservation program for *Crocodylus mindorensis*. This is primarily financial, with $AUD40,000 provided in the 2022-23 financial year and $AUD30,000 provided in the 2023-24 financial year to date. Advice has also been provided on captive management of Philippine Crocs at the Philippine Crocodile Conservation Centre in San Mariano, Isabella Province in northeast Philippines. Education supplies, which the Foundation uses for various elements of their community engagement program, benefits wild crocodiles as the more engaged the local people are, the greater the likelihood of them protecting crocodiles and reporting infringements of local and municipal ordinances.

The report was noted.

3.5. Taxonomy

Kent Vliet introduced the item, highlighting:

- About 40 people are involved in developing a consensus list of crocodilian taxonomy.
- 26 species, recognising *Osteolaemus osborni*, but not others until final assessments have been published in peer-reviewed literature. This list will be published in the next CSG Newsletter and website. This will be a live document that will be updated as required.
- There has been a large amount of research done on *C. rhombifer/C. acutus* hybridisation as well as *Caiman* throughout their range. There appears to be remarkable population structure within these species.
- While efforts have been placed around anatomy and genetics for speciation, developing tools for customs and trade issues has been a more complex problem.

Discussion items included:

- Chris Brochu noted that sample availability and disproportionate sampling are two major issues when trying to dissociate some of these complexes based on zoo and museum records. For example, there are numerous samples from East Africa but limited specimens from West Africa.
- Paolo Martelli proposed to have a laboratory where tissue samples could be submitted to genetically speciate animals. Kent Vliet would like to have both genetic tools as well as dichotomous keys to speciate animals.
- Discussion was held about obtaining further genetic samples from the *C. novaeguineae* distributed within the south of Papua New Guinea to determine if the addition of *C. halli* is appropriate.

The report was noted.

3.6. Legal Affairs

Curt Harbsmeier introduced the item, highlighting:

- CSG members continue to provide advice to governmental agencies as required.
- Australian Department of Climate Change, Energy, the Environment and Water is reviewing the "Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles".
- Northern Territory and Queensland crocodile management plans are currently being finalised.
- HCC is increasing (eg Timor-Leste, Jamaica, Cuba, Guatemala). CrocFEST is working with Valerie Garcia (Guatemala) to develop a management plan to help mitigate this and we need to keep working with Governments in all range states.
- South Africa is working on the non-detriment finding for Nile crocodiles and CSG members have been providing evidence and recommendations to the Scientific Authority by the end of the year (as noted in the East & Southern Africa report).
- As reported in the industry-trade report, Californian law 6530 was found to be unconstitutional. The State of California have not contested this ruling which is now final. Christy Plott should be congratulated for her dedication and commitment to this cause and commended on the outcome.
- The Florida Fish and Wildlife Commission approved changes to the current alligator hunt (15 August-1 November; ~7000 permits and ~14,000 alligators) by adding a "special hunt". This includes issuing another 100 permits (200 alligators) and extending the season to these permit holders until 31 December. These permits will be allocated by a random drawing of applicants in May. Approximately 6000 alligators permitted by the current harvest go unharvested, so the special hunt is not expected to have any measurable impact on the Florida alligator population.

The report was noted.

3.7. IUCN Red List Authority (RLA)

Sally Isberg introduced the item, highlighting:

- Three Red List assessments have been published since the last meeting. These were for *C. rhombifer* (Critically Endangered), *C. moreletii* (Least Concern) and *Tomistoma schlegelii*, which was upgraded from Vulnerable to Endangered. Thank you to all the assessor/authors and the numerous other CSG members who contributed to, or reviewed, these publications.
- The Red List team consists of Sally Isberg, Sergio Balaguera-Reina (GIS), Brandon Sideleau (GIS), Colin Stevenson and Clare Wilkie, with Perran Ross as mentor. Caroline Pollock from the IUCN Red List team also provides support and mentoring as required.
- Processes are now very well-established, using existing Action Plans if they exist as the baseline assessment text. Assessment teams are then assigned by the RLA to update the existing knowledge. Excel and Word-based templates have now been created to assist these assessment teams and provide support throughout the assessment process. Maps are created using survey data provided and, if none is provided, publicly available information is used, including CrocAttack data. The RLA assessment team then refines this map based on expert knowledge. Once the assessment and RLA teams are happy with the assessment draft, the CSG Chairs provide their review, at which point further experts are often identified, and further items are refined. After these are addressed, the assessments are submitted. A request was made for people to follow this process and not assign their own teams or start their own assessment without conferring with the RLA first.
- There are currently six assessments underway (*C. palustris, C. suchus, Melanosuchus niger, Mecistops cataphractus, Mecistops leptorhynchus* and *Osteolaemus*) at various stages.
- The next priorities will be the re-assessment of *C. siamensis* and *C. mindorensis*.
- Indigenous and local knowledge remain a conscious part of all Red List assessments. All assessment teams are encouraged to include references showing communications with locals to empower their voice in the formulation of these assessments.
- Better promoting the publication of Red List assessments is being trialled with a presentation-style YouTube with the assessment team. The first, *Tomistoma* with Kyle Shaney, received good reviews and can be seen as another engagement strategy on the CSG's social media platforms.

The report was noted.

4. Task Force/Working Groups

4.1. Future Leaders Program

Alejandro Larriera introduced the item on behalf of Pablo Siroski, highlighting that the FLP has evolved with many of these members now on the SC and in senior CSG roles. As a result, the FLP model will be dissolved, but activities will continue informally as opportunities arise.

The report was noted.

4.2. Drone Working Group

Lonnie MaCaskill introduced the item, highlighting that while the technology was new, there was a lot of interest and enthusiasm around the working group and workshop, but with the ready integration of this technology into the crocodilian survey, conservation and other needs, it is questioned whether a working group was still appropriate.

Charlie Manolis suggested that the working group has met its original terms of reference. Discussions should be held to determine the utility of continuing the working group or whether it should be reframed and, if so, in what form.

Action 3: Discussions to be held to determine the utility of continuing the Drone working group or whether it should be reframed and, if so, in what form.

5. General Business

5.1. CITES (CoP19 and NDF)

Alejandro Larriera introduced the CoP item, highlighting:

- Items from CoP19 (Panama, 2022) have been published in the CSG Newsletter. *C. porosus* (Philippines) and *C. latirostris* (Brazil) were transferred to Appendix II with zero quotas, but the proposal to downlist *C. siamensis* (Thailand) from Appendix I to Appendix II with zero quota was unsuccessful.

Charlie Manolis asked Daniel Natusch to address the item on non-detriment findings (NDFs) and the workshop and NDF guidance recently produced by the CITES Secretariat.

- Dr. Natusch was commission by the CITES Secretariat to coordinate the consultants and production of the guidance. This involved 6-months of online meetings to create draft guidance, which then fed into a 160-person workshop in Nairobi in December 2023. At the workshop, finalised guidance was produced that will then be field tested by specific Parties. Working Groups, and hence chapters for which guidance was produced, concerned several thematic and taxon-specific topics. Those related most closely to crocodilians were the generic NDF guidance, the guidance on incorporating the knowledge of Indigenous People and Local Communities into NDF-making, and the guidance on reptiles. For crocodilian NDFs, little has changed with regard to how Parties should undertake NDFs. Dr. Natusch's intervention also touched upon the broader CITES and wildlife trade landscape, especially in relation to Stricter Domestic Measures imposed by some Parties - which, in some cases, relate more to politics and public sentiment (largely driven by Animal Rights NGOs opposed to wildlife trade) than to science. It is anticipated that such measures will become more strict without concerted efforts to reverse this trend.

The reports were noted.

5.2. Convention on Migratory Species (CMS)

Charlie Manolis introduced the item, highlighting:

- At CMS CoP14 (Samarkand, Uzbekistan, February 2024), a Resolution was adopted that the CMS Scientific Council would consult with the CSG to determine if crocodilians meet the criteria for CMS inclusion. The definition used by the CMS is "the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries". There are currently two crocodilian species listed on the CMS (*Crocodylus porosus* and *Gavialis gangeticus*). As yet, CSG has not been contacted by the CMS.

The report was noted.

6. Other business

6.1. Charlie Manolis introduced the item of reinstating the HCC Working Group as proposed by Brandon Sideleau (by e-mail). The original HCC working group was formed in 2002 and had very specific goals that were achieved, and the group was disbanded. If the HCC group were to reform, the goals of the group should be defined and terms of reference developed.

Action 4: Discussions to be held to determine the utility of forming a working group, including the development of a draft terms of reference and the outputs to be developed.

6.2. Terry Cullen raised concerns around the current membership nomination process and structure of the CSG. Charlie Manolis clarified that the current nomination process through the Regional Chairs and Vice-chairs was working quite well and that the CSG operates on a platform of "tolerance, respect and understanding".

7. 28th CSG Working Meeting

Charlie Manolis informed the SC that two proposals had been received to host the 28th CSG Working Meeting - from Morocco (Crocoparc, Agadir) and Brazil (Caimasul, Corumba). The EC decided that, pending further information, Morocco will host the 28th Working Meeting in 2026. However, as a meeting in Brazil would comprise a different representation of participants, there may be merit in Brazil hosting the 29th Working Meeting in 2027; this would be discussed with the relevant agencies in Brazil.

The meeting closed at 1513 h.

Agenda Item SC. 1.0

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Agenda

---

1. Executive Reports
   - 1.1. Chair's Report (Alejandro Larriera and Charlie Manolis)
   - 1.2. Minutes and Actions from SC meeting, Chetumal (Sally Isberg)
   - 1.3. Executive Officer's Report (Sally Isberg)
   - 1.4. Financial Reports (Charlie Manolis)
   - 1.5. IUCN Membership 2021-2025 (Sally Isberg)

2. Regional Reports
   - 2.1. East & Southern Africa (Xander Combrink)
   - 2.2. West & Central Africa (Matthew Shirley)
   - 2.3. East & Southeast Asia (Lonnie McCaskill)
   - 2.4. Latin America & the Caribbean (Pablo Siroski)
   - 2.5. South Asia & Iran (Anslem de Silva)
   - 2.6. Australia & Oceania (Matt Brien)
   - 2.7. Europe (Fabian Schmidt)
   - 2.8. North America (Ruth Elsey and Allan Woodward)

3. Thematic Group Reports
   - 3.1. Industry (Christy Plott)
   - 3.2. Trade Monitoring (John Caldwell)
   - 3.3. Veterinary Science (Paolo Martelli and Cathy Shilton)
   - 3.4. Zoos (Kent Vliet and Colette Adams)
   - 3.5. Taxonomy (Kent Vliet)
   - 3.6. Legal Affairs (Curt Harbsmeier)
   - 3.7. IUCN Red List (Sally Isberg)

4. Task Force/Working Group Reports
   - 4.1. Future Leaders Program (Alejandro Larriera and Pablo Siroski)
   - 4.2. Drone Working Group (Lonnie McCaskill and Carlos Piña)

5. General Business
   - 5.1. CITES (CoP19 and NDF) (Alejandro Larriera)
   - 5.2. Convention on Migratory Species (Charlie Manolis)

6. 28th CSG Working Meeting (2026)
   - Brochure from CROCOPARC, Agadir, Morocco

Agenda Item: SC. 1.2.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Crocodile Specialist Group Steering Committee Meeting
Chetumal International Business and Convention Centre, Chetumal, Mexico
(4 July 2022)

FINAL MINUTES

SC members present in person: Alejandro Larriera, Perran Ross, Xander Combrink, Matthew Shirley, Rainier Manalo, Pablo Siroski, Hesiquio Benítez Diaz, Marisa Tellez, Luis Bassetti, Laura Porras Murillo, Carlos Piña, Alvaro Velasco, Christy Plott, Enrico Chiesa, Kent Vliet, Valentine Lance, Simone Comparini.

SC members present by Zoom: Grahame Webb, Christine Lippai, Charlie Manolis, Tom Dacey, Matthew Brien, Alfonso Llobet, Allan Woodward, Curt Harbsmeier, Nathalie Kpera, Phil Wilkinson, Ruth Elsey, Colette Adams, Thomas Rainwater, Frank Mazzotti, Gowri Mallapur.

Observers present in person: Kyle Shaney, Robert Godshalk, Bruce Shwedick, Bekky Muscher-Hodges, Helen Sung, Miriam Boucher, Paul Reilly, Robinson Botero Arias, Phoebe Griffith, Alba Imhoff, Treya Picking, Saiyaad Ali, Melina Simoncini, Eduardo Mosso, Iri Gill, Shawn Helflick, Jhonathan Triminio, Gabriela Lopez Jauregui, Samuel Seashole, Sol Gutierrez.

Observers present by Zoom: Mitsuko Takehara, Yoichi Takehara, Noboru Ishii, Gisela Poletta, Sukanao Iida, Jose Arturo Bocanegra Martinez, Kataoka Takayuki, Lucia Fernandez.

SC member apologies: Alison Leslie, Howard Kelly, Emmanuel Amoah, Lonnie McCaskill, Wu Xiaobing, Nao Thuok, Kornvika Youngprapakorn, Yosapong Temsiripong, Luke Evans, Oswald Braken Tisen, Adrian Sugiarto, Steve Platt, Jhon Calderon, Anslem de Silva, Madhava Botejue, Maheshwar Dhakal, Raju Vyas, Abdul Aleem Choudhury, Asghar Mobaraki, S.M.A. Rashid, Thomas Ziegler, Fabian Schmidt, Jeb Linscombe, Pamela Ashley, Kevin Van Jaarsveldt, Helen Crowley, John Caldwell, Cathy Shilton, Paolo Martelli, Chris Brochu, Sally Isberg.

Agenda

The agenda papers for the Steering Committee meeting can be found at;
http://www.iucncsg.org/pages/SC-Meeting%2C-Chetumal%2C-4-July-2022.html

Minutes

Interim CSG co-Chair Alejandro Larriera opened the meeting at 1500 h (Chetumal time), thanking the sponsors and organizers, including both local and national Mexican Governments, for their efforts in arranging the meeting in the face of difficulties caused by the Covid-19 pandemic, which had caused several postponements of the meeting.

One minute silence was held for 13 CSG members who had passed away since the last working meeting in May 2018: Joseph Fagan, Manuel Tabet, Effendy Sumarja, Ernesto Boede, Giam Choo Hoo, Maria Cristina Robayo, Sergio Medrano Bitar, Mario Baudoin, Mushtaq Ahmed, Wayne Sagrera, Widodo Ramono, Jerome Caraguel, Utai Youngprapakorn.

1.1. Chair's Report

The Chair Grahame Webb apologized for not being able to attend the meeting in person, and thanked Alejandro Larriera and Charlie Manolis for filling in as joint co-Chairs during his recent recovery from illness. He also thanked the hosts and organisers of this working meeting.

The Chair highlighted the following:

- The CSG, with some 710 members from 70 countries, is one of the biggest specialist groups within the Species Survival Commission, and that since the last meeting the pandemic had impacted on many of its members, including some deaths.
- Thirteen (13) members had passed away and two were expelled from the CSG since the last working meeting for breaches of the IUCN Code of Conduct.
- Since 2009, 222 students from 42 countries have been awarded SRAS and/or FHVS-SRAS grants. Some of these students are now CSG members, members of the Future Leaders Program and/or are on the CSG Steering Committee. Summary reports for completed studies are posted on the CSG website, and many have maintained their interest in crocodilians and published papers from their projects.
- Establishment of the Future Leaders Program, with Pablo Siroski as Chair, aims to enable members with demonstrated leadership abilities to strengthen their skills, become proficient in the complex world of biopolitics, and further the goals of the CSG. It is intended to get some of the Future leaders to the next CITES CoP, to be held in Panama City, on 14-25 November 2022.
- Industry Issues. Following a survey by Alan Woodward and Perran Ross, the Chair undertook to finalise a report, but this has been made more difficult because of the recent actions by animal rights activists. Matter listed for further discussion in Agenda item 3.1 Industry.
- CSG funding comes from various industry members, which is a double edge sword. However, the CSG is open and transparent and not subjected to any pressure from industry donors.
- CrocFest, headed by a small group people (Colette Adams, Flavio Morrissey and Curt Harbsmeier), is very effective and has achieved remarkable results for crocodilian conservation.
- Case Studies document is still being developed. Delays caused by change in direction with respect to the audience for the document.
- The IUCN-SSC has established a relationship with the Indianapolis Zoo, but not sure how this will work out as many CSG members are not necessarily interested in IUCN activities. (Refer comments in Agenda item 3.6 Legal Affairs).
- The CSG Newsletter continues to be published ever quarter, thanks to the efforts of Charlie Manolis. It provides members with regular information about crocodilians, publications and CSG activities.

1.2. Minutes from SC Meeting, Santa Fe

Tom Dacey introduced the item. He undertook to provide a copy of the "CSG Targets for the 2021-2024 Quadrennium" to SC members (by time of writing of these Minutes this had been done). The report was noted.

1.3. Actions from SC Meeting, Santa Fe

Tom Dacey introduced the item. Actions from the previous SC meeting were also addressed:

1. African Survey Database: Christine Lippai advised "the general feeling is that the database structure is 'old fashioned' and requires a lot of effort and manpower to bring it up to modern standards. It remains an excellent historic source of information about surveys carried out on the continent, but is not of value to incorporate recent survey information." No further action required at this time.
2. Incorporation of contact details of CSG members on CSG website: No actions are recommended at this time - the details of Steering Committee members will remain in the

CSG Newsletter as has been the case for over 18 years now. Given information on the web, locating people is much is easier now.

3. Terms of Reference for Industry Group: The Chair prepared Terms of Reference for the Industry group, which were accepted by the Executive Committee, and appointed Christy Plott as the Vice Chair of the Group.
4. Future Leaders Working Group: Following the verbal report from the working group, it was confirmed that it should now become the "Future Leaders Program", under the leadership of Pablo Siroski and Sergio Balaguera-Reina.

The report was noted.

1.4. Executive Officer Report

Tom Dacey introduced the item. The report was noted.

1.5. CSG/IACS Financial Reports

Charlie Manolis introduced the item, advising that the Auditor's Reports for IACS would be posted on the CSG website (by time of writing of these Minutes, this had been done). He also reported that both WMI and the Executive Officer had volunteered to take a 25% reduction in their contracts due to restrictions on travel, and as a contribution to CSG during this difficult time due to the Covid-19 pandemic.

1.6. IUCN Membership 2021-2025

Tom Dacey introduced the item, advising that of the 710 "members" currently included on the CSG's database, only 590 were registered on the IUCN portal. People who are not on the IUCN database are not formally recognized as members of the CSG (or IUCN), and they are encouraged to register as soon as possible.

1.7. SRAS and FHVS-SRAS

Charlie Manolis introduced the item advising that there had been 222 grants awarded to date, and to date only 3 applicants had failed to complete their projects. Overall, the scheme has been very successful.

Matt Shirley asked whether the outcomes had resulted in publications. Charlie Manolis advised that CSG does not monitor publications produced from funded projects, in part because of the long periods of time that may exist between completion of the project and eventual publications. Students doing their project as part of a MSc or PhD typically publish, but students undertaking projects as part of their undergraduate degree do not. Many students attend working meetings, where they present their work.

Grahame Webb suggested that it might be good to do a review of publications resulting from SRAS students. He also reminded the SC that the prime purpose and focus of the scheme was to get people involved with crocodilians, not publications.

2. Regional Reports

2.1. East and Southern Africa

Xander Combrink introduced the item, highlighting:

- Madagascar: the Madagascar Crocodile Conservation and Sustainable Use Program came to an end in 2019.
- South Africa: a) decrease in wild population; b) breeders from commercial farms provided for hunting; c) increasing number of escapes from commercial farms; and, d) research postponed due to Covid-19 pandemic, beginning again.

- Namibia: research focusing on the decrease in population, while identifying the cause of the trend.
- Zimbabwe: ranching and trophy hunting of Nile crocodiles have contributed to the increase in crocodile populations. Increased HCC in fringe communities.

The report was noted.

2.2. West and Central Africa

Matt Shirley introduced the item, highlighting:

- Emmanuel Amoah (Ghana) replaced retiring regional Vice Chair Prof. Guy Apollinaire Mensah
- An increase in regional membership
- Red List assessments and Action Plans are now progressing
- New Regional Capacity-building Program for Under-represented Species (including crocodilians) is underway
- Two documentaries have been produced on African Dwarf crocodiles in Gabon
- Lots of research is being undertaken

The report was noted

2.3. East and Southeast Asia

Rainier Manalo introduced the item, highlighting:

- Cambodia - FFI involvement
- Indonesia - WCS involvement
- Laos and Vietnam - Laos Zoo
- Philippines: a) involvement of CCPI and Mabuwaya Foundation; b) development of Crocodile Conservation Action Plan in the Philippines 2023-2032; and, c) a split-listing proposal for the transfer of the Philippine population of Saltwater crocodiles (*Crocodylus porosus*) on Palawan Island, from Appendix I to Appendix II, with a zero export quota for wild specimens, has been submitted to CITES.

Charlie Manolis advised that in Cambodia and the Philippines there has been increased collaboration between farmers, Government and NGOs.

The report was noted.

2.4. Latin America and the Caribbean

Pablo Siroski introduced the item, highlighting LAC Regional Office activities and the CSG's 50th Anniversary Virtual Event

- Alvaro Velasco advised on the Report on Trade in the LAC Region for 2010-2020.
- Hesiquio Diaz advised that whilst the CSG working meeting in Chetumal had been postponed three times, he was glad the meeting had eventuated as it will engage many people from the region.
- Alfonso Llobet stressed the impact being incurred on local livelihoods and the economic incentives for local conservation in Bolivia. Charlie Manolis noted that the closure of farms and programs in the region will have impacts on livelihoods.
- Marisa Tellez provided an update on the situation in El Salvador, Honduras and Trinidad & Tobago.
- Grahame Webb indicated that: a) Mexico report raises several important issues, particularly, global recognition of local communities, biodiversity and sustainable use; b) there was an oversupply of skins in trade; c) in the Philippines, *C. porosus* farmers were funding the research on *C. mindorensis*; d) Traceability (see Agenda item 5.2) - many local communities

cannot meet traceability requirements (eg PNG local communities reliant on wild harvests); and, e) CSG review of sustainable use programs is not yet finalized.

The report was noted.

2.5. South Asia and Iran

The report was noted.

2.6. Australia and Oceania

Charlie Manolis introduced the item, highlighting:

- Matthew Brian is now Regional Chair for Australia & Oceania, replacing Charlie Manolis
- The Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles is coming up for review.
- Monitoring of the population in the Northern Territory has occurred consistently since 1975.
- In Queensland, detailed information is awaited on recent population surveys and there has been increasing human-crocodile conflict over the last two decades.
- In Western Australia, there is now only one commercial farm and the population monitoring program has been reduced.
- Papua New Guinea: (a) due to the international market decline, there has been an impact on the wild harvest and conservation program; (b) legislation is being reviewed; and, (c) there is concern that there may be impacts on the local harvest programs and livelihoods.
- Timor-Leste: CrocFest is funding research into whether crocodiles are coming from Australia or elsewhere, with sampling being undertaking by Sebastian Brackhane, and analysis by Australian researchers. Grahame Webb indicated that the crocodile culture beliefs of the people in Timor-Leste are changing.
- Solomon Islands: Government is currently developing a national crocodile management plan, and implement training programs.
- Palau: Has a small stable population and HCC is very uncommon.

2.7. Europe

The report was noted.

2.8. North America

Alan Woodward addressed this item, highlighting:

- Distribution of American alligators is extending north with climate change;
- Price declines for alligator skins is affecting the nuisance alligator program and trappers are seeking assistance funds from Government;
- There has been a decline in the harvest of alligators and eggs;
- Research projects: a) report on the effects of translocation due out soon; b) caiman removal program by Frank Mazzotti.

Ruth Elsey thanked everyone for their contributions to the Louisiana report, and highlighted:

- Surveys
- Reduction in nesting
- Lower prices for skins and effect on trappers

The report was noted.

3. Thematic Group Reports

3.1. Industry

Christy Plott addressed this item, and highlighted:

- Conservation, sustainable use, livelihoods and the industry are intimately linked to each other for many species of crocodilian.
- Luxury markets only want perfect skins. Brands have tightened quality requirements.
- Wild skin markets remain bleak.
- Demand for meat, globally, has eclipsed the demand for skins.
- California issue - it is recommended that industry should:
  (a) increase communication on sustainability, animal welfare, conservation, and alignment with United Nations Sustainable Development Goals industry-wide;
  (b) explore new markets for low-medium grade farmed and wild skins;
  (c) decrease raw skin production, where possible, in order to discourage a global price crash;
  (d) tanners and traders should collaborate to sell old stock of crust and finished leather;
  (e) farms should aim to sell skins as quickly as possible due to tanning issues with old skins;
  (f) implement strict policies internally (and amongst various associations) at the trapper, farm, tannery, manufacturers, and brand/retail store levels for compliance with CITES regulations; and
  (g) aim to increase education on CITES procedures amongst small artisans and cottage businesses to decrease violations globally on single item shipments.

The report was noted.

3.2. Trade Monitoring

The report was noted.

3.3. Veterinary Science

Gowri Mallapur addressed this item. The report was noted.

3.4. Zoos

Kent Vliet addressed this item and highlighted:

- Colette Adams is now a Vice Chair for the Zoo Group.
- Israel asking for assistance in re-homing 700 Nile crocodiles from the Pezael Crocodile Farm that had closed.
- Cooperative project between Dr. Matt Shirley (Project Mecistops), Albuquerque BioPark Zoo, and the staff and administrators of Abidjan Zoo.
- Activities in European zoos (see Agenda item 2.7).
- Zoo Animal of the Year.
- Zoos funding in-situ projects.
- St. Augustine Alligator Farm research contributions.
- St. Louis Zoo Cuban crocodiles.
- CrocFest fundraising events.

The report was noted.

3.5. Taxonomy

Kent Vliet addressed this item and highlighted:

- Problems being experienced in moving tissue samples (eg CITES and other management authorities).
- Definition of “species”.

- Sorting out caiman taxa.

Hesiquio Diaz advised that there is a need to be very careful when advising CITES on taxonomic issues.

The report was noted.

3.6. Legal Affairs

Curt Harbsmeier addressed this item, and highlighted:

- CSG has not been a party to any litigation over the past 3 years.
- Christy Plott's involvement in the California issue was much appreciated.
- Alligator situation in the USA: a) permits increased in Florida; and, b) extended hunting hours.
- Amazon Smile as a fund-raising tool for CSG.
- Renewed focus on ethical considerations.
- IUCN World Commission on Environmental Law (WCEL).
- Indianapolis Zoo and IUCN-SSC create new Global Center for Species Survival.

The report was noted.

3.7. IUCN Red List Authority

Perran Ross advised that Sally Isberg has taken over responsibility for the Red List Authority.

To date 7 species have been submitted to the IUCN Red List Team; 3 more are pending; and, 2 others are almost ready to submit.

The report was noted.

3.8. CITES

Charlie Manolis advised that three "crocodilian" proposals were submitted for consideration to CoP19 (Panama, 14-25 November 2022):

1. Brazil: Transfer of *Caiman latirostris* from Appendix I to Appendix II. This proposal was not provided to CSG for review.
2. Philippines: Transfer of Palawan population of *Crocodylus porosus* from Appendix I to Appendix II, with zero export quota for wild specimens. The draft proposal was reviewed by CSG.
3. Thailand: Transfer of *Crocodylus siamensis* from Appendix I to Appendix II, with zero quota for export of wild specimens. The draft proposal was reviewed by CSG. The proposal is similar to previous, unsuccessful proposal at CoP16. The problem is that a very large captive population is being managed as an Appendix-I species, and wild population is very small.

Grahame Webb advised that previously the CSG was opposed to trade in crocodilians, however, there has been a quantum shift and the CSG now assists proponents with development of proposals. CSG has been asked by IUCN/TRAFFIC to provide comments of these proposals. Any feedback would be appreciated, but there is a tight timeline.

Matt Shirley advised that CITES is organizing workshops on "non-detriment findings", and that CSG should be represented. Grahame Webb suggested that he and Matt should have further discussions on this issue.

The report was noted.

4. Task Force/Working Groups

4.1. Future Leaders Program

Pablo Siroski addressed this item highlighting:

- Restructuring process has been implemented.
- Some FLs were represented as part of official IUCN delegation at CoP18 (Geneva, Switzerland, 17-28 August 2019), and attended a number of side-events on conservation, sustainable use, and livelihoods.
- FLs provided an important review and some feedback on a critical endangered species, *Tomistoma schlegelii*
- FLs involved in the development of "Traceability in Crocodylian Conservation and Management"

The report was noted.

4.2. Drone Working Group

A workshop was held prior to the Chetumal Working Meeting.

The report was noted.

5. General Business

5.1. IUCN World Conservation Congress

The report was noted.

5.2. Traceability

The report was noted.

5.3. Case Studies

The proposed Case Studies document is still being developed.

The report was noted.

6. 27th CSG Working Meeting

The 27th Working Meeting will be held in Darwin, Northern Territory, Australia, tentatively scheduled for early June 2024.

Grahame Webb commented that we are now good at participating in Zoom meetings, and it will no doubt become a feature of future meetings. CSG meetings give people the opportunity to meet and discuss issues with each other, apart from the formal agenda. There is a need to make it more worthwhile for people to travel and participate in face-to-face meetings.

7. Other Business

7.1. CSG Science Group

Carlos Piña suggested that consideration be given to re-establishing the Science thematic group. It was agreed that the matter be discussed out of session during the Working Meeting and a recommendation be made to the CSG Executive Committee for consideration.

Tom Dacey, CSG Executive Officer (csg@wmi.com.au)

Agenda Item: SC. 1.3

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Executive Officer Report

General
Tom Dacey stepped down from the role of the CSG Executive Officer (EO) after 19 years of service in April 2023. Sally Isberg accepted the Executive Officer role and is employed on a part-time basis, based in Darwin, Australia. The EO's current annual salary is $AUD25,000 (approx. $US16,500) which includes all associated on-costs as required by the Australia Taxation Office (eg superannuation, workers compensation, etc.). Any travel expenses incurred by the EO (including attendance at CSG working meetings, regional meetings, etc.) are in addition to the salary, and are subject to prior approval by the Chairs, but none have been requested at this time.

Steering Committee Composition
Current membership of the CSG Steering Committee (SC) is 71 people. The last meeting of SC was just prior to the Chetumal Working Meeting (4 July 2022). This provided an opportunity to update SC members on changes in the CSG and advise them of proposed activities.

CSG Membership
There were 728 CSG members (in 82 countries) recorded in the CSG's database, as of 28 February 2024.

Region	N	%
Latin America & the Caribbean	165	23
North America	146	20
East & Southeast Asia	105	14
South Asia & Iran	91	12
Europe	80	11
Australia & Oceania	68	9
Southern & East Africa	45	6
West & Central Africa	28	4
Totals	**728**	

Since the last CSG working meeting, the IUCN has recognised that many specialist group members were not registered through their portal. An e-mail was distributed to CSG members who were not already registered, seeking their permission for the IUCN to be provided with their details so they could be included. Only two members responded asking for their details to be withheld.

Ten (10) members have passed away since the Chetumal working meeting (2022 - Wayne King, Tran Nga, Roberto "Toby" Ramos Targarona, George Saputra, Paul Weldon; 2023 - Angel Alcala, James Aparicio, Hank Jenkins, Juana Pena Flores, Pedro Vasquez Ruesta) and one ex-member (2023 - Goff Letts). It has recently come to our attention that Harry Andrews (India) passed away in 2018.

CSG Database
We continue to maintain our own CSG database. It is regularly updated with new contact details as they become available. However, this is very much dependent on members informing the EO of any changes to their contact details, particularly e-mail addresses.

Regional Offices
Regional offices were "established" with one-off funding at different times in Latin America & the Caribbean (Argentina), Central America & Caribbean (Belize), South Asia & Iran (Sri Lanka) and East & Southern Africa (South Africa), to enable the Regional Chairs to maintain a CSG office and more active presence in their region. However, only the LAC office has continued with a formal office structure and been funded consistently each year. The CSG Executive Committee has previously agreed to establish a West & Central Africa regional office, and $US5000 has been earmarked for this purpose, if and when required.

Reviews/Missions
Co-ordination was provided for the following since July 2022:

- Review of the "Modelling population dynamics of estuarine crocodiles on Queensland's northern populated east coast"
- CITES CoP19, Panama City, Panama, 14-25 November 2022
- Submission of SSC Internal and SSC Internal EDGE grants - one of each was successful in 2023 (SSC Internal Grant: Marisa Tellez; SSC Internal EDGE grant: Matt Shirley)

Meetings
The Executive Committee currently meets on a monthly/bimonthly basis as necessary. The outcomes of these meetings include:

- Development of "Bullying, Harassment, and Discrimination Prevention Policy for CSG-Endorsed Events"
- Development of "Bullying, Harassment, and Discrimination Resolution Procedures for CSG-Endorsed Events"
- Discuss strategies with the social media team to increase engagement and CSG profile
- Launch Red List assessments to increase engagement on our social platforms
- Create SRAS student and interested persons email lists to increase the awareness of CSG communications
- Other issues discussed and still to be resolved included: Development of a "Communication Strategy" for the CSG; Development of "Crocodile conservation priorities"; Drafted Terms of Reference for Regional and Thematic Group Chairs; and, Revised Nomination Form for members

CSG Newsletter
The CSG Newsletter remains one of the key means of communicating with members and other people and organizations interested in crocodilian conservation. Since July 2004, the Newsletter has been edited and compiled by Charlie Manolis. Since July 2018 the Newsletter has been produced in electronic (pdf) form only. All CSG members are advised by e-mail when the Newsletter is available. Other interested persons/organizations have been advised that the Newsletter is available on the CSG website.

Communication
The main methods of communication within the CSG membership are through e-mail, the CSG Newsletter, the CSG website and specific Zoom meetings. Regular phone contact has been established with several senior members. The CSG website is updated regularly.

Financial Management
Quarterly financial statements are compiled by Charlie Manolis and sent to the CSG Executive and Steering Committee members.

Student Research Assistance Scheme
Between 2009 and April 2024, 269 applications for SRAS and FHVS-SRAS funding were received, of which 249 were approved (SRAS N= 237; FHVS-SRAS N= 12). Details of applicants/projects are posted on the CSG website at: www.iucncsg.org (under Grants).

Next CSG meeting
The venue and host of the 28th CSG Working Meeting will be discussed in Darwin, in April 2024. At the time of writing of this report, the CSG had received two informal submissions to host the 28th Working Meeting, and additional information is being sought these can be assessed and a decision made.

Prepared by: Sally Isberg
Date prepared: 20 March 2024

Agenda Item: SC. 1.4.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Financial Reports

The CSG currently operates its main banking accounts in Darwin, and a not-for-profit NGO (IACS-USA Inc.) established under section 501(c)(3) of the US Internal Revenue Code (contributions by US donors IACS-USA may be tax deductible).

Bank account balances are provided to the CSG Executive Officer at the end of quarter, and financial reports are produced quarterly for the IACS Management Committee and CSG Executive Committee. The IACS operates on a cash transaction basis and does not produce Profit and Loss statements as the only accountable assets are Cash at Bank. At 29 February 2024, the total cash at bank was around $AUD710,164, with $AUD597,513 held in Darwin, Australia, and $US85,417 held in Gainesville, USA.

Financial summaries for January-December 2022, January-December 2023 and January-February 2024 are attached below. The audited reports for IACS-Australia for the 2021-2022 and 2022-2023 Financial Years are also attached.

CSG funds continue to be managed responsibly, with a strong and determined effort to build resources, giving us the financial means to act quickly and decisively when needed. This continues to be possible through the exceptional voluntary effort of our members, the support of our donors and the CSG Executive Officer working part-time.

Prepared by: Charlie Manolis
Date: 17 March 2024

Income and Expenditure for IACS-Australia and IACS-USA, January-December 2022

	IACS ($AUD)	IACS-USA ($USD)	ALL ($AUD)
Opening Balances	**$647,134.12**	**$115,189.83**	**$800,668.42**
Income			
Donations	$97,762.41	$31,084.91	$139,208.96
Interest	$1,236.72	$16.57	$1,258.81
GST Reimbursement	$10,608.00	$0.00	$10,608.00
Auction	$16,494.12	$150.00	$7,694.12
CSG meeting	$40,000.00	$0.00	$40,000.00
Reviews	$1,000.00	$0.00	$10,000.00
Total: Income	**$167,101.25**	**$31,251.48**	**$208,769.89**
Expenditure			
Bank charges	$182.48	$98.85	$314.28
SRAS	$18,026.06	$3,000.00	$22,026.06
Projects	$0.00	$18,433.74	$24,578.32
CoP19	$13,507.72	$0.00	$13,507.72
Executive Officer	$19,800.00	$0.00	$19,800.00
WMI Support	$76,087.22	$0.00	$76,087.22
Newsletter	$6,871.07	$0.00	$6,871.07
LAC Office	$27,933.33	$30,000.00	$67,933.33
CSG Meeting	$20,666.88	$1,000.00	$22,000.22
Annual fees	$19.00	$61.25	$100.67
Miscellaneous	$1,700.00	$30.00	$1,740.00
Audit fees	$1,430.00	$0.00	$1,430.00
Total: Expenditure	**$186,223.76**	**$52,623.84**	**$256,388.89**
Closing Balances	**$628,011.61**	**$93,817.47**	**$753,049.42**

Income and Expenditure for IACS-Australia and IACS-USA, January-December 2023

	IACS ($AUD)	IACS-USA ($USD)	ALL ($AUD)
Opening Balances	**$628,011.61**	**$93,817.47**	**$753,049.43**
Income			
Donations	$67,838.79	$2,557.85	$71,492.86
Interest	$11,585.14	$67.90	$11,682.14
GST Reimbursement	$8,257.00	-	$8,257.00
Auction	$1,260.87	-	$1,260.87
CSG meeting (travel)	$6,500.00	-	$6,500.00
Reviews	$11,000.00	-	$11,000.00
Projects	-	$15,810.67	$22,586.67
Total: Income	**$106,441.80**	**$18,436.42**	**$132,779.54**
Expenditure			
Bank charges	$120.00	$30.00	$162.86
SRAS	$15,826.39	$3,000.00	$20,112.10
Projects	$714.29	$16,950.00	$24,928.57
Executive Officer	$11,825.00	-	$11,825.00
WMI Support	$76,940.87	-	$76,940.87
Newsletter	$5,671.07	-	$5,671.07
LAC Office	-	$10,000.00	$14,285.71
CSG Meeting	$2,376.37	-	$2,376.37
Annual fees	-	$61.25	$87.50
Miscellaneous	$1,700.00	$77.50	$1,810.71
Audit fees	$1,540.00	-	$1,540.00
GST paid	$846.00	-	$846.00
Total: Expenditure	**$117,559.99**	**$30,118.75**	**$160,586.76**
Closing Balances	**$616,893.42**	**$82,135.14**	**$725,242.21**

Income and Expenditure for IACS-Australia and IACS-USA, January-February 2024

	IACS ($AUD)	IACS-USA ($USD)	ALL ($AUD)
Opening Balances	**$616,893.42**	**$82,135.14**	**$725,242.21**
Income			
Donations	$5,487.87	$8,000.00	$16,916.44
Interest	$0.92	$11.85	$17.85
GST Reimbursement	$249.00	-	$249.00
Total: Income	**$5,737.79**	**$8,011.85**	**$17,183.29**
Expenditure			
Bank charges	$20.00	-	$20.00
SRAS	$6,353.95	-	$6,353.95
Projects	$2,857.14	-	$2,857.14
Executive Officer	$13,750.00	-	$13,750.00
Newsletter	$2,071.07	-	$2,071.07
CSG Meeting	-	$5,000.00	$7,142.86
Annual fees	$66.00	-	$66.00
Total: Expenditure	**$25,118.16**	**$5,000.00**	**$32,261.02**
Closing Balances	**$597,513.05**	**$85,146.99**	**$710,164.48**

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

ABN 48 728 346 943

Special Purpose Financial Statements

For the year ended 30 June 2022

JKY & CO

Certified Practising Accountant

PO Box 38233

Winnellie NT 0821

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

STATEMENT BY THE COMMITTEE

FOR THE YEAR ENDED 30 JUNE 2022

The Committee has determined that the association is not a reporting entity and that this special purpose financial report should be prepared in accordance with the accounting policies outlined in Note 1 to the financial statements.

In our opinion –

a) the accompanying financial report as set out on the following pages, being a special purpose financial statement, is drawn up so as to present fairly the state of affairs of the Association as at 30 June 2022 and the results of the Association for the year ended on that date:

b) the accounts of the Association have been properly prepared and are in accordance with the books of account of the Association; and

c) there are reasonable grounds to believe that the Association will be able to pay its debts as and when they fall due.

We confirm as follows:

(a) The names of each committee member of the association during the relevant financial year were:

Grahame Webb (Chair/President)
Alejandro Larriera
Thomas Dacey
Charlie Manolis (Treasurer)
Perran Ross
Christine Lippai
Mitsuko Takehara

(b) The principal activities of the association during the relevant financial year were crocodile research management conservation.

No significant change in the nature of these activities occurred during the year.

(c) The loss of the association for the relevant financial year was: $17,253.82.

.....

CHAIRMAN

1 October 2022

.....

DATED

.....

TREASURER

1 October 2022

.....

DATED

JKY & CO.
CERTIFIED PRACTISING ACCOUNTANT

PO Box 38233
48 Albatross Street
WINNELLIE NT 0821
Ph: 8947 7030
Fax: 8947 7032

JOHN YOUSEF FCPA
Commissioner for Oaths

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

Independent Audit Report

For the year ended 30 June 2022

To the members of International Association of Crocodile Specialists Incorporated

We have audited the accompanying financial report, being a special purpose financial report, of International Association of Crocodile Specialists Incorporated, which comprises the statement of financial position as at 30 June 2022, the statement of comprehensive income for the year then ended, notes comprising a summary of significant accounting policies and other explanatory information and the Management Committee's assertion statement.

The Committee responsibility for the financial report

The Committee is responsible for the preparation and fair presentation of the financial report and have determined that the basis of preparation described in Note 1 is in accordance with Australian Accounting Standards and has meet the requirements of the Associations Act and the needs of the members. The Management Committee's responsibility also includes such internal control as the Management Committee determines what is necessary to enable the preparation and fair presentation of a financial report that is free from material misstatement, whether due to fraud or error.

Auditor's responsibility

Our responsibility is to express an opinion on the financial report based on our audit. We have conducted our audit in accordance with Australian Auditing Standards. Those standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Association's preparation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by Management Committee's as well as evaluating the overall presentation of the financial report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Independence

In conducting our audit, we have complied with the independence requirements of the Australian professional accounting bodies.

Opinion

In our opinion, the financial report presents fairly, in all material respects, the financial position of International Association of Crocodile Specialists Incorporated as at 30 June 2021 and of its financial performance and its cash flows for the year then ended on that date and complies with Australian Accounting Standards and the Associations Act to the extent described in Note 1.

Basis of accounting

Without modifying our opinion, we draw attention to Note 1 to the financial report, which describes the basis of accounting. The financial report has been prepared for the purpose of fulfilling Management Committee's reporting responsibilities. As a result, the financial report may not be suitable for another purpose.

[Signature]
Certified Practising Accountant

John Yousef FCPA

13/10/2022

Date

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED ABN 48 728 346 943

Detailed Profit and Loss Statement
For the year ended 30 June 2022

	2022 $	2021 $
Income		
Interest received	1,236.02	5,374.46
Other income	1,868.33	0.20
Donations	94,324.49	38,080.99
Total income	97,428.84	43,455.65
Expenses		
Accountancy	1,200.00	1,100.00
Bank Fees And Charges	119.75	243.90
CSG Executive Officer Contract	20,837.50	25,000.00
WMI Executive Service Contract	66,000.00	117,000.00
Fees & charges		18.00
Grants to International Organisations	18,810.49	19,857.99
Reptile traceability report		3,000.00
Newsletter Production	4,064.61	5,155.52
Professional Fees	2,104.85	
Web hosting	1,545.46	1,440.00
Travel, accom & conference		632.51
Total expenses	114,682.66	173,447.92
Profit (loss) from ordinary activities before income tax	**(17,253.82)**	**(129,992.27)**
Income tax revenue relating to ordinary activities		
Net profit (loss) attributable to the association	**(17,253.82)**	**(129,992.27)**
Total changes in equity of the association	**(17,253.82)**	**(129,992.27)**
Opening retained profits	647,001.58	776,993.85
Net profit (loss) attributable to the association	(17,253.82)	(129,992.27)
Closing retained profits	**629,747.76**	**647,001.58**

These financial statements are audited. They must be read in conjunction with the attached Audit Report and Accompanying Notes which form part of these financial statements.

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED ABN 48 728 346 943

Detailed Balance Sheet as at 30 June 2022

	Note	2022 $	2021 $
Current Assets			
Cash Assets			
Cash at bank		85,658.34	27,049.52
		85,658.34	27,049.52
Current Tax Assets			
Input tax credit control account		171.33	2,269.33
		171.33	2,269.33
Other			
Short term deposits		543,918.09	617,682.73
		543,918.09	617,682.73
Total Current Assets		**629,747.76**	**647,001.58**
Total Assets		**629,747.76**	**647,001.58**
Net Assets		**629,747.76**	**647,001.58**
Members' Funds			
Accumulated surplus (deficit)		629,747.76	647,001.58
Total Members' Funds		**629,747.76**	**647,001.58**

Note 1: Summary of Significant Accounting Policies

This financial report is a special purpose financial report prepared in order to satisfy the financial reporting requirements of the Associations Incorporations Act. The committee has determined that the association is not a reporting entity.

The financial report has been prepared on an accrual basis and is based on historical costs and does not take into account changing money values or, except where specifically stated, current valuations of non-current assets.

The following significant accounting policies, which are consistent with the previous period unless otherwise stated, have been adopted in the preparation of this financial report.

(a) Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, and other short-term highly liquid investments with original maturities of three months or less.

(b) Revenue and Other Income

Revenue is measured at the fair value of the consideration received or receivable after taking into account any trade discounts and volume rebates allowed. For this purpose, deferred consideration is not discounted to present values when recognising revenue.

Interest revenue is recognised using the effective interest rate method, which for floating rate financial assets is the rate inherent in the instrument. Dividend revenue is recognised when the right to receive a dividend has been established.

Grant and donation income is recognised when the entity obtains control over the funds, which is generally at the time of receipt.

All revenue is stated net of the amount of goods and services tax (GST).

(c) Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Taxation Office (ATO). Receivables and payables are stated inclusive of the amount of GST receivable or payable. The net amount of GST recoverable from, or payable to, the ATO is included with other receivables or payables in the assets and liabilities statement.

(c) Currency

All amounts shown are in $AUD*

	2022	2021

Note 2: Revenue and Other Income

Revenue:

Interest revenue	1,236.02	5,374.46
Other income	1,868.33	0.20
Donations	94,324.49	38,080.99
	97,428.84	**43,455.65**

Note 3: Cash assets

Bank accounts:		
Cash at bank	85,658.34	27,049.52
	85,658.34	**27,049.52**

All amounts shown are in $AUD*

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

ABN 48 728 346 943

Special Purpose Financial Statements

For the year ended 30 June 2023

JKY & CO

Certified Practising Accountant

PO Box 38233

Winnellie NT 0821

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

STATEMENT BY THE COMMITTEE

FOR THE YEAR ENDED 30 JUNE 2023

The Committee has determined that the association is not a reporting entity and that this special purpose financial report should be prepared in accordance with the accounting policies outlined in Note 1 to the financial statements.

In our opinion –

a) the accompanying financial report as set out on the following pages, being a special purpose financial statement, is drawn up so as to present fairly the state of affairs of the Association as at 30 June 2023 and the results of the Association for the year ended on that date:

b) the accounts of the Association have been properly prepared and are in accordance with the books of account of the Association; and

c) there are reasonable grounds to believe that the Association will be able to pay its debts as and when they fall due.

We confirm as follows:

(a) The names of each committee member of the association during the relevant financial year were:

Grahame Webb (Chair/President)
Alejandro Larriera
Thomas Dacey (Secretary)
Charlie Manolis (Treasurer)
Perran Ross
Christine Lippai
Mitsuko Takehara

(b) The principal activities of the association during the relevant financial year were crocodile research management conservation.

No significant change in the nature of these activities occurred during the year.

(c) The loss of the association for the relevant financial year was: $13,437.64.

....

CHAIRMAN **DATED**

....

TREASURER **DATED**

JKY & CO.
CERTIFIED PRACTISING ACCOUNTANT

PO Box 38233
48 Albatross Street
WINNELLIE NT 0821
Ph: 8947 7030
Fax: 8947 7032

JOHN YOUSEF FCPA
Commissioner for Oaths

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED

Independent Audit Report

For the year ended 30 June 2023

To the members of International Association of Crocodile Specialists Incorporated

We have audited the accompanying financial report, being a special purpose financial report, of International Association of Crocodile Specialists Incorporated, which comprises the statement of financial position as at 30 June 2023, the statement of comprehensive income for the year then ended, notes comprising a summary of significant accounting policies and other explanatory information and the Management Committee's assertion statement.

The Committee responsibility for the financial report

The Committee is responsible for the preparation and fair presentation of the financial report and have determined that the basis of preparation described in Note 1 is in accordance with Australian Accounting Standards and has meet the requirements of the Associations Act and the needs of the members. The Management Committee's responsibility also includes such internal control as the Management Committee determines what is necessary to enable the preparation and fair presentation of a financial report that is free from material misstatement, whether due to fraud or error.

Auditor's responsibility

Our responsibility is to express an opinion on the financial report based on our audit. We have conducted our audit in accordance with Australian Auditing Standards. Those standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Association's preparation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by Management Committee's as well as evaluating the overall presentation of the financial report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Independence

In conducting our audit, we have complied with the independence requirements of the Australian professional accounting bodies.

Opinion

In our opinion, the financial report presents fairly, in all material respects, the financial position of International Association of Crocodile Specialists Incorporated as at 30 June 2023 and of its financial performance and its cash flows for the year then ended on that date and complies with Australian Accounting Standards and the Associations Act to the extent described in Note 1.

Basis of accounting

Without modifying our opinion, we draw attention to Note 1 to the financial report, which describes the basis of accounting. The financial report has been prepared for the purpose of fulfilling Management Committee's reporting responsibilities. As a result, the financial report may not be suitable for another purpose.

_____ _____

[Signature] John Yousef FCPA
Certified Practising Accountant

_____

Date

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED ABN 48 728 346 943

Detailed Profit and Loss Statement

For the year ended 30 June 2023

	2023 $	2022 $
Income		
Interest received	1,093.90	1,236.02
Other income	553.80	1,868.33
Donations	106,485.44	94,324.49
Projects	20,000.00	
Total income	128,133.14	97,428.84
Expenses		
Accountancy	1,300.00	1,200.00
Bank Fees And Charges	121.46	119.75
Conference/seminar costs	2,160.30	
CSG Executive Officer Contract	14,850.00	20,837.50
WMI Executive Service Contract	80,800.00	66,000.00
Fees & charges	19.00	
Grants to International Organisations	22,111.28	18,810.49
Newsletter Production	5,155.52	4,064.61
Professional Fees		2,104.85
Web hosting	1,545.46	1,545.46
Travel, accom & conference	13,507.76	
Total expenses	141,570.78	114,682.66
Profit (loss) from ordinary activities before income tax	**(13,437.64)**	**(17,253.82)**
Income tax revenue relating to ordinary activities		
Net profit (loss) attributable to the association	**(13,437.64)**	**(17,253.82)**
Total changes in equity of the association	**(13,437.64)**	**(17,253.82)**
Opening retained profits	629,747.76	647,001.58
Net profit (loss) attributable to the association	(13,437.64)	(17,253.82)
Closing retained profits	**616,310.12**	**629,747.76**

These financial statements are audited. They must be read in conjunction with the attached Audit Report and Accompanying Notes which form part of these financial statements.

INTERNATIONAL ASSOCIATION OF CROCODILE SPECIALISTS INCORPORATED ABN 48 728 346 943

Detailed Balance Sheet as at 30 June 2023

	Note	2023	2022
		$	$
Current Assets			
Cash Assets			
Cash at bank		117,131.34	85,658.34
		117,131.34	85,658.34
Other			
Short term deposits		500,008.09	543,918.09
		500,008.09	543,918.09
Total Current Assets		**617,139.43**	**629,576.43**
Total Assets		**617,139.43**	**629,576.43**
Current Liabilities			
Current Tax Liabilities			
GST payable control account		1,000.00	
Input tax credit control account		(170.69)	(171.33)
		829.31	(171.33)
Total Current Liabilities		**829.31**	**(171.33)**
Total Liabilities		**829.31**	**(171.33)**
Net Assets		**616,310.12**	**629,747.76**
Members' Funds			
Accumulated surplus (deficit)		616,310.12	629,747.76
Total Members' Funds		**616,310.12**	**629,747.76**

Note 1: Summary of Significant Accounting Policies

Basis of Preparation

This financial report is a special purpose financial report prepared in order to satisfy the financial reporting requirements of the Associations Incorporations Act . In the opinion of the committee the association is not a reporting entity.

The financial report has been prepared on an accrual basis and is based on historical costs and does not take into account changing money values or, except where specifically stated, current valuations of non-current assets..

The following significant accounting policies, which are consistent with the previous period unless otherwise stated, have been adopted in the preparation of this financial report.

(a) Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, and other short-term highly liquid investments with original maturities of three months or less.

(b) Revenue and Other Income

Revenue is measured at the fair value of the consideration received or receivable after taking into account any trade discounts and volume rebates allowed. For this purpose, deferred consideration is not discounted to present values when recognising revenue.

Interest revenue is recognised using the effective interest rate method, which for floating rate financial assets is the rate inherent in the instrument. Divident revenue is recognised when the right to receive a dividend

Grant and donation income is recognised when the entity obtains control over the funds, which is generally at the time of receipt.

All revenue is stated net of the amount of goods and services tax (GST). has been established.

(c) Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Taxation Office (ATO). Receivables and payables are stated inclusive of the amount of GST receivable or payable. The net amount of GST recoverable from, or payable to, the ATO is included with other receivables or payables in the assets and liabilities statement.

(d) Currency

All amounts shown are in $AUD.

	2023	2022

Note 2: Revenue and Other Income

Revenue:

Interest revenue	1,093.90	1,236.02
Other income	553.80	1,868.33
Donations	106,485.44	94,324.49
Projects	20,000.00	
	128,133.14	**97,428.84**

Note 3: Cash assets

Bank accounts:		
Cash at bank	117,131.34	85,658.34
	117,131.34	**85,658.34**

Note 4: Tax Liabilities

Current

GST payable control account	1,000.00	
Input tax credit control account	(170.69)	(171.33)
	829.31	**(171.33)**

Agenda Item: SC. 1.5

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

IUCN SSC Membership 2021-2025

The IUCN SSC requests members to renew their registration after each quadrennium, with the current quadrennium being 2021-2025.

At the last CSG Steering Committee meeting, it was noted that many members had not renewed their membership with the IUCN, whereby their membership had lapsed.

After recognising that many Specialist Groups (SGs) were maintaining separate membership databases to deal with this issue, in May 2023 the IUCN offered to add SG members to their membership database. An e-mail was sent to all non-IUCN listed CSG members seeking permission to provide their details to the IUCN.

Two CSG members requested that their details not be provided to the IUCN, while all others were provided. This resolves the Agenda item SC26 1.6.

It is unclear what procedure will be used at the start of the next quadrennium, but CSG will communicate this with CSG members as information becomes available.

Prepared by: Sally Isberg, Executive Officer
Date prepared: 18 January 2024

Agenda Item: SC. 2.1.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

East and Southern Africa

Information on the status of Nile crocodiles in the East & Southern Africa region

South Africa: The South African National Biodiversity Institute (SANBI) facilitated a workshop in 2022 to discuss and determine the national Non-Detriment Finding (NDF) for Nile crocodiles. CSG regional members collaborated actively with SANBI and provided guidance and comment on the NDF document produced. Dr. Jeanetta Selier, Senior Scientist at SANBI, reports that the NDF has now been finalised and will be presented to the Scientific Authority of South Africa within the next few months for approval. The Scientific Authority includes one representative from each of the nine provincial conservation agencies of South Africa, together with representatives from the Department of Environment, Forestry and Fisheries, SANBI, South African National Parks, and the National Zoological Garden.

The inaugural meeting for the South African Crocodile Monitoring Network was held at Nkwazi Lodge, Pongola Game Reserve, KwaZulu-Natal (26-28 September 2023). The event was organised through African Ecological Conservation Projects with sponsorship of selected travel allowances by Ubunthu Trust. The main objective of the meeting was to share information on the current situation regarding the monitoring of wild crocodile populations throughout South Africa and discuss factors affecting the conservation of these populations. A second objective was to use data from the meeting to assist with drafting a Biodiversity Management Plan (BMP) for the Nile crocodile in South Africa. Regional CSG members have been calling for a BMP for South Africa's Nile crocodile population to guide management to ensure long-term survival of the species in the wild. The BMP falls under the National Environmental Management Biodiversity Act (Act No. 10 of 2004). The event was attended by provincial herpetologists, conservation ecologists, representatives from academic institutions, and parties with an interest in the conservation of Nile crocodiles in South Africa. Several interested parties also attended the meetings virtually.The meeting included presentations on the status of monitoring programs throughout the provinces of KwaZulu-Natal, Limpopo, and Mpumalanga as well as the situation in the North-West province.The populations of Ndumo Game Reserve and Kruger National Park were discussed as well.A practical demonstration of crocodile veterinary procedures and fieldwork, including capture operations was conducted. Presentations on the hunting market for crocodiles, human-crocodile conflict, the South African crocodile farming industry, and ecotoxicology was also presented. Discussions on the introduction of crocodile ranching and hunting took place. During most discussions, the lack of funding for all aspects of crocodile conservation became apparent. Currently, the establishment of a non-profit entity, specifically for crocodile surveys and monitoring in South Africa is being discussed. It could facilitate funding as well as coordinate efforts across provinces and between different conservation agencies to proceed with the creation of the national Nile crocodile BMP.

Dr Krystal Tolley from SANBI reports that a lab in Cape Town (Diplomics) has agreed to sequence the entire genome for the Nile crocodile.

Ezemvelo KZN Wildlife, the provincial conservation agency for KwaZulu-Natal (KZN) province, hosted two internal workshops (with invited external participation) focusing on Nile crocodiles. The workshops were chaired by Mr Ian Rushworth, Scientific Manager Ecological Advice (West) of Ezemvelo KZN Wildlife. Issues that were discussed included: a) the genetic structure of southern African crocodiles and conservation implications; b) implications for mixing crocodiles from different areas, genetic supplementation of wild populations and the process for improving genetic understanding, including adding additional KZN samples to the analysis; c) the status of wild crocodiles in KZN, drafting a Nile Crocodile Biodiversity Management Plan and an update on Nile crocodile farming in KZN; d) permit conditions required to safeguard wild crocodile population genetics relating to import and keeping of live crocodiles, guidelines/rules for relocation of problem crocodiles from different river systems; e) Nile crocodile welfare on crocodile farms (ie single penning and dental management); and, f) welfare standards and general operating procedures for the South African crocodile industry, permit conditions for crocodile farming relating to animal welfare, wild crocodile hunting and permit conditions relating to this, understanding lead contamination, hunting of captive bred crocodiles in small dams and permit conditions for this. A key point highlighted by Ian Rushworth was that crocodile farming has resulted in the mixing of animals from historically separated major drainage basins, resulting in unnatural levels of genetic mixing. The escape, active release, and accidental release of these farmed crocodiles into natural systems is problematic. With climate change,

the frequency of escapes from flooded and/or damaged facilities is likely to increase. A genetics project will be initiated to better understand the implications.

Sharon Louw, District Ecologist Central East (iLembe & King Cetshwayo Districts, KZN Wildlife) reported on the most southern natural nesting location of Nile crocodiles, except for the re-introduction of Nile crocodiles to the Eastern Cape by Tony Pooley in the 1980's, followed by records of successful nesting.

Water levels in the Matigulu-Nyoni estuary and Nyoni River were low, making it easier to conduct a foot patrol to the Nile crocodile nesting grounds. Low water levels make the system accessible to poachers and cattle that are herded into the protected area. Increased activity and disturbances at the Nile crocodile breeding grounds, and the threat of excessive gillnetting, particularly in the Nyoni River, pose a threat to the survival of crocodile hatchlings. The population are restricted to the river systems within the protected area.

Illegal cattle grazing continues unabated within the protected area regardless of management's efforts to herd cattle out of the protected area. Aquatic alien invasive plant species present a threat to the natural functioning of the Nyoni River, including Matshangula pan in the adjacent grasslands. The Nyoni River channel is narrow, and although deeper channels exist, the river is a major corridor for Nile crocodile movements, largely restricted to the protected area. The movement of floating mats of common water hyacinth (*Pondedaria crassipes*) are restricted by antelope grass (*Echinochloa pyramidalis*) that compartmentalise the river. These barriers have been effective for the biological control program and the release of water hyacinth planthoppers (*Megamelus scutellaris*). Flood events dislodge aquatic invasive plants in the Nyoni River, washing them into the Matigulu-Nyoni estuary where plants die due to increased salinity levels.

Poaching levels in the protected area continue to increase. The planned 2023 crocodile nest survey planned to take place between 15 and 17 March had to be delayed due to a gang of armed gunmen taking refuge in the protected area after robbing retail outlets at Macambini. An illegal camping shelter was located during the Nile crocodile nest survey on 29 March. Poachers use these sites to manage gillnetting operations (including other illegal activities) in the protected area. Field rangers apprehended a person at the shelter, seven gill nets with a total length exceeding 900 m were retrieved and burnt in the fire at the shelter. Field Rangers requires reliable canoes (preferably kayaks which offer greater stability) on station to facilitate greater coverage of the Matigulu-Nyoni estuary and Nyoni River, especially at times when these waters are not navigable by boat.

HCC and public awareness:
Dr. Simon Pooley submitted a manuscript "Research and Management of the Nile crocodile (*Crocodylus niloticus*) in Ndumo Game Reserve". It is a historical overview and will be published as part of a special issue focusing on the past, present, and future research at Ndumo Game Reserve.

Of great concern is the increase in Nile crocodile escapees from crocodile farms and other facilities, often followed by crocodile attacks on people in that area. This is especially true in areas where crocodiles have not been seen in recent times, for instance, Northwest province.

Tanzania: Dr. Xander Combrink conducted a one-day Nile crocodile workshop in October 2022 in conjunction with Six Rivers Africa and the Tanzania Wildlife Research Institute (TAWIRI) with 16 Tanzanian veterinarians and TAWIRI and TANAPA ecologists in the Msolwa section of Nyerere National Park. The workshop covered topics such as the biology and ecology of crocodilians, catching methods, the marking of Nile crocodiles and transmitter attachment methods, Nile crocodile survey and monitoring methods as well as human-crocodile conflict and management. The workshop was followed by fieldwork in the Kilombero River consisting of setting 10 crocodile baited snare traps, daily trap checking and rebaiting, as well as active crocodile capture from boats during the day and night. In total, five Nile crocodiles were captured in the Kilombero River, and satellite transmitters were attached to four individuals. Reports summarised mean daily movements per crocodile, mid-river linear distance, and a visual overview of mapped GPS locations and home ranges. Unfortunately, the solar-powered transmitters did not last very long and transmitter efficiency, calculated as a percentage of recorded GPS locations from the scheduled duty cycle (ie six potential recordings per 24-hour day) was 6.8%, 26.3%, 48.9% and 63.5% for the four units until the day the last unit stopped transmitting. Due to the poor performance of the SpoorTrack satellite transmitters in 2022, Six Rivers Africa procured four satellite tags from African Wildlife Tracking based in Pretoria South Africa for the 2023 fieldwork, and they are non-solar units. A Memorandum of Understanding has been drafted between the Department of Nature Conservation of the Tshwane University of Technology and TAWIRI and is close to being finalised. Six Rivers Africa has agreed to sponsor two MSc students from TAWIRI/TANAPA to study through the Tshwane University of Technology in South Africa in 2024.

Research and Publications:

In South Africa, the following post-graduate research projects are being carried out:

- Fortunate Davhana from the Department of Nature Conservation of the Tshwane University of Technology has finally started fieldwork for her Masters study titled "Experimental study investigating the effect of ingested lead (Pb) in captive Nile crocodiles (*Crocodylus niloticus*)". The study aims to measure lead concentrations in captive sub-adult Nile crocodiles as well as several other parameters. The main supervisor is Dr. Xander Combrink with co-supervisors Prof. M. Humphries (WITS), Dr. Nimmi Seoraj-Pillai (TUT) and Dr. Juan Scheun (TUT).

- Nompumelelo Ngcobo from the Department Nature Conservation of the Tshwane University of Technology will continue with her Masters study that was delayed from 2020 due to Covid-19. The title of her study is "Population status and conservation conundrum of Nile crocodiles (*Crocodylus niloticus*) at Lake Sibaya, South Africa". Her study aims to determine the Nile crocodile population size, establish likely causes for the decline, and investigate opportunities and benefits for lake users to conserve crocodiles in Lake Sibaya. The main supervisor is Dr. Xander Combrink with co-supervisors Prof. T. Nangammbi (TUT) and Dr. Nimmi Seoraj-Pillai (TUT).

- Joshua Smit from the University of Pretoria finished an Honours study titled "Behavioural sensitivity of Nile crocodiles (*Crocodylus niloticus*) to thermal environments" under the supervision of Prof. Stephan Woodborne, Prof. Jan Myburgh and Dr. Albert Myburgh.

- Albert Wilken from the University of Pretoria finished an Honours study titled "The suitability of census techniques for the management of threats to crocodilian populations" under the supervision of Prof. Stephan Woodborne, Prof. Jan Myburgh and Dr. Albert Myburgh.

Publications include:

- Du Plooy, K.J., Swan, G.E., Myburgh, J.G. and Zeiler, G.E. (2023). Electroencephalogram (EEG) assessment of brain activity before and after electrical stunning in the Nile crocodile (*Crocodylus niloticus*). Scientific Reports 13: 20250.

- Humphries, M., Benitez-Nelson, N. and Combrink, X. (2022). Trace metal accumulation in eggs of wild Nile crocodiles (*Crocodylus niloticus*) from Lake St Lucia, South Africa: Implications for biomonitoring in a global biodiversity hotspot. Arch Environ Contam Toxicol (doi: 10.1007/s00244-022-00960-5)

- Humphries, M., Myburgh, J., Campbell, R. and Combrink, X. (2022). High lead exposure and clinical signs of toxicosis in wild Nile crocodiles (Crocodylus niloticus) from a World Heritage Site: Lake St Lucia Estuarine System, South Africa. Chemosphere 303 (https://doi.org/10.1016/j.chemosphere.2022.134977).

- Lensink, A.V. (2023). Bacterial and Fungal Penetration of the Nile Crocodile (*Crocodylus niloticus*) Egg in Relation to the Eggshell and Eggshell Membrane Anatomy and Microstructure. PhD thesis, University of Pretoria, Pretoria, South Africa.

- Lensink, A.V., Swan, G.E. and Myburg, J.G. (2023). The structure of the eggshell and eggshell membranes of *Crocodylus niloticus*. Journal of Microscopy (doi: 10.1111/jmi.13173).

- Meal Diets as a Potential for Replacement of Fishmeal Protein in Commercial Production of Mozambique Tilapia (*Oreochromis mossambicus*). PhD thesis, University of KwaZulu-Natal, Pietermaritzburg, South Africa.

- Myburgh, A., Botha, H., Combrink, X., Myburgh, J., Guillette, Jr., L.J., Hall, G., Chimimba, C. and Woodborne, S. (2022). Terrestrial diet dependence in an unprotected Nile crocodile (*Crocodylus niloticus*) population. Journal of Herpetology 56(4): 507-513.

- Myburgh, A., Myburgh, J., Steyl, J., Downs, C.T., Botha, H., Robinson, L. and Woodborne, S. (2023). The histology and growth rate of Nile crocodile (*Crocodylus niloticus*) claws. Journal of Morphology 284(10) (doi: 10.1002/jmor.21634).

- Price, C., Ezat, M.A., Hanzena, C. and Downs, C.T. (2022). Never smile at a crocodile: Gaping behaviour in the Nile crocodile at Ndumo Game Reserve, South Africa. Behavioural Processes 203 (https://doi.org/10.1016/j.beproc.2022.104772).

- Viljoen, D.M., Webb, E.C., Myburgh, J.G., Truter, J.C., Lang, J.W. and Myburgh, A. (2023). Adaptive thermal responses of captive Nile crocodiles (*Crocodylus niloticus*) in South Africa. Applied Animal Behaviour Science (https://doi.org/10.1016/j.applanim.2023.106098).

- Viljoen, D., Webb, E., Myburgh, J., Truter, C. and Myburgh, A. (2023). Remote body condition scoring of Nile crocodiles (*Crocodylus niloticus*) using uncrewed aerial vehicle derived morphometrics. Front. Anim. Sci. 4:1225396. doi: 10.3389/fanim.2023.1225396

Namibia: Research and Publications
- Zan Le Roux finished his Master's study titled "The state of crocodiles in the Kunene River, Namibia: Population dynamics and socio-ecological interactions". The main supervisor was Dr. Alison Leslie, and the co-supervisors were Dr. Patrick Aust and Vince Naude.

South Sudan: Research and Publications:
- Benansio, J.S., Demaya, G.S., Dendi, D. and Luiselli, L. (2022). Attacks by Nile crocodiles (*Crocodylus niloticus*) on humans and livestock in the Sudd Wetlands, South Sudan. Russian Journal of Herpetology 29(4): 199-205.

Uganda: Research and Publications:
- Amanya, S. (2023). Conservation and Management of the Nile crocodile "*Crocodylus niloticus*" in Uganda, a case study of Lake Victoria and Victoria Nile River at Murchison Falls National Park. MSc thesis, Universidad Internacional de Andalucía, Spain.

- Huge, J. (2023). The state and perceptions of human-crocodile interactions around Murchison Falls Conservation Area, Uganda. Human Dimensions of Wildlife (https://doi.org/10.1080/10871209.2023.2212692).

- Melo, K., Horvat, T. and Ijspeert, A.J. (2023). Animal robots in the African wilderness: Lessons learned and outlook for field robotics. Sci Robot 8(85) (doi: 10.1126/scirobotics.add8662).

Zimbabwe: Research and Publications:
- Matanzima, J., Marowa, I. & Nhiwatiwa. T. (2023). A Negative human-crocodile interactions in Kariba, Zimbabwe: data to support potential mitigation strategies. Oryx. 57 (4): 452 - 456. (doi:10.1017/S003060532200014X)

- Hocutt, C.H. (2022). Seasonal variation in thermoregulation of wild free-ranging Nile crocodiles: Recovery of a 36-year old data set. International Journal of Current Microbiology and Applied Science 11(10): 101-11.

- Simakani, A., Mashapa, C., Muboko, N., Mutanga, C.N. and Gandiwa, E. (2023). Trends and local perceptions of human-crocodile conflicts in Kariba town, northern Zimbabwe. Human Dimesions of Wildlife (https://doi.org/10.1080/10871209.2023.2243970).

- Te Velde, K., Peeters, E., Verdegem, M. and Beijer, J. (2022). Aquaculture carrying capacity of Nile tilapia *Oreochromis niloticus* and Nile crocodile *Crocodylus niloticus* in Lake Kariba, Zambia and Zimbabwe. Aquaculture Environment Interactions 14: 113-125.

- Makumbe, P., Mapurazi, S., Jaravani, S. and Matsilele, I. (2022). Human-Wildlife Conflict in Save Valley Conservancy: Residents' attitude toward wildlife conservation. Scientifica (Cairo) (doi:10.1155/2022/2107711).

- Hungwe, H., Utete, B. and Madamombe, H. (2024). Assessing human crocodile conflicts in the Dande Area, Zimbabwe: Data on potential mitigation strategies. Human Wildlife Interactions (*in press*).

Prepared by: Xander Combrink
Date prepared: 23 March 2024

Agenda Item: SC. 2.2.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

West and Central Africa

The West & Central Africa region (WCA) continues to advance its primary missions of: 1) better understanding crocodiles, their conservation and management needs throughout WACA; and, 2) attracting local personnel/organizations and developing capacity for crocodile work within the region. Since the last CSG working meeting (Chetumal, Mexico, 2022), we have been productive to these ends. Here we recount some of the events over the last two years.

Retirement of Regional Vice Chair: We said farewell to Christine Lippai, who stepped down as regional Vice Chair after nearly a decade of service to the region. Throughout her tenure as part of the WCA leadership team, Christine was instrumental in bringing increased attention to the region. In particular, she played critical roles helping to organize and implement our second (2010, Burkina Faso) and third (2015, Cote d'Ivoire) regional meetings. And was instrumental in bringing range State leadership to our team. We would like to thank Christine for all her valuable contributions to helping build up and support the WCA region throughout her tenure. We look forward to continuing to work with her through the Executive Committee.

Red List Assessments: WCA is one of the most diverse regions for crocodylian species, housing all seven of Africa's crocodylians. Since 2022, our regional leadership team has submitted assessment drafts for the West African slender-snouted crocodile *Mecistops cataphractus* (CR) and the Central African slender-snouted crocodile *M. leptorhynchus* (EN) - the first ever review for the latter. We are currently working on the assessment for the West African crocodile *Crocodylus suchus* (VU) and the Congo Dwarf crocodile (*Osteolaemus osborni*), also their first assessments and inclusion on the IUCN Red List. We anticipated that these assessments would be published on the Red List in 2022, but there have been delays. Part of the issue has to do with availability of the regional leadership team to move them forward, as well as changes in CSG's Red List team and their availability. But much of the issue has to do with building regional capacity to implement IUCN's Assess, Plan, Act cycle. We are using these assessments as opportunities to train CSG WCA members in Red List assessment methods - which can take considerably longer. We are hopeful that all will be submitted and published in 2024.

Conservation Action Plans: Conservation action plans have been in development for all 6 crocodylian species in the WCA region. For four of these species, *O. osborni*, *O. sp. nov. cf. tetraspis - West Africa, M. leptorhynchus* and *C. suchus*, this is the first time that they will be represented by CSG-produced action plans. And, for 5 of the 6 species, this is the first time that the action planning process is being led by range State CSG members working on these species. We were hopeful that they would be available as of 2022, but the work is advancing slowly. A recent SSC EDGE internal grant to the WCA region for *Osteolaemus* will certainly facilitate finalization of the plans for these species.

Updated Crocodylian Taxonomy: Since the early 2000s, increasing evidence has been found for the existence of cryptic crocodylian species from Africa, specifically the West and Central African region. There is now strong support for 7 crocodylian species on the continent. The formal resurrection and updated description of the West African crocodile *C. suchus* is still underway, though this species is now so entrenched in the literature this is just a formality. The genus *Osteolaemus* contains three taxa, with prior names available for all. Two of these, *O. tetraspis* and *O. osborni* are sufficiently entrenched in the literature, but the third taxon from West Africa Ghana westwards has yet to be formally resurrected in the literature. A formal description and systematic revision of the genus *Osteolaemus* is currently in the works as a collaborative effort amongst various CSG WCA members and we will be presenting updates on this during the working meeting.

Regional Capacity-building Program for Underrepresented Species (including crocodylians): Since 2022, M. Shirley and E. Amoah have been running a conservation science and planning program to support about 40 junior scientists from West and Central Africa as they build or reinforce their capacity to implement science and plan for conservation action for crocodylians and other underrepresented species. The 25 participants that continue in the program represent seven countries in the region. Two groups are getting ready to start implementing research projects on dwarf crocodiles, both of which will help fill significant knowledge gaps on these species.

Documentaries*:* One documentary was filmed on African Dwarf crocodiles in Gabon, again focusing on the unique population of cave-dwelling crocodiles in the Abanda cave system. This was filmed for the upcoming BBC series *Home* and will likely air in 2025.

We attach below the reports of some of the people working in these countries on crocodiles. In addition, we are aware of the following burgeoning or underway projects in this region:

- **Congo:** WCS is implementing a Key Biodiversity Areas (KBA) initiative in Congo and included *Mecistops* and *Osteolaemus* as potentially critical species triggering recognition of KBAs. The results are likely to be available in 2024 or 2025.

- **Gambia:** The NGO Project Wild Gambia continues its work around the country and has documented dwarf crocodiles in several sites that they were previously not known to inhabit. There are long-term plans to rehabilitate some of the habitats that favor this species to improve its conservation outlook in the country. And there are plans to repeat surveys in the River Gambia National Park to determine the status of *M. cataphractus* there since it was last seen in 2008, but as yet these efforts have not yet been implemented. Roy Armstrong, formerly of the University of Cumbria, is the lead point of contact.

- **Guinea:** Development of the Simandou Bauxite Mine in the Fouta Djallon highlands started again, including environmental impact assessments for the railway and port that will be used to export the ore. WCA members Michel Ahizi and Matt Shirley participated in the EIAs for the port, assessing the *C. suchus* population and its vulnerability to port development. Crocodiles continue to be widely, if not sparsely, distributed across the coastal area. Though no signs of *Osteolaemus* were detected, in contrast to similar efforts in 2012.

- **Guinea:** The potential presence of *Mecistops* in the region of Bankan triggered the need for surveys as part of the ESIA for a large industrial gold mining project. WCA members Christine Kouman and Matt Shirley facilitated this effort, but ultimately only found *C. suchus*. The areas are not likely to support the Critically Endangered slender-snouted crocodile.

- **Liberia:** In August 2023, a group of Critically Endangered *M. cataphractus* was confiscated by the Liberian Forestry Development Agency from a private citizen and transferred into the custody of the Libassa Wildlife Sanctuary. WCA Chair Matt Shirley coordinated between these stakeholders to guide their successful reintroduction back into the Gola Forest National Park. Surveys are needed in this part of Liberia to evaluate the continued presence of a small population of this species.

- **Senegal:** In collaboration with the NGO Panthera, who is in a co-management agreement with the Senegalese Government for Niokolo Koba National Park, the Project *Mecistops* team implemented surveys in search of *Mecistops* and *Osteolaemus*. Neither of these species have been documented in the area since the 1960s. We surveyed 72 km of riverine habitat, including the Gambia River, and four of its tributaries draining the central plateau of the park. We did not detect any *M. cataphractus* or *O. tetraspis*. Interestingly, the habitat along the Gambia River and its tributaries was suitable for nesting, providing the riparian forest needed by these species. However, the nighttime temperatures were quite low, around 15ºC, which is likely lower than the minimum threshold for either species. Unfortunately, we can likely declare both species as absent from the park and it is unknown if this represents local extinction or simply erroneous historic reporting. This also unfortunately means that *M. cataphractus* can most likely be declared eradicated from Senegal nationally. In contrast, we detected 432 *Crocodylus suchus* individuals ranging in size from yearlings (<0.5 m) to 3.5 m TL (Table 1). Happily, this population is one of the best thus far observed and surveyed anywhere in this species' distribution and we can consider Niokolo Koba National Park a stronghold for *C. suchus*.

- **Zambia:** Not strictly in the WCA region, but it was brought to the attention of Alison Leslie, who contacted M. Shirley, by African Parks that local community leaders around the Benguela wetlands believe there to be *M. leptorhynchus* present. There are no previously confirmed records for this species in that area, but it all connects to the Luapula River from which there are Zambian records. No further information is available at this time. As far as we know, efforts by Gladys Kasabo and Carl Huchzermeyer to locate this species in other parts of Zambia has yet to pay off.

Individual country reports can be found below.

Prepared by: Matthew Shirley
Date prepared: 7 March 2024

Benin

- **Two papers published from** R. Bio Ouré PhD thesis. PhD defense planned in June 2024 at the University of Abomey Calavi. Supervisors : Dr Nathalie Kpéra and Prof Kassa
- **Two papers under review**

R. Bio Ouré, G.N. Kpéra, C.A.M.S. Djagoun, B. Kassa, A. Natta, J.G. Djego, E.A. Eniang, G.A. Mensah, B. Sinsin (2023). **Does Crocodile Conservation Matter in Sacred Natural Sites of Benin (Western Africa)?** *West African Journal of Applied Ecology* 31(2): 69-85.

Abstract: Crocodiles are protected species present in Sacred Natural Sites (SNS) in Benin.The impact of SNSs on the conservation of crocodylians in Benin were carried out by (i) assessing the extent to which anthropogenic activities affect crocodylians' population, and (ii) analysing the impact of social and religious changes for the conservation of crocodylians over a timescale. The characteristics of the crocodile population and habitats in 11 SNSs during daytime and night were also provided. Semi-structured interviews with 330 respondents were conducted and land use/land cover changes with 2000 and 2020 remote sensing data were analysed. The West Africa crocodile (*Crocodylus suchus*) was recorded in 81.8% SNS and consisted of 61.5% hatchlings, 15.6% juveniles, 11.85% subadults, and 11.1% adults (N= 135 crocodiles). With increasing degradation of natural ecosystems and increasing settlements/agricultural lands, there has been a significant decrease in crocodile abundance and extirpation (18.2% SNSs). Communities perceived crocodiles as sacred, a link with ancestors, the god of fertility, and a way to preserve water. Nevertheless, respondents also perceived the negative impact of introduced religions (70.9%) and no longer worshiped sacred crocodiles (52.7%) due to religious prohibition. Raising awareness, and participatory management of SNSs with the communities would help to mitigate the threats.

R. Bio Ouré, G.N. Kpéra, C.A.M.S. Djagoun, B. Kassa, A. Natta, G. A. Mensah, B. Sinsin. (2023). **Population patterns of the West African crocodile, Crocodylus suchus (Saint-Hilaire, 1807) in the agropastoral dams of Benin.** *Annales de l'Université de Parakou - Série Sciences Naturelles et Agronomie*

Abstract : Agropastoral dams (APDs) are popular methods of providing communities with permanent water during dry season. We provided insight into the impact of APDs for crocodilians conservation in northern Benin in the Sudanian ecological regions over the last two decades by (i) establishing shift in geographic distribution with ArcGis 10.4 and habitat-lost rate (HLR), (ii) assessing population structure (hatchling, juveniles, sub-adults, adults) and abundance, and (iii) analysing drivers of population decline through dam users' perception and Land Use Land Cover Change. Geographic coordinates were recorded with GPS during field surveys for mapping geographic distribution. Population structure and abundance were established respectively with day binocular counts and night spotlight surveys. Each crocodile was classified based on its total length. We interviewed 370 dam users selected by snowball technique around 25 APDs. The number of crocodiles APDs decreased up to 59% HLR. The population structure of the west Africa crocodile (Crocodylus suchus) recorded, showed significant difference between age classes (Kruskal-Wallis chi-squared= 7.96, DF= 3, P= 0.046) that were 4.2% hatchling, 8.3% subadults and 87.5% adults. Day counts showed significant difference between the year 2002 and 2020 (Kruskal-Wallis chi-squared = 6.9325, df = 1, p-value= 0.008464) revealing a significant population decrease. Dam users' perception varied significantly according to the period ($P<0.001$) and they perceived a decrease in crocodiles' abundance. Poaching (72.7%), prey depletion (71.4%), habitat degradation (63.5%) and negative perception (51.1%) were the main drivers of crocodile populations decline. The threats that face *C. suchus* call for enhancing their conservation by local authorities and forest administration.

- **One (01) PhD thesis started in January 202 at the Agricultural University of Kétou (BENIN)**

Supervisors : Dr. Nathalie Kpéra & Prof. Djossa

Title: Improving crocodile husbandry in Benin

Abstract: This research work aims at providing crocodile farmers with a technical framework (a crocodile breeding guide) in the Beninese context with a view to improving the management of crocodile breeding in captivity in Benin. Specifically, this will involve: i - georeferencing crocodile farms in Benin; ii- to characterize crocodile farms in Benin, iii- to make a typology of crocodile farms, iv- to identify the state of health of crocodiles held in captivity in Benin, v- to identify problems encountered in the farms and the solutions applied, vi- and to develop a technical guide to crocodile breeding. The beneficiaries of the findings of this research are the breeders and agro-breeders (men and women) of crocodiles in captivity, the researchers, the political decision-makers with a view to their use to promote husbandry in Benin.

Prepared by: Nathalie Kpera
Date prepared: 25 January 2024

Burkina Faso

For 2022, we were able to carry out two field trips with students to raise awareness of crocodile conservation measures in times of insecurity at the Kanazoe reservoir in Oauhigouya and the Baoule sacred crocodile river in the center of the country. Given the security situation, illegal crocodile harvesting is on the increase in many parts of Burkina Faso.

In addition to the field trips, we gave an oral presentation on the crocodiles of Burkina Faso at the University of Fada N'Gourma during the scientific days titled "Distribution of *Crocodylus suchus* (Geoffroy Saint-Hilaire, 1807) and human-crocodile relations in Burkina Faso".

We published an article on the "Impact of Anthropogenic Activities on the Abundance of Crocodylus suchus (Saint-Hilaire 1807) within the Nazinga Game Ranch, Burkina Faso". Open Journal of Ecology 12: 788-803. https://doi.org/10.4236/oje.2022.1212046

Prepared by: Ilassa Ouedraogo
Date prepared: 30 January 2024

Cameroon

La Cameroon Reptiles and Ecosystems Valorisation Society carried out several activities at the end of 2022 and beginning of 2023 as part of the crocodile research project following the recommendations of Professor Ekke Waitkuwait (wewaitkuwait@gmail.com) in Agenda Item SC. 2.2 by Dr Matthew Shirley, Regional Chair West and Central Africa published on 2 July 2022.

1. Bioecological characteristics of the crocodiles of Lake Boboyo in Kaélé

The study of the bioecological characteristics of crocodiles present in Lake Boboyo was carried out from 5-26 February 2023 by David Makongo, Evrad Medjo, Stéphane Tchakoudeu from CREVS in collaboration with wildlife officers from the Kaélé forestry station and the Association Cameroon Tour. Lake Boboyo is located in the Locality of Kaélé, Arrondissement of Mayo-kani, Northern Region near Chad. Created in 1986 as part of the stone quarry, Lake Boboyo has an average temperature of 31°C, an average depth of 71 m and not far from homes. From direct observations at night, using lighting lamps and the reflection of the eyes, we counted approximately 74 crocodiles distributed as follows: 28 adults, 22 sub-adults and 24 juveniles. The crocodile identification keys from several crocodile specialists allowed us to conclude that it is a species of crocodile, namely: the suchus crocodile (*C. suchus*). Their presence is believed to be due to involuntary introductions during floods from the tributaries of the Bénoué River. Several species of Cichlidae (Tilapia), Clarias (catfish), and crabs are present in the lake. The study of the socio-cultural aspects of the crocodiles of Lake Boboyo reveals good coexistence with the surrounding populations and no loss of human life has been deplored for years due to the crocodiles of the lake. Several research projects are planned from March 2024.

Left: A crocodile in Lake Boboyo. Right: Lake Boboyo.

2. Agreement between CREVS and INSTITUTE OF FISHERIES AND AQUATIC SCIENCES AT YABASSI (I S H) for the study and research on Nile crocodiles in the zones: (NKAM – Wouri) and (Douala- Edéa)

The Terms of Reference for teaching and research on Nile crocodiles to students of the Institute of Fisheries and Aquatic Sciences at Yabassi (ISH) proposed by the CREVS Coordinator, David Makongo, were validated by Professor Tomedi Eyango Minette (Director of ISH) during a consultation meeting held on 20 November 2023. It will be a question of providing the course on the domestication of African crocodiles in particular:

- General morphology of the species: *O. tetraspis*; *C. suchus*; *C. niloticus* and *Mecistops*
- Habitat, diet, reproduction, threats and status of species

- Species distribution, inventory and management of crocodiles
- Captive breeding of crocodiles.

Students will carry out scientific research during their various academic internships either at the CREVS or the ZSL in Edea. Thus, this work will allow better knowledge of African crocodiles and significant advances for scientific research in Camaroun. Through CREVS, we continue to monitor wild crocodile captures in the Nkam-Wouri area and raise awareness among local populations.

Prepared by: Stéphane Tchakoudeu Kehou, David F. Makongo Ndilock and Evrard Kouopestchop Medjo
Date prepared: 30 January 2024

Cote d'Ivoire

Over the last two years, crocodile conservation in Côte d'Ivoire has significantly improved due on various activities ranging from captive breeding to tourism based on crocodiles. Efforts were mainly focused on *Mecistops cataphractus*. We briefly synthetise some key activities undertaken during this period.

Activity 1: Merging bioacoustic and camera trap approaches to inform the critically endangered West African slender snouted crocodile (*Mecistops cataphractus*) nesting behaviour. Throughout this study, we aim to identify *Mecistops cataphractus* nesting behaviour from camera traps and audiomoths data. We will determine both nest-guarding female defence-related visual displays and vocalisation patterns.

Picture1: Camera trap and audiomonth deployed in *Mecistops cataphractus* nesting area in Taï National Parc

Activity 2: Identify knowledge, perception and attitude of locals toward crocodiles around Taï National Park and Voluntary Reserve of Grand-Béréby. We carried out focus groups, participatory ethnography and semi-structured interviews in ten villages (five in each study area) to understand interactions between crocodiles and all stakeholders. We found that people are less tolerant of crocodiles due to their perceived dangerousness, they have no information on their environmental role nor their touristic value. However, in all targeted villages, crocodile bile is believed to be very poisonous, and an extant local law requires a person to inform local authorities for each crocodile caught by a villager, so that they can proceed to a public destruction of the bile. This traditional belief limits threats on crocodiles, providing an indigenous conservation strategy of *M. cataphractus* and *C. suchus*, but does not extend protection to the dwarf crocodile because their bile is not considered as poisonous.

Activity 3: Technical assistance for safeguarding crocodile populations during a dam construction. A private enterprise called IHE (Ivoire-hydro Energy) is building a new dam on a section of the Bandama River inhabiting individuals of *Mecistops cataphractus*. We conducted multiple surveys to capture all crocodile species in the vicinity of the dam construction area. Crocodile individuals were translocated and kept in the Abidjan Zoo before their release in a safe site. We recorded nine individuals of *M. cataphractus* and two dwarf crocodiles. Based on the ecology of both species; we plan to reintroduce them with some individuals from our breeding program in a secured zone for over 10 years of monitoring.

Activity 4: Captive-breeding program in Abidjan Zoo. During the 2022 and 2023 breeding season, *Mecistops cataphractus* females laid a total of 198 eggs. 148 eggs were fertile, and we recorded 56 hatchlings. To date, 10 individuals from the 2022 hatch and 25 from the 2023 breeding season have survived.

Activity 5: Empowering crocodile conservation through ecotourism in the first marine protected areas of Côte d'Ivoire. We trained eight people of Mani-Bérébi village to conduct daytime and nocturnal crocodile surveys for tourists. This

activity has improved the understanding of the local community members on the economic value of crocodiles, ensuring their conservation by locals. We currently have one boat and received our first tourists visit, with enthusiasm.

Picture 2: Training session with locals from Man-Bérébi village and first tourist visit in the first marine protected areas of Côte d'Ivoire.

Prepared by: Michel Ahizi and Christine Kouman
Date prepared: 15 February 2024

Gabon

The Smithsonian Gabon Biodiversity Program (GBP) is supporting high environmental standards and biodiversity conservation activities in the Assala Gabon Biodiversity Management Plan through biodiversity project research and monitoring of focal taxa, including hippopotamus, forest elephants and crocodiles in the Gamba Complex of Protected Areas, SW Gabon. Regarding crocodiles, the project includes:

1. **Nesting ecology of West African dwarf crocodiles (***Osteolaemus tetraspis***) in the vicinity of the oil production gathering terminal in Gamba, Gabon**

   Status: Nests detection, although no nests were detected in 2022.
   Aim: This study aims to investigate nesting ecology of *O. tetraspis* to understand the species ecology for best practise development and conservation awareness.
   Progress: The 12 missions of 62 linear km (covering 16 km^2) from May 2022 to December 2022 revealed no nests. Night patrols will be necessary to track the presence of hatchlings in the study area to confirm the presence or absence of nesting in the survey area. In December 2023, we found a dead specimen in a swampy Raphia forest (Figure 1), which reinforces the idea that they are present but in remote locations.

2. **Nile crocodile nest monitoring of Nile crocodiles (***Crocodilus niloticus***) in the south of the Gamba Complex of Protected Areas. Gabon**

   In 2022, the GBP found six Nile crocodile nests on the Mouambi river, six others at Malabi and one at Ipadou, both on the Ndougou Lagoon and nothing at the Nyanga river mouth. From the 13 nests detected, only one hatched on the Mouambi River and the other five were destroyed by monitor lizards. On the Ndougou Lagoon, the seven nests were all human predated.

For both species, the African Dwarf crocodile and the Nile crocodile, the negative results urged us to raise an awareness campaign in 2023 in order to value the crocodiles in the ecosystem where they occur (Figure 4). In August 2023, we designed an awareness poster (Figure 5), as part of the campaign for crocodile conservation in the southern part of the Gamba Complex. The poster highlights all three species of crocodile in Gabon, that they are integrally protected but they are threatened either by predation or collection of their eggs, bycatch, or illegal hunting. At the same time, the poster indicates the important roles crocodiles play in their respective ecosystems - ones which people also depend on.

A month later, the GBP team organized and led a workshop on crocodile conservation to start preparing the awareness campaign on crocodile conservation in the Gamba Complex in collaboration with local conservation actors. Nine representatives of all local conservation partners involved participated at the workshop (2 local NGOs: Kussu and Diboty Conservation, the ministries of water and forests and of fisheries and the national park agency). The poster distribution and awareness campaign were carried out with these collaborators. We also made wooden panels to display posters for visual awareness in the vicinity of the nesting sites where eggs had been illegally harvested. In total, we reached 165

fishers and families in 23 camps and villages across Ndougou Lagoon and Nyanga River. We also erected five awareness signs on the hotspots.

The joint awareness campaign involved 18 members from eight institutions including the National Park Agency, Water and forest Brigade and local NGOs. During the campaign, the team discovered that crowbars were used to dig for crocodile eggs (Figure 3) and trapping crocodiles on the Ndougou lagoon nesting sites also occurred (Figure 2). This really reinforced the necessity of intensive awareness and a call to action by the rangers to start prosecuting offenders.

In November, we contributed to a social media event organized by the Crocodile Research Coalition which was named "28 days of CROCmas". For this crocodilian outreach campaign, information and status of one of 28 crocodile species was published on Facebook on 28 days in December. The GBP contributed to raising awareness of the Nile crocodile (*Crocodylus niloticus*) found in Gabon and can be found here.

Regulatory changes
Since 2011, the three crocodile species enjoyed full protection throughout the territory meaning that their hunting, capture, possession, commercialization and transport was strictly prohibited, and therefore punishable by law, except upon issuance of a scientific hunting permit and scientific capture permit (Article 92 of the Forest Code; Decree No. 064/PR/MEF of January 19, 2011 on the classification and killing latitudes of animal species).

Currently, a new law, Decree no. 0040 bis PR/MEFPECCHF November 2, 2023 classifying wild animal species is being enacted. Within this law, Article 4b, declassifies the status of the African Dwarf crocodile from full protection to partial protection. This means that they can be hunted, captured, possessed, commercialised and transported from 16 March to 14 September during a defined hunting season. We are still awaiting information on whether quotas will be enforced. There is considerable cause for concern, as the species was already heavily hunted even when fully protected. The lack of information on the ecology of the species *Osteolaemus tetraspis*, coupled with poor law enforcement, could further decrease the species population in the country. This is especially so, since the African Dwarf crocodile is one of the top bushmeat species consumed in Gabon.

Figure 1: Dead Dwarf crocodile

Figure 2: A Nile crocodile trap in Malabi

Figure 1: Nile crocodile nest dug in Ipadou

Figure 4: An awareness campaign

Figure 5: Crocodile awareness poster

Prepared by: Elie Tobi
Date prepared: 26 January 2024

Ghana

Over the past two years, Ghana's crocodile work has focused on building strong grassroots support for crocodile conservation through stakeholder engagement, exploring the potential of urban ecology, and discovering and safeguarding

significant populations. Through this broad aim, we worked with local communities to mitigate habitat threats, rehabilitate degraded nesting areas, train 24 local volunteers to support our conservation initiatives and support four undergraduate students to successfully conduct their thesis research on crocodiles.

One of the most exciting news from the last two years is that our team is working in partnership with the Rainforest Trust to create Africa's first crocodile protected at the upstream portion of the Tano River. The creation of the Tano River Crocodile Sanctuary will safeguard a 40-km stretch of the Tano River with an estimated riparian buffer of 971 acres, which currently harbours the largest known population of the Critically Endangered West African slender-snouted crocodile outside protected areas. In 2022, one of the members of the Ghana crocodile team, Emmanuel Amoah, was recognized by the UK-based charity, the Whitley Fund for Nature, for his outstanding contribution to the conservation of the Critically Endangered West African slender-snouted crocodile in the Tano River. Overall, the period under review has been very inspiring for crocodile research and conservation in Ghana. Below are the brief highlights of the projects initiated in the last two years.

1. Creating the Tano River Crocodile Sanctuary, Ghana

Status: Ongoing
Aim: This project aims to secure legal protection of a 40-km stretch of Tano River through the creation of a 40-m riparian buffer to safeguard the habitat of one the known significant populations of the Critically Endangered West African slender-snouted crocodile.
Progress: There have been comprehensive ecological studies about the population, distribution, and threats of West African slender-snouted crocodiles at the site and findings indicate the site is suitable for the creation of a sanctuary. There have been a series of stakeholder engagements including landowners, traditional leaders, government institutions, and general host community assessments to determine local acceptance of the creation of the sanctuary**.** Our meetings with these stakeholders have had positive outcomes and a clear indication of local support. We are currently working with host communities to develop by-laws that will guide the establishment of the sanctuary.

2. Safeguarding the last stronghold of West Africa slender-snouted crocodile in Ghana

Status: Ongoing
Aim: The goal of this project is to address the habitat threats faced by the West African slender-snouted crocodile in the Tano River by fostering grassroots engagement, enhancing local capacity through volunteer training, and restoring degraded nesting areas through tree planting.
Progress: Through this project, 24 local volunteers have been trained in crocodile conservation including night surveys and nest monitoring, over 5000 indigenous trees have been planted across critical nesting habitats, and over 2000 locals have been educated through awareness campaigns. The awareness campaigns have reduced riparian vegetation by over 50% over the past two years.

3. Nesting Ecology of West African slender-snouted crocodiles in the Tano River, Ghana

Status: Ongoing
Aim: The project seeks to investigate the nesting habitat requirements, nesting success, and incubation temperature of West African slender-snouted crocodile.
Progress: Through this project, we have recorded 36 nests, identified critical factors influencing West African slender-snouted crocodile nest site selection, and determined incubation temperature as well as the influence of external temperature on nests.

4. Scaling Up the Conservation of West African Slender-Snouted Crocodiles in the Obuasi Municipality

Status: Ongoing
Aim: This project aims to restore degraded critical nesting habitats of West African slender-snouted crocodiles along the Jimi River in Obuasi.
Progress: Over 2000 indigenous trees have been planted across identified critical nesting areas. The trees are currently being monitored to ensure fast growth and high survival rate.

5. Urban ecology and Conservation of the West Arican Dwarf Crocodile in the City of Kumasi, Ghana

Status: Ongoing
Aim: Promote crocodile conservation in urban ecosystems which are as equally important as the non-urban ecosystems.
Progress: Investigated the population structure and encounter rates of the West African dwarf crocodile in urban landscapes, which have been neglected in research due to their perceived lack of biodiversity. The study was conducted in six purposively selected urban centres in the Kumasi metropolis of Ghana, where surveys were

conducted using interviews, literature review, and standard nocturnal crocodile survey methods. The study found no significant difference (H= 6.88, df= 4, P= 0.143) in encounter rates when compared with the findings of similar studies conducted on the species in its non-urban ranges, with the mean encounter rates varying significantly (H= 18.95, df= 5, p= 0.002) across the different freshwater habitats, ranging from 2.000±0.540/km in KNUST campus to 0.063±0.125/km in the Complex (Uaddara Barracks) site. The population structure composed of all the three major size classes dominated by adults and hatchlings (41.176% [n= 28]; and 39.706% [n= 27]) followed by juveniles (19.118% [n= 13]) although did not vary significantly among sites, as well as when compared with similar studies on the species. Factors (habitat characteristics) that influence the distribution (abundance) of the species included opened canopy, closed canopy, dredged sites, agriculture land, settlement, and grassland, with closed canopy recording the highest abundance. The study underscores the significance of conserving habitats with forest fragments in urban areas for West African dwarf crocodile management programs, offering essential baseline data for policymakers to develop sustainable urban management strategies that prioritize biodiversity and support inclusive urban development.

Next Step: Creation of riparian buffer and habitat expansion through restoration at the Kwame Nkrumah University of Science and Technology in the Kumasi city.

6. Survey of Crocodile Trade in Ghana: Case of Kumasi, Tamale, and Accra Markets

Status: Completed
Aim: Obtain first-hand knowledge and understanding of crocodile trade in Ghana
Findings: Various parts of all three different crocodile species were recorded from the three markets surveyed. Crocodile parts were sold by some specific people within the markets and 100 people were interviewed 40, 30, and 30 from Kumasi, Tamale, and Accra respectively. The parts included the skin, feet, teeth, bile, and excreters. The dominant part commonly traded was the skin followed by the feet and bile mostly coming from the dwarf crocodile. No crocodile meat was recorded at the meat markets surveyed. When asked about the sources of those crocodile parts, most of the respondents replied that they have contacts around the country, mostly hunters and farmers, who supply the parts. The respondents also confirmed that the meat is sometimes either eaten by the killer or by individuals who eat crocodile meat or sold at local markets. We realized that the parts are not sold anywhere across the cities studied but rather found at the traditional medicinal markets within these cities. Kumasi which is the second largest city in Ghana after Accra recorded the highest number of individuals who sell crocodile parts.

Crocodile skin on display at traditional medicine shops in Kumasi Central Market.

7. Assessment and Strengthening of the Local Protection of the Vulnerable West African Dwarf Crocodile in Payinammisa, Ghana

Status: Ongoing
Aim: Build local capacity and capitalise on traditional beliefs to promote community-based protection of the West African dwarf crocodile

Prepared by: Emmanuel Amoah, Clement Sullibie Saagulo Naabeh, Akwasi Anokye and Daniel Konzin
Date prepared: 1 February 2024

Sierra Leone

Three species of crocodiles are known to occur in Sierra Leone, including the West African crocodile (*Crocodylus suchus*), West African dwarf crocodile (*Osteolaemus* sp. nov. cf. *tetraspis*) and West African Slender-snouted crocodile

(*Crocodylus cataphractus*) (Zug, 1987; Okoni-Williams *et al*. 2004; Aruna *et al.* 2013, 2014, 2015). The occurrence of these species in Sierra Leone is now confirmed by research and therefore widely believed that the Dwarf crocodiles occur in a large number at the Mamuta Mayosso Wildlife Sanctuary (Okoni-Williams, et al 2004). The species also occur in other areas, sparsely distributed in streams, estuaries and other wetland areas in Sierra Leone.

According to biodiversity assessment surveys carried out by various institutions including the Reptile and Amphibian Program – Sierra Leone (RAP-SL), Save the Crocs Initiative, Conservation Society of Sierra Leone (CSSL), Wildlife Conservation Division of the Forestry Department at the Ministry of Environment, Institute of Marine Biology and Oceanography (IMBO), and results of Environmental and Social Impact Assessment (ESIA) studies carried out around the country by various consultancy firms, crocodiles are known to occur in many parts of the country. Of the known three species, the Dwarf and West African crocodiles are the most common species.

Though crocodiles are particularly hunted for meat within the southern region of Sierra Leone, they are not targeted in the northern region. Generally, juvenile crocodiles sometimes entangle in local fishing nets and once trapped or found astray due to extensive flooding; they are either kept as pets or killed. This happens because locals are not adequately aware of the laws that prohibit them killing or keeping crocodiles as pets in Sierra Leone. This situation resulted in the establishment of the "Save the Crocs Initiative Sanctuary" which caters mainly for confiscated juvenile crocodiles comprising largely of West African Nile and Dwarfs from around the country. Others isolated cases include three domestic pet facilities known to exist in Bo (Western African Crocodile), Eastern Freetown and Kenema. There still remain to be one that has been habituated in the Western Area Peninsula Forest at Tokeh village. (https://www.youtube.com/watch?v=VpiCZgMg-2E).

In order to curb these situations, the Wildlife Conservation Unit at the Forestry Department under the Ministry of Environment has, over the years, been working on improving and enacting the Wildlife Conservation Act of 1972. The document has been updated and enacted. All species of crocodiles in Sierra Leone are included as prohibited and protected animals. This status however accords them protection and conservation, but at present there is particularly no special prioritized research on the species. RAP-SL, a biodiversity conservation NGO, is undertaking low key survey of all reptile species in the country during its field trips and ESIA consultancy surveys. The Forestry Department at the Ministry of Environment is with the full intention of assessing the biodiversity status of all protected areas and also ensuring that all protected/prohibited species are protected together with their habitats.

Being that the wildlife laws of Sierra Leone still continue to prohibit the keeping of crocs as pets, some locals have abstained from the keeping of crocodiles as pets. For all species in captivity, there is a continuous effort in identifying suitable sites for their release into the wild though this still remains a challenging issue at present.

There is presently no dedicated survey, monitoring or research on crocodiles in Sierra Leone, with all reports about their occurrence being incidental and anecdotal. RAP-SL is presently searching for funds for a national survey of reptiles and amphibians of Sierra Leone in order to establish a comprehensive list of reptile and amphibian species of Sierra Leone with enough evidence including photos and videos where possible. In the interim, RAP-SL is documenting reptiles and amphibians across the country through opportunistic encounters and ESIA surveys. In RAP-SL's many survey trips around the country in 2023; there hasn't been any report of crocodile meat sales in marketplaces around the country.

At a regional level, the need for crocodile protection and implementing projects for their conservation is invaluable. Sierra Leone is working towards the conservation of the species, since they have been included in the wildlife conservation act and also at local level, community leaders have by-laws in place that cater for the protection of crocodiles in many communities in Sierra Leone.

Aruna, E. (2015) Environmental Impact Assessment of the TIMIS Mining Company, Herpetofauna Species Assessment Report. Page 20, (unpub)

Aruna, E. et al (2014) Report on the Herpetological Survey in the Western Area Peninsula Forest and Environ. Page 12 (unpub)

Aruna, E. Johnny, J. & Jalloh, J. (2013): Follow-up Survey of Reptile and Amphibians of Bumbuna H Hydroelectric Project Area. Pages 10, 25 (unpub). (https://www.youtube.com/watch?v=VpiCZgMg-2E).

Okoni-Williams, A.D., Thompson, H.S., Koroma, A.P. and Wood P. 2004. Important Bird Areas in Sierra Leone: Priorities for biodiversity Conservation. Conservation Society of Sierra Leone and Forestry Division, GOSL.

Zug, G. (1987) Amphibians and Reptiles of the Outamba-Kilimi Region, Sierra Leone. Journal of Herpetological Association of Africa. 33: 1-4.

Prepared by: Edward Aruna

Date prepared: 27 January 2024

Agenda Item: SC. 2.3.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Southeast Asia Report

Laos
WCS Laos, January 2022-February 2024

Wildlife Conservation Society (WCS) Laos monitors Siamese crocodile nests, collects eggs and incubates to head start in two local communities: Tan Soum and Dogyanong Villages. We have been working with Tan Soum for almost 10 years (off and on) and recently Dongynong Village constructed a head start rearing facility. Currently, a total of 152 juvenile are being head started 138 at Tan Soum and 14 at Dongynong. Of these 37 are planned to be released in March 2024 into the wetlands adjacent to the Tan Soum Village.

In 2022, 47 juvenile Siamese crocodiles were released, and in 2023, 31 juveniles were released.

The Lao Conservation Trust for Wildlife (LCTW) has had a large group of Siamese crocodiles that they have had for several years. There has been some DNA work done by Cologne Zoo and Thomas Zigler to identify purebred Siamese crocodiles whereby a large percentage were identified as purebred. Many were scute-clipped for identification and are now being established as breeding colonies for reintroduction of offspring. However, over the years, the group has been divided up for management purposes and many of the "marked" animals are hard to clearly identify now.

Unfortunately, LCTW had to relocate to a new location and move the entire zoo collection. With the move to a new location, there is even a stronger interest in better managing these crocodiles and to do follow up genetics testing of the animals with the main goal is to support in situ conservation through captive breeding. This group has the potential to add significant numbers of crocodiles for reintroduction in the future.

LCTW have now successfully bred and donated 9 hatchlings to be released in the Tan Soum wetlands in 2026 to add genetic diversity to this population.

Cambodia
WCS Cambodia, January 2022-February 2024

WCS continues to monitor the area of the Sre Amble River where they have collected, and head-started several juveniles at the Koh Kong Endangered Reptile Center. At the center, they hatch and raise both Siamese crocodiles and *Batagur affinis*. The last release of Siamese crocodiles was in 2023, with 15 1.5-<2 m animals from clutches hatched in 2019-20. Since then, there have been few nests found to only contain infertile eggs, and no nests have been found since 2021 containing only infertile eggs.

Monitoring continues along the Sre Amble and will be incorporating the use of drones to look for additional nests in the surrounding oxbow lakes adjacent to the Sre Amble River

Rising Phoenix has released Siamese crocodiles at two sites in Cambodia:
In Boeng Nava 15 Siamese Crocodiles were released in March 2022 and in May 2022 4 additional crocs were released in the same area for a total of 19, 3 of which were males and 5 of the May release animals had Argos transmitters attached for post-release monitoring. In 2023, 6 nests were located at this location - none were successful.

A release of 10 animals is planned for March 2024 in a designated deep pool of the O'Khampha River, and an additional 30 Siamese crocodiles are proposed to be released into the same sanctuary by the end of 2025. All crocodiles released are scute-clipped and DN-tested prior to release to eliminate hybrids.

Fauna and Flora
Report to CSG: Highlight Report on Fauna & Flora's Cambodian Crocodile Conservation Project (CCCP), (April 2022-December 2023)

1. Monitoring Key Populations

- Annual monitoring was conducted in five crocodile sanctuaries (O'Som, Areng, Chhay Reap, Tatai Leu and Steung Khiew) in the Cardamom Mountains. Analysis of monitoring data from the last two decades indicates that the population in the Cardamom Mountains is stable overall, with the two sites known to hold the largest populations of the species showing evidence of reproduction, and a stable and growing population, respectively.
- In May 2022, we found one nest with a total of 22 eggs in the release site of Chhay Reap, unfortunately, none were fertile. We also set up two camera traps near the same crocodile nest to monitor any activities, and we captured some great photos and videos of a female crocodile guarding her nest and Monitor lizards preying on the eggs which presents some interesting insight on the ecology of the species.
- In June 2023, we found another nest in Trapeang Peing crocodile sanctuary with 21 eggs (17 fertile, 4 infertile). We moved the fertile eggs to a safe area and guarded them for 24 hours, but these eggs were affected by serious floods in the Cardamom Mountains between July and August.
- Hatchling night surveys were conducted at critical crocodile breeding sites of O'Som, Chhay Reap and Areng between August and October 2022. No hatchlings were seen, but 5 juvenile crocodiles (70-90 cm TL) were sighted during the night surveys in Trapeang Peing of Chhay Reap critical site.

2. Release
   - We have successfully released 10 crocodiles (2 males and 8 females) in the upper Stung Kampong Tachey River in a community-protected sanctuary in the Cardamom Mountains in December 2022. All 10 crocodiles released were fitted with acoustic tags and the largest two (202 cm and 205 cm TL) were also fitted with satellite tags. We expect that satellite and acoustic tags will generate vital data to monitor their movements post-release. Since 2012, a total 146 purebred Siamese crocodiles have been released into safety areas of the Cardamom Mountains. In addition to this, we collected eight eDNA samples from the Chhay Reap release site to test the method's potential for crocodile surveys and to identify other wildlife in this area, including prey fish diversity.
   - We have continued working with Rising Phoenix, a conservation enterprise that co-manages Siem Pang Wildlife Sanctuary in northern Cambodia, providing technical assistance for the release of Siamese crocodiles in the area.
   - We have already sought the release permission from the Ministry of Agriculture, Forestry and Fisheries (MAFF). We plan to release other 50 crocodiles into Cardamom areas in late February 2024.

3. Protection and Crocodile Sanctuaries
   - We continue to support and closely work with 26 crocodile community wardens to patrol in O'Som, Areng, Chhay Reap, Tatai Leu and Steung Khiew (Cardamom Mountains). Wardens are using SMART patrols system within their sites to help conduct monitoring, and to evaluate and respond to threats at each site more effectively. In mid-2022, the project staff provided separate intensive two-day trainings on the application of the SMART Mobile App for field and photo-based patrol data collection to crocodile community wardens each site to further strengthen capacity in their patrols. Training included practical use of the app in the field.

4. Captive Breeding Program at Phnom Tamao Wildlife Rescue Center
   - The Siamese crocodile conservation breeding facilities at Phnom Tamao Wildlife Rescue Centre (PTWRC) have been maintained up to the highest standards, ensuring all crocodiles kept are in optimal conditions. From 2022 to 2023, our captive breeding program produced 138 hatchlings (60 in 2022 and 78 in 2023), and currently holds a total of 269 Siamese crocodiles (10 breeding males, 43 breeding females, 129 sub-adults and juveniles, and 87 hatchlings) as part of the breeding and release program. All of them are healthy and well cared for by our expert crocodile team.
   - From 2022 to 2023, we conducted DNA sampling with 75 crocodiles, and identified 63 of which as purebred Siamese crocodiles and 12 as hybrids.

5. Others
   - In July 2022, FFI submitted an official letter to the Ministry of Environment requesting permission for the trial release of 10 satellite-tagged Siamese crocodile into Prek Toal Ramsar Site of the Tonle Sap Biosphere Reserve, to attempt the re-establishment of a wild population in Tonle Sap. FFI obtained the free, prior and informed consent of the local communities in the area, as well as the support from relevant sub-national authorities including the Fisheries Administration. However, the Ministry of Environment advised against the release of crocodiles in the area, given concerns about the safety of the human population living in the lake, and suggested other areas are identified instead.
   - In March 2023, we conducted a crocodile survey and habitat assessment in O'Chay and O'Chentong within Virachey National Park (VNP), Siem Pang district, Steung Treng province, but no evidence of Siamese crocodile was found. Habitat assessment of these rivers were not suitable for release crocodiles during this survey; much of rivers were dry and shallow water with only a small number of Anlongs remaining water in dry season. Anlongs were generally small and very shallow, often less than 1 m deep and about 50-150 m long, and thus unsuitable for crocodiles.
   - In August 2023, we collaborated with Provincial Department of Environment in Ratanakiri to assess habitat suitability for Siamese crocodile reintroduction/reinforcement in O'Kanhou, Virachey National Park (VNP), Ratanakiri Province; however, habitats were less suitable for crocodiles, especially reproduction, and support

only small population. We plan to conduct the trial release into the habitats of Virachey National Park. We will conduct FPIC process in March 2024.

Indonesia

Some bullet points for Indonesia were provided by Herdanau Jayanto.

- (2022) report *C. halli* in Mappi and Bouven Diguel, South Papua. No ongoing survey so far from BKSDA Papua.
- (2022) Two Tomistoma studies conducted in Sebangau National Park by students from UGM (https://etd.repository.ugm.ac.id/penelitian/detail/221808, https://etd.repository.ugm.ac.id/penelitian/detail/222425)
- (2023) Progress report published on Tomistoma movement ecology study in Berbak National Park, Jambi (.https://arcg.is/1CjTWX)
- (2023) Saltwater crocodile was proposed to be downlisted from the protected species list
- (2023) Consortium of Yayasan Ulin-YASIWA just wrapped up their TFCA project, the deliverable is the Mesangat-Suwi symposium, document of analysis of habitat and bioecology of crocodile in Mesangat-Suwi, and document of management guide for crocodile habitat in Mesangat-Suwi. Though we don't have access to those documents
- (2023) First national SOP on wildlife rehabilitation RESCUE OF FOUND, CONFISCATED, AND SEIZED LIVE WILDLIFE AS A RESULT OF LAW ENFORCEMENT by Ministry of Environment and Forestry was published, but still need suggestion and species-specific SOP such as for crocodile
- (2023) 23 Saltwater crocodiles were released to Sembilang National Park, South Sumatera

Thailand

The Thai Crocodile Farm Association (TCFA), formerly the Crocodile Management Association of Thailand (CMAT), was established in 1991. Its main objective is to gather attention from all stakeholders to increase wild Siamese crocodile populations. There have been three release programs implemented since 2000 (two by CMAT & TCFA and a DNP release program). These reintroduction programs had little contribution to the wild stocks in terms of number of viable populations, but the capability has been built up within the relevant government agencies for the successful restocking of the species in the future.

The management authorities of the Siamese crocodile population in Thailand are from two different ministries. The Department of Fisheries (DoF), Ministry of Agriculture and Cooperatives, is responsible for captive population, while the Department of National Parks (DNP), Wildlife and Plant Conservation, Ministry of Natural Resources and Environment is responsible for wild population and their habitats. The main obstacles are the suitable habitats and the multiagency cooperation. Each government agency has its own master plan to manage the habitat and the species.

TCFA has been involved in improving the status of wild Siamese crocodile populations, by continuing to encourage and support any reintroduction programs by government agencies. Recently, DoF has committed to a long-term reintroduction program (see attached concept note). Together with DNP, they planned to release 200 juveniles into six historical habitats and protected areas started in 2023.

Recently, WCS Thailand has published a survey report of wild population status in Kaeng Krachan National Park (KKNP) and has a plan to secure funding for the first reintroduction program soon.

Nation-wide survey ended in 2020 with an estimated number of wild populations less than 100 individuals. No additional survey has been made in 2023 except that of KKNP and Bueng Borapet Reservoir. A few guarding mothers and their hatchlings were often observed by official and tourists.

TCFA is looking forward to reporting the ongoing reintroduction and monitoring programs in 6 protected areas in Thailand as we are not authorized to do it without permission. All protected areas in Thailand are under DNP, who recently has capability to increase wild population with support from DoF, TCFA and academic institution.

China

Since Anhui Chinese alligator National Nature Reserve (ACANNR) focused on the protection of wild population in 2001, the wild population of Chinese alligator has increased year by year. However, due to the small area of suitable habitat for Chinese alligator in the wild, the rejuvenation of wild population has been seriously affected. In the past three years, the ACANNR has formulated a five-year plan for the development of the wild population, which will implement the reintroduction of 1500 Chinese alligators in the field, aiming at recovering the wild population of Chinese alligators. We

are very sorry that we did not submit the annual report of the past two years, so we summarized the protection work in the past three years as 2023 annual report.

1. Implement the recovery plan of wild population of Chinese alligator

1.1. Expanding the suitable habitats of Chinese alligator in ACANNR

The ACANNR is densely populated, and the area of suitable habitat in the reserve was decreasing, which limited the development space of Chinese alligator wild population. Since 2020, with the support of the local government where ACANNR is located, the relocation of 148 original residents' houses in the core habitats of Chinese alligators in five counties, including Changle District, Shuangkeng District, Zhongqiao District, Hongxing District and Gaojingmiao District of ACANNR, has been completed. They have moved out of the core habitats of Chinese alligators in the ACANNR, expanding the living space of Chinese alligators. Governments at all levels invested about $US66.1 million in land transfer, relocation and resettlement of residents, factories and enterprises, livestock and poultry farms etc. in the ACANNR.

Figure 1. Villages within the core habitat of the protected area have been removed (Left: before removal; Right: after removal, and restored habitat).

1.2. Actively promote the restoration of existing suitable habitats.

The land attribute of the ACANNR is mostly collective ownership land, and the implementation of field population management in the ACANNR is greatly limited. In order to better protect the wild population of Chinese alligators, 956.93 ha of land has been transferred to ACANNR since 2020. At the same time, we put forward the Ecological Restoration Plan of Core Habitat and studied the Technical Procedures for Ecological Restoration of Wild Chinese alligator Habitat. Under this background, ACANNR also carried out restoration and transformation of suitable habitats. In order to better adapt to the survival, reproduction and population expansion of Chinese alligators, and make preparations for the wild release of Chinese alligators. Anhui Provincial Forestry Bureau has invested about $US2.87 million for the restoration and transformation of suitable habitats, including the construction of the food chain of Chinese alligators.

Figure 2. The transferred farmlands were restored for habitat of Chinese alligators (Left: before restoration; Right: after restoration).

1.3. Implement the reintroduction of Chinese alligators into the wild

In order to better adapt to the wildlife, when the captive Chinese alligators released, ACANNR built a new wild training region with an area of 6.29 ha (94.36 mu) in Gaojingmiao District, Langxi County, to strengthen the wild training before reintroduction, and provide individual alligators for wild reintroduction. Before reintroduction, the ACANNR will organize the demonstration of the suitability of the released habitat and the analysis of the genetic background of the released alligators. Since 2019, large-scale field release of Chinese alligators has been carried out for four consecutive years, with 1300 Chinese alligators released into the field till t0 2023. We also continued to carry out scientific research such as “Research on tracking and monitoring of Chinese alligators in the later period of their field release” and “Experiment on the survival ability of Chinese alligators in the natural situation”. The monitoring results show that the released Chinese alligators are in good condition in the wild, with a one-year survival rate of more than 80%.

Figure 3. Releasing Chinese alligator into wild habitat.

2. Implement the Long-term Monitoring Program (LTMP) for the field population of Chinese alligator in the ACANNR

In the past three years, the ACANNR, jointed together with Anhui Normal University and other units, has carried out annual monitoring and investigation of the Chinese alligator wild population. As a result of the monitoring, the wild population of Chinese alligators has grown rapidly. In May 2021, 395 Chinese alligators (excluding those released in the wild that year) were seen in the survey, including 215 adult alligators, 180 sub-adult alligators and young alligators; In May 2022, 698 Chinese alligators (excluding those released in the same year) were seen in the survey, including 599 adults, and 99 sub-adults and juveniles (Fig. 1). The reproduction of wild population also increased year by year. In 2020, 156 eggs in 7 nests, and 78 hatchlings were hatched; In 2021, there were 320 eggs in 14 nests, and 137 hatchlings will be hatched; In 2022, 602 eggs were found in 26 nests and 372 hatchlings were hatched. In 2023, 400 eggs were found in 17 nests and 250 hatchlings were hatched (Due to the dense vegetation in the habitat, many nests are difficult to be found). According to statistics, the number of wild Chinese alligators has reached at least 1200 individuals in the wild (This number will be determined based on next year’s survey results). After the implementation of the recovery plan for the field population of Chinese alligators, the wild populations of the Chinese alligator and the breeding situation in the field has increased rapidly.

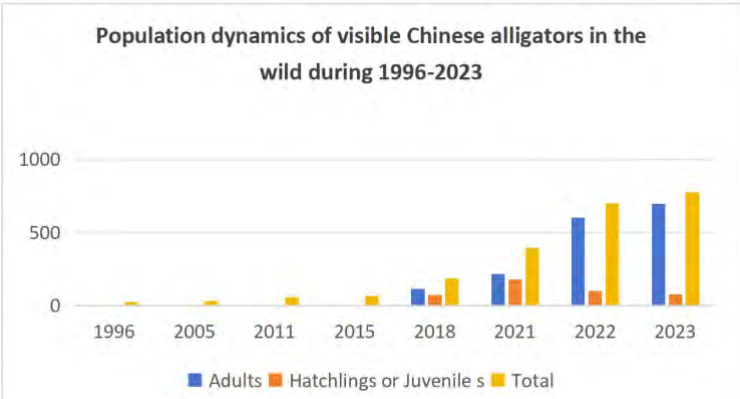


Figure 4. Population dynamics of Chinese alligators seen in the wild during 1996-2023.

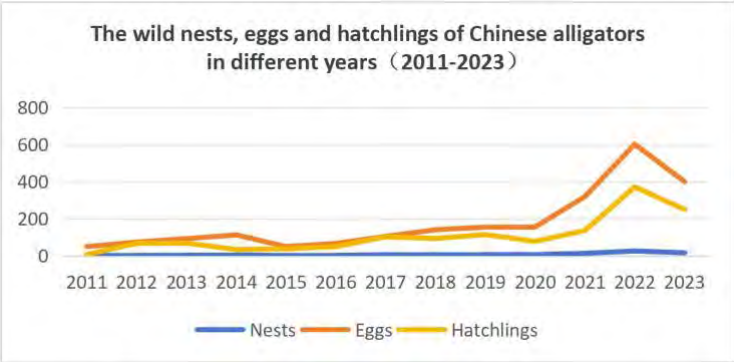


Figure 5. Wild nests, eggs and hatchlings of Chinese alligators in different years (2011-2023.

3. Implement some protection projects in ACANNR

ACANNR Organized and implemented key projects such as “infrastructure construction projects in the Reserve”, “upgrading and reconstruction of Chinese alligator breeding facilities”, with a total investment of more than $US7.31 million (50 million yuan, RMB). Fully carry out the rejuvenation and ecological restoration of the wild population of Chinese alligators and improve the habitat environment of Chinese alligators in the wild. Artificial breeding technology was improved.

4. Establish a long-term mechanism for the management of ACANNR

4.1. Established and improved policies and regulations for the protection of Chinese alligators, and Drafted “the Administrative Measures for ACANNR”.

4.2. Continue to deepen the co-management and co-construction of ACANNR and communities.

We Comprehensively implemented the ecological patrol system of ACANNR, selected 23 local residents who are familiar with the situation of the Reserve as ecological patrol officers with full coverage of the protected areas, and carried out regular patrol supervision, and comprehensively strengthen the management of ACANNR.

Figure 6. The ecological patrol officers were carrying out regular patrol supervision.

4.3. Build a joint prevention, control and management mechanism with the local government.

The administrative department in charge of ACANNR, The Forestry Bureau of Anhui Province, together with Xuancheng and Wuhu Municipal Government, formulated the Community Joint Defense, Joint Control and Joint Management Mechanism of ACANNR, and established the joint meeting system for the management of Chinese alligators. The ACANNR regularly carries out “three-level consultation” with the local government, and effectively plays the role of “four platforms” of regular consultation, comprehensive management, joint prevention and control, and community co-management. This joint protection mechanism has played very important role in the protection of wild Chinese alligator population.

Figure 7. Joint meeting system with local government for the management of Chinese alligators.

4.4. Promote science popularization and Natural education

We made the publicity videos on the protection of Chinese alligators, and Open WeChat official account of ACANNR to publicize and display the work and dynamics of the reserve from multiple perspectives. ACANNR also Completed the exhibition arrangement and opening of the Chinese alligator education center, introduce natural education courses, regularly carry out the activities of education to the countryside, and organize the activities of science popularization in the community and campus.

China report prepared by: Xiaobing Wu

Philippines

- The Philippine population of *C. porosus* on Palawan Islands was transferred from Appendix I to Appendix II, with a zero export quota for wild specimens, in accordance with Resolution Conf. 9.24 (Rev. CoP17) during CITES CoP19 in Panama. (November 2022).

- In May 2023, the Philippine Government received three (3) juvenile *C. mindorensis* named "Mutya", "Mayumi", and "Ligaya", as part of the second repatriation from Cologne Zoo (Germany) for future reintroduction programs. These crocodiles will be transferred to the Philippine Crocodile Research and Education Center (PCREC) in Mindanao once completed this June 2024, through the ZGAP grant-aid to CPPI.

- The 3rd Forum on Crocodiles in the Philippines at the University of Santo Tomas, España, Manila, was concluded on 8-10 November 2023, with the theme "*Engaging Communities and Partners Participation Towards Sustainable Conservation.*" It was attended by 80 participants from six countries, representing 25 institutions and organizations.

- The DENR-Biodiversity Management Bureau has consulted the National Committee for Crocodile Conservation (NCCC) and knowledgeably consolidated the estimates of crocodile population, distribution, and threshold level in February 2024 for the DENR Roadmap on Priority Threatened Species. These are as follows:
  1. Philippine Crocodile: Present in 8 cluster regions (40 municipal locations); 251 matured, 339 est. population.
  2. Saltwater Crocodile: Present in 11 cluster regions (70 municipal locations); 5385 matured, 6117 est. population.

- In February 2024, the same national crocodile committee confidently identified 10 priority areas for protection through the establishment of Critical Habitat for crocodiles. This is in support for its commitment in conserving and managing 30% of the Philippines terrestrial and marine ecosystem by 2030. The identified areas were included in the proposed Key Biodiversity Area (KBA) and Other Effective Area-based Conservation Measures (OECM).

Philippine report prepared by: Rainier Manolo

Prepared by: Lonnie McCaskill
Date prepared: March 2024

Agenda Item: SC. 2.4.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Latin America and the Caribbean

The LAC Regional Office has been in operation for over 17 years, based in Santa Fe Province, Argentina. It fulfills a variety of functions and services, including maintaining an up-to-date database with information generated from CSG contacts and members, facilitating communication among them, assisting with SRAS funding matters, and more.

Another activity involves distributing scientific publications received from various authors. The Regional Office maintains an extensive database of studies or reports on different crocodile species and a wide range of topics. These publications are organized by year of publication and by species, making them accessible to anyone. Additionally, all contacts regularly receive information about various activities conducted regionally and globally, including courses, workshops, meetings, congresses, symposia, and others. This helps promote the participation of different interested individuals in these activities.

After having reactivated the category of "CSG contact", numerous people have been detected through suggestions that are active in relation to the activities with crocodilians, many of them are already members of the CSG. The updating of "non-member" contacts tries to ensure the efficient and constant exchange of information with different people from the region.

We also facilitate cooperation among various academic fields, scientists, NGOs (non-governmental organizations), and other institutions, providing information to specialists, researchers, officials, undergraduate, and graduate students from Latin America and the Caribbean.

Countries virtual meetings
We organized various meetings with representatives from most countries in the Latin America and Caribbean islands region. These gatherings provide us with the opportunity to connect with numerous individuals involved in crocodilian activities, some of whom were not familiar with the CSG, its mission, and objectives. Unfortunately, we encountered connectivity issues with some countries, limiting our ability to meet with them.

During each meeting, we conducted a brief presentation to introduce the CSG to new participants. The primary goal of these meetings was to foster networking and collaboration among regional stakeholders, leveraging available technologies to facilitate communication. We established a virtual platform to facilitate ongoing discussions on crocodilian conservation, encouraging the exchange of perspectives among participants. This platform also serves as a means for maintaining regular contact with CSG members and other key stakeholders through frequent virtual meetings.

Human-crocodilian interactions survey in LAC region
As part of our ongoing initiatives, we participated in the 1st Online Conference Cycle commemorating the 30th anniversary of "Human-Crocodile Interactions in Mexico 1993-2023", from September to December 2023.

LAC social media
Active engagement on Instagram and Facebook is reflected in the steadily increasing number of followers. However, a challenge remains in encouraging crocodilian enthusiasts to actively identify LAC social media channels on their own, though this is gradually changing.

In response to an initiative from women in the region, we commemorated "International Women's Day" by featuring an article in the newsletter "Women in Crocodilian Research, Management, and Conservation", published in 2022 in the CSG Newsletter [41(1)]. This initiative aimed to enhance the visibility and empowerment of women across various sectors, recognizing that this may not always be straightforward, particularly in certain cultural and social contexts.

Another significant development is the creation of an interactive database by country. This database, with defined data fields, serves as a tool for organized information storage, facilitating quick access and retrieval through technological devices. Managed by representatives from each country in the LAC region, this database allows every member or contact working with crocodiles in the region to continually update relevant information, ensuring its ongoing relevance and usefulness.

Prepared by: Lucía Fernández and Pablo Siroski
Date prepared: 31 January 2024

Argentina

Ranching of broad-snouted Caiman (*Caiman latirostris*) and yacare caiman (*Caiman yacare*) in Argentina, along with releasing juveniles into the wild population, are the only authorized initiatives for both species. Currently, Formosa Province has the only program based on ranching with trade purposes in Argentina. In contrast, the traditional Proyecto Yacaré program in Santa Fe has shifted its focus since 2020 to collecting eggs solely for conservation and research purposes, involving local communities through incentives for conservation. Notably, there has been a significant increase in the involvement of women in ranching activities, with many expressing a desire to continue participating in all stages of the process. These developments underscore a noteworthy empowerment and strengthening of women's roles in sustainable crocodilian management practices, but sadly, the activities related to ranching operations are decreasing because there would be very interesting for women as collaborators with families' incomes.

Furthermore, unconventional surveys and population studies are being conducted in various locations, including monitoring nesting sites within El Palmar and Ibera National Parks, and studying not well-known populations of caimans. Additional activities such as informational talks on reproductive biology and species characteristics, as well as night sightings for rangers and visitors, contribute to broader education, awareness efforts, and they are very useful in the design of caiman management inside of National Parks.

There are certain laboratories that work integrated with the Proyecto Yacare, and reports from them are below:

Laboratorio de Ecología Aplicada report (Centro de Investigación Científica y de Transferencia Tecnológica a la Producción, CICYTTP - CONICET) - Melina Simoncini and Carlos Piña

We have conducted studies on the characterization of meat and fat from *Caiman latirostris* and their potential uses, aiming for them to be valued as other by-products and thus be subsidiary to management programs, in addition to leather. Regarding meat produced in captivity, it has excellent characteristics (lean, good protein percentage, and fatty acid profile) and in tastings, it has been the most chosen meat by consumers (compared to other white meats such as those from other reptiles and fish). Although the meat proved to be very good, we were able to make it healthier (improving the fatty acid profile) by modifying the captive diet. We achieved the same enrichment with the fat of the caimans, and we even managed to produce oil without altering its quality. In relation to this topic, we published a book chapter on the characterization and utilization of meat and fat from reptiles from sustainable management programs, using the caiman as a model as well as other reptiles.

Regarding the captive breeding of caimans (located in the EZE), we published exploitation or cooperation behaviors identified through cameras. Regarding the work carried out on temperature sex determination, we published a review on the effect of hormones on the sex determination of caimans, as well as other reptiles.

In the wild, studies have been conducted on how body condition could determine whether a female reproduces or not. We evaluated how climatic variables affect female attributes and consequently reproductive success, and we also published a study on the survival of caiman offspring during winter. Based on historical databases, we conducted a modeling study of the population dynamics of caimans in Santa Fe province, considering possible uses.

Based on the study of changes in caiman eggshell structures during incubation, we published a paper in which these changes could be used to understand the incubation of dinosaur eggs, by evaluating the state of eggshell in fossil nests.
In terms of ongoing Work, we are continuing our studies on temperature sex determination and the effects of constant and variable temperatures on the reproductive structures and phenotypes of offspring, such as how hormones and fatty acids transferred by the mother can affect sex determination, in addition to temperature. We continue with monitoring studies of caimans in the wild using camera traps, drones, and even the application of artificial intelligence. As well as other research on female reproduction, their behaviors, and the effects of extreme events (droughts and floods) as a result of climate change.

Thesis Completed (2022-2024)

- Evangelina Viotto (2022). Population dynamics of *Caiman latirostris*: development of a predictive model for its conservation, incorporating possible scenarios of climate change and sustainable use. Doctoral thesis, Universidad Nacional de Córdoba.
- Hernán Ciocán (2023). Population ecology of reintroduced and wild *Caiman latirostris* and evaluation of their monitoring methods. Doctoral tesis, Universidad Nacional de Córdoba.

Publications (2022-2023)

1. Leiva PML, Valli FE, Piña CI, González MA, Simoncini MS. 2022. Chemical characterization and potential use of reptile fat from sustainable programs. Ethnobiology and Conservation, 11:06 (22 March 2022) https://doi.org/10.15451/ec2022-03-11.06-1-12.
2. Viotto EV, Simoncini MS, Verdade LM, Navarro JL, Piña CI. 2022. Winter survivorship of hatchling broad-snouted caimans (*Caiman latirostris*) in Argentina. Ethnobiology and Conservation, 11:18 (29 August 2022) https://doi.org/10.15451/ec2022-07-11.18-1-13
3. Pierini SE, Imhof A, Larriera A, Simoncini M, Príncipe G, Piña CI. 2022. Nest-sharing behavior of captive Broad-snouted caimans (*Caiman latirostris*): cooperation or exploitation? Amphibia-Reptilia https://doi.org/10.1163/15685381-bja10118.
4. Viotto EV, Navarro J, Simoncini M, Piña CI. 2023. Staged-based model of population dynamics and harvest of Broad-snouted caiman (*Caiman latirostris*) under different management scenarios. Ethnobiology and Conservation 12:01. https://doi.org/10.15451/ec2023-01-12.01-1-20.
5. Leiva, PML, Simoncini M, Piña CI, Labaque MC. 2023. Influence of climatic variables on corporal attributes of adult female caiman and their relationship with reproductive success. South American Journal of Herpetology, 28, 2023, 16–25. http://doi.org/10.2994/SAJH-D-21-00033.1.
6. Valli, FE, Leiva, PML, Lavandera J, Contini MC, Gerstner C, Piña CI, Simoncini M, González MA. 2023. Caiman's fat enriched with n-3 fatty acids: potential food supplement Tropical Animal Health and Production 55, 194. https://doi.org/10.1007/s11250-021-02974-y.
7. Mazaratti M, Valli F, Pierini SE, Simoncini M, Piña CI, González MA, Leiva PML. 2023. Reptile bushmeat, an alternative for the supply of high biological value proteins? Sustainability 15(9), 7448; https://doi.org/10.3390/su15097448
8. Valli F, Simoncini M, González M, Piña C. 2023. How do maternal androgens and estrogens affect sex determination in reptiles with temperature-dependent sex? Development, Growth & Differentiation, 1–12. https://doi.org/10.1111/dgd.12887
9. Fernández M., Piazza M., Simoncini M. 2023. Do ontogenetic changes during incubation interfere with the interpretation of incubation mode in dinosaur eggs? Historical Biology. https://doi.org/10.1080/08912963.2023.2257956
10. Viotto, E.V.; Leiva, P.M.L.; Pierini, S.E.; Simoncini, M.S.; Navarro, J.L.; Piña, C.I. 2024. Body Condition of Reproductive and Non-Reproductive Broad-Snouted Caiman Females. Animals 2024, 14, 1. https://doi.org/10.3390/ani14010001.

Books

11. Pedro Mayor, Alejandro Meléndez Herrada, Fernando Xicoténcatl Plata Pérez, Pedro Pérez Peña, Carlos I. Piña y Melina S. Simoncini. 2022. Protocolos para el Monitoreo y manejo de la fauna silvestre (Volumen I). COMFAUNA (Ed) Bogotá, Colombia. ISBN: 978-958-8753-83-6

Book chapters

12. Leiva P, Valli F, Piña C, González M, Simoncini M. 2022. Caracterización y aprovechamiento de carne y grasa de reptiles provenientes de programas de manejo sustentable pp. 57-83.
13. Pighin, G.A., Albornoz E.M., Piña CI. 2022. Protocolo de obtención de imágenes para detección de individuos mediante vehículos aéreos no tripulados pp. 37-56.
14. Urbina Flores DP., Arellano Alavez T., Pierini SE., Xicoténcatl Plata Pérez F. 2022. Muestreo de poblaciones de fauna silvestre mediante cámaras fotográficas sensibles al movimiento a distancia (cámaras trampa) pp. 82-112.

Laboratorio de Ecología Molecular Aplicada Report (Instituto de Ciencias Veterinarias del Litoral/UNL-CONICET) - Pablo Siroski

The Applied Molecular Ecology Laboratory (Instituto de Ciencias Veterinarias del Litoral/UNL-CONICET) is a comprehensive facility that encompasses a wide range of activities and functions aimed at advancing our understanding of various animal species, conducting biological assays, managing biodiversity, and other associated tasks. The laboratory is equipped with state-of-the-art facilities for housing and maintaining different species, including specialized boxes for animals of various sizes, as well as areas dedicated to isolation, quarantine, and rehabilitation.

In addition to these animal care facilities, we have designated spaces for conducting general procedures and processing initial samples. Our laboratory is also well-equipped for educational and research purposes, and development offices.

We recognize the importance of utilizing natural resources through tailor-made sustainable development plans, not only for the benefit of local populations but also for the dynamics of natural ecosystems. By fostering sustainable practices, we contribute to the conservation of countless wildlife species and play a vital role in implementing state policies related to the management and reintroduction programs of biologically significant species.

Furthermore, our laboratory serves as a crucial link in socio-educational efforts against illegal wildlife trafficking, providing valuable insights and data to support conservation initiatives. Our research focuses on the application of environmental health markers, actively contributing to the preservation of natural resources. These markers are

instrumental in monitoring both natural and productive areas, enabling the early detection of potential impacts on various parameters in wildlife species.

Overall, the lab is dedicated to advancing scientific knowledge, promoting sustainable practices, and contributing to the conservation of biodiversity and the well-being of ecosystems. Some of the most important research lines include:

- Study of the general and specific physiology of wild animals to develop the necessary knowledge for implementing management and conservation strategies for both *in situ* and *ex situ* wildlife.
- Promotion of knowledge about the sustainable use of natural resources through the use and valorization of therapeutic products derived from them, as well as the assessment of environmental and anthropogenic threats that may disrupt these ecosystem services.
- Production of caiman recombinant proteins of biotechnological interest in veterinary sciences.
- Evaluation of survival and reproductive strategies of caiman in the face of a changing climate, assessing metabolic, physiological, endocrine, and genetic responses.
- Evaluation and characterization of the gastrointestinal microbiome of Broad-snouted Caiman.
- Assessment of molecular markers for early warning as indicators of environmental stress due to exposure to xenobiotics in Broad-snouted Caiman.
- Evaluation of cellular damage through biomarkers of genetic instability and gene expression as indicators of exposure to different stress conditions in Broad-snouted Caiman.
- Conservation genetics of Argentinean caimans.
- Use of environmental DNA as a method for monitoring biodiversity.
- Evaluation of the effect of commonly used pesticides on the activity of the adrenocortical axis of the Broad-snouted caiman and its impact on sustainable development programs.

These research lines contribute significantly to understanding various aspects of caiman physiology, behavior, and health, as well as providing valuable insights for conservation and management efforts.

Recent publications

1. López González EC., Odetti LM, Latorre MA, Aville OB., Contini LE. Siroski PA., Poletta GL. A comprehensive approach using multiple biomarkers to detect damage induced by pesticides in broad-snouted caiman (*Caiman latirostris*) Heliyon 8, (1): E08667 (2022)
2. Odetti, LM., EC. López González, P.A. Siroski, MF. Simoniello, GL. Poletta. How the exposure to environmentally relevant pesticide formulations affects the expression of stress response genes and its relation to oxidative damage and genotoxicity in *Caiman latirostris*. Environm. Toxicol. Pharmacol. Volume 97, January 2023, 104014 IF: 5,354; SJF: 0,87 = Q1 (Health, Toxicology and Mutagenesis).. https://doi.org/10.1016/j.etap.2022.104014
3. María Soledad Moleón, Pablo Fernando Cuervo , María Virginia Parachú Marcó, Elisa Olivia Pietrobon, Graciela Alma Jahn, and Pablo Ariel Siroski. Effects of physical restraint and endogenous adrenocorticotropin challenges on corticosterone levels and immunological indexes in the Broad-snouted Caiman (Caiman latirostris). Can. J. Zool. 101: 1–9 (2022). http://dx.doi.org/10.1139/cjz-2022-0053
4. María Soledad Moleón, Gonzalo Santiago, Samuel Hilevski, Pablo Ariel Siroski. Blood biochemistry parameters of Broad snouted caiman, Caiman latirostris subjected to stress conditions, applying micro-volume techniques. J Exp Zool A Ecol Integr Physiol. 2023;1-6.
5. Patricia S. Amavet, Gualberto Pacheco-Sierra, Marcela M. Uhart, Walter S. Prado and Pablo A. Siroski. Phylogeographical analysis and phylogenetic inference based on the cytochrome b gene in the genus Caiman (Crocodylia: Alligatoridae) in Central and South America. Biological Journal of the Linnean Society, Volume 138, Issue 3, March 2023, Pages 289–303, https://doi.org/10.1093/biolinnean/blac145
6. Lucia M. Odetti, Camila F. Chacón, Pablo A. Siroski, Ma. Fernanda Simoniello, Gisela L. Poletta. Effects of glyphosate, 2,4-D, chlorantraniliprole, and imidacloprid formulations, separately and in mixtures in *Caiman latirostris* hatchlings Toxicology and Applied Pharmacology 469 (2023) 116544 https://doi.org/10.1016/j.taap.2023.116544
7. Trinidad de los Ángeles Cordero Gil, Patricia Susana Amavet, Belkis Ester Marelli and Pablo Ariel Siroski. Evidence of venom factor-like in crocodilians. Organisms Diversity & Evolution. https://doi.org/10.1007/s13127-023-00617-8.
8. Samuel Hilevski, Hernan Ciocan, Luis Bassetti, and Pablo A. Siroski. Relationship between skin colour, conjunctivitis, and dermatitis in captive Caiman latirostris in Argentina. Herpetology Notes Volume 16: 847-854 (2023) (published online on 25 November 2023)
9. Hilevski, S., Cordero, T. y Siroski, P. 2022. Do Crocodilians Eat Plant Material? A Review of Plant Nutrients Consumed by Captive Crocodilians. South American Journal of Herpetology, 24: 1-7
10. Odetti L., MF. Simoniello, GL. Poletta. Alterations in the Expression of Antioxidant Enzyme Genes in Response to Pesticide Exposure During Embryonic Development in the Native Reptile Species *Caiman latirostris*. Bull. Environm. Cont. Toxicol 110:3 (2023).

Book chapters

11. L.M. Odetti, E.V. Paravani, M.F. Simoniello, G.L. Poletta (2022). The role of superoxide dismutase in reptiles under toxicity contexts, en: En: Owen PJ (Ed.) Advances in Animal Science and Zoology. Vol. 20, Chap. 5, pp. 167-187. Nova Science Publishers, New York, USA. ISBN: 979-8-88697-199-6.
12. L.M. Odetti, M. F. Simoniello, P. A. Siroski and G. L. Poletta (2023). The Broad-snouted Caiman (Caiman latirostris): A Model Species for Environmental Pesticide Contamination Assessment Through Molecular Markers. Chapter 11. Pp. 196-209. Issues in Toxicology No. 45. Bird and Reptile Species in Environmental Risk Assessment Strategies Edited by Guillermo Eli Liwszyc and Marcelo L. Larramendy. The Royal Society of Chemistry 2023. Published by the Royal Society of Chemistry, www.rsc.org

Laboratorio Externo de Vertebrados de la FHUC Report (Convenio MAyCC/UNL) - Alba Imhof and Alejandro Larriera

In 2020, we began on the CAI+D referred to "Biodiversidad asociada a los ambientes de nidificación de *Caiman latirostris* en humedales del espinal santafesino", which is based on a multidisciplinary approach integrating researchers from biodiversity, agricultural sciences, veterinary and icthyology and others. Due to the COVID pandemic, the work was delayed until 2022 and is currently underway. There are four CSG members in this team.

We were invited to the National Congress on Biodiversity at Iguazú Falls in Misiones Province, to participate on a round table on sustainable use of wildlife, presenting as a case story the example of the Proyecto Yacaré, past, present and future.

We are working on a regular night count survey at the campus of the Universidad Nacional del Litoral, where a *Caiman latirostris* population has been identified.

An international production for Wildlife Television was working at our facilities the last summer to record maternal care and sounds of the hatchlings at birth.

The educational community outreach program is going on, despite the scarcity in eggs numbers due to the suspension of the commercial program which collects the eggs. Over a couple of hundred peoples did have the chance to help and learn about biology and conservation of caimans.

Of course, in parts of the facilities of the Proyecto Yacare, some instances of the research carried out by the other labs occurred.

Thesis

Three theses were developed and defended in the period by Luciano Muñoz, Joaquin Zapata and Bruno Holubicky

Conference papers

1. Imhof, A. y Larriera, A. 2022 –A community-based participatory research experience on Proyecto Yacaré-Broad-Snouted Caiman Sustainable Use Program (*Caiman latirostris*) Chetumal, México
2. Holubicki Fernández Campón B, Marsico Fettolini M, Larriera, A e Imhof A. La sonrisa del yacaré, forma y función de la mandíbula y dientes en *Caiman latirostris*. 2022 -Poster - Congreso de Biodiversidad. Misiones
3. Marsico Fettolini M, Holubicki Fernández Campón B, Imhof A. 2022. Variación en la forma de la mordida en *Caiman latirostris*. XXII Congreso Argentino de Herpetología.
4. Muñoz, L., Imhof, A., Pierini, S. y Larriera, A. 2023 Relaciones interespecíficas entre *Caiman latirostris* y tortugas acuáticas en condiciones de semicautiverio. XXIII Congreso Argentino de Herpetología.

Research publications

5. Pierini, S., Imhof A., Larriera A., Simoncini M., Príncipe G., Piña C. (2022). Nest-sharing behavior of captive Broad-snouted caimans (*Caiman latirostris*): cooperation or exploitation?. Amphibia-Reptilia (2022) DOI:10.1163/15685381-bja10118.
6. Larriera, A. (2022). POLICY BRIEF Deontology or consequentialism? Ethical approach on the use and management of wildlife, illustrated by the use of caimans in Latin America. Ethnobiology and Conservation. 11:07 (22 March 2022) doi:10.15451/ec2022-03-11.07-1-5ISSN 2238-4782ethnobioconservation.com
7. Webb, G.J.W., Ross, J.P., Manolis, S.C., Larriera, A. and Lippai, C. (2021). Key points about traceability in crocodilian conservation and management? Pp. 11-17 in Traceability in Crocodylian Conservation and Management. IUCN SSC Crocodile Specialist Group: Darwin, Australia.
8. Webb, G.J.W., Ross, J.P., Manolis, S.C., Larriera, A. and Lippai, C. (2021). Why address traceability? Pp. 1-9 in Traceability in Crocodylian Conservation and Management. IUCN SSC Crocodile Specialist Group: Darwin, Australia.

Symposia: XII and XIII Argentine Herpetology Congress (AHA) Symposiums on Crocodylia

In both 2022 and 2023, Crocodylia Symposia were held within the Argentinean Herpetology Congress, aimed to provide a comprehensive platform for integrating and representing crocodilians within the realm of herpetology. The symposia

focused on sharing diverse perspectives, opinions, and information regarding Argentine species of caimans. Led by Dr. Gisela Poletta and Dr. Pablo Siroski, the symposium aimed to reflect the current state of research on caiman biology, advances in management, current challenges, and future conservation efforts. There were numerous oral presentations and posters, and they provided valuable insights into various aspects of caiman research, including genetics, evolution, environmental stress, health assessment, and reproductive consequences of climatic phenomena. The symposium facilitated fruitful discussions and highlighted the importance of continued research and conservation efforts for Argentine caiman species.

Sustainable Use of Reptiles

The Symposium "Sustainable Use of Reptiles" was celebrated on 23 November 2023. Attendees and invited speakers, whose work related to conservation and use of reptiles and links with local communities, participated in the Congress. At the end of the presentations, there was discussion and exchange among the participants, highlighting key points and current challenges. The taxonomic groups discussed were turtles, lizards, crocodilians and anacondas. Several CSG members organized and participated in the Symposium (Alejandro Larriera, Melina Simoncini, Carlos Piña, Sofía Pierini, Pamela Leiva and Alba Imhof).

Prepared by: Pablo Siroski
Date prepared: 31 January 2024

Belize

1. *Crocodylus actus* research

In 2023, Aces Wildlife Rescue, in collaboration with University College Cork, conducted the most comprehensive American crocodile population assessment on Ambergris Caye to date. The rapid and ongoing development of Belize's foremost tourist destination has led to the unchecked destruction of vital mangrove wetland habitats on the island, posing significant threats to the remaining populations on the Caye and the delicate, unique ecosystem of the surrounding islands. The primary objective of this assessment was to ascertain the present condition of the population by examining data collected by Aces a decade ago. This examination aimed to determine the impact of the observed expansion and destruction of remaining wetland habitats on the crocodile population and the availability of crucial nesting habitats. All historical nesting sites were evaluated to assess their ongoing suitability for nesting. Aces additionally is delving into the trend of human-crocodile interactions. Aces has diligently documented all such occurrences for over a decade on Ambergris Caye, and aims to quantify the primary factors contributing to negative human-crocodile interactions.

The Crocodile Research Coalition (CRC) is collaborating with Turneffe Atoll Sustainability Association (TASA) with regard to creating an annual monitoring program of the American crocodile to monitor it's population. Turneffe Atoll is considered the last stronghold for the American crocodile in Belize, in addition to an important source population for *C. acutus* on the mainland. July 2023 was the second year the CRC conducted eyeshine and capture surveys with TASA around the atoll. Three nests were observed in 2023, and there are plans to expand and explore for more nest survey sites in 2024. In the last decade, erosion along the beach and cayes has increased drastically threatening suitable habitat for nesting. The CRC and TASA are currently looking at other potential nesting spots where intervention of beach erosion can be implemented.

During July 2023-August 2023, graduate student Gary Moscarelli from National University of Cork investigated the increase of crocodiles exhibiting aggressive and dangerous behavior towards tourists and locals on the island of Ambergris Caye. These unnatural levels of aggression displayed by the crocodiles are seemingly isolated to populations directly affected by illegal feeding practices driven by the island's ever expanding tourism industry. In this study, comprehensive behavioral surveys were carried out to assess a group of crocodiles known to be exposed to consistent human interaction via illegal feeding events. The habituation of wild crocodiles in Belize poses significant threats to the safety of local community members and tourists visiting the island, as well as endangering further this already threatened species. Habituation can lead to individuals being more susceptible to poaching as well as lethal retaliation from concerned local community members. More information about this study can be found in the reference at the end of this report.

In September-December 2023, Yannick Hendricks from University of Coppenhagan collaborated with the CRC to evaluate how American crocodiles were utilizing and distributing themselves across a habitat, primarily the Placencia Lagoon in southern Belize. The objectives of his study were to (1) determine gross population abundance and density estimates, and (2) provide baseline microhabitat use data for the American crocodile within an urban-influenced coastal lagoon. Findings of past studies on microhabitat use and habitat suitability in other crocodilians were used to test some of the hypotheses in this study. It was expected that smaller size classes (i.e., hatchlings and juveniles) would utilize areas of lower depths compared to larger size classes (i.e., sub-adults and adults). Also, it

was expected that the smaller size classes would utilize areas of higher percentage cover compared to the larger size classes and that distribution would be non-random across all size classes. Furthermore, it was expected that crocodiles would be less abundant in areas where arboreal vegetation was absent, and that the degree of human activity would impact relative densities. Moreover, this study has an objective to identify which microhabitat components were most utilized by the American crocodiles in the Placencia Lagoon with aim to establish baseline habitat use data for the American crocodiles in the Placencia Lagoon.

2. *Crocodylus moreletii* research

The CRC in collaboration with Friends for Wildlife Conservation, and Northern Arizona University initiated an investigation into a population of Morelet's crocodiles that are inhabiting caves in Central Belize in September 2023 and is on-going. The investigators are determining if the crocs are transient or permanent residents of these caves. Besides the ecological uniqueness of this research, the investigators are also looking for any connection with the ancient Maya civilization to the presence of the crocs in these caves given evidence illustrates ancient ceremonial practices occurred in these caves. The ancient Maya highly revered crocodiles as observed in their creation story, the Maya calendar, etc.

The CRC collaborated with Princeton doctoral student Yeraldi Loera on her thesis project that examines transcriptomic responses and possible mechanisms of adaptation in response to pesticides. In an increasingly polluted world, anthropogenic contaminants have become a significant threat to wildlife globally. Entering an organism through water, soil, food, and air, these toxic chemicals alter biological functioning and can act as a source of human-mediated selection in chronically exposed populations. Uncovering the mechanisms by which this selection may impose adaptive resistance to toxic contaminants can help to understand and predict the long-term evolutionary consequences of exposure. Studies on wildlife inadvertently exposed to chronic levels of contaminants are ideal study subjects for documenting biological responses to exposure. However, few studies have connected these adverse responses across the biological hierarchy to help identify the underpinning mechanisms of adaptation. As long-lived generalist apex predators, crocodilians are uniquely suited for studies on persistent pesticide bioaccumulation within an individual through time, as well as the biomagnification of contaminants across trophic levels of the food chain. Previous studies have measured high concentrations of endocrine-disrupting pesticides, including DDT, in the waterways, eggs, and tissues of *C. moreletii* in Belize. The effects of these endocrine disruptors have not yet been studied in this population but have been meticulously analyzed as estrogenic disruptors of reproductive function in closely related American alligators at Lake Apopka, Florida. By comparing the genetic regulatory underpinnings of blood and tissue samples from pesticide-exposed Morelet's crocodiles in Belize, Yeraldi aims to describe parallel or stochastic mechanisms of disruption or adaptive responses to chronic contaminants.

In September 2022, CRC Biologist Jonathan Triminio was awarded Year 2 of the ECOP grant by the Marine Conservation Action Fund. This grant allowed the research team to conduct monthly surveys in the polluted New River watershed in northern Belize, resulting in valuable preliminary data including 5 years worth of contiguous crocodile population and individual morphometric and health data. Although the pollutant(s) responsible for the fish and crocodile epidemic have not yet been identified, the team has shipped 60 samples of *C. moreletii* tissue and claw samples to their collaborators at the NCSU Laboratory, with results expected by mid-2024.

Between June 2022 and January 2024, the team surveyed a total of 78 km of river habitat and observed 161 crocodiles resulting in an encounter rate (ER) of 2.06 crocodiles per kilometer (Table 1). The crocodile population density has shown minimal variability throughout the years of monitoring, and it has been determined to be currently stable. In 2018/2019, the ER was at 2.66 crocodiles per kilometre, and in 2022, the ER was 2.44. Nonetheless, monitoring this population is still crucial for the project's viability, especially since there is still evidence of fish kill and eutrophication in some parts of the river system. Since January 2023, the team has managed to carry out 11 capture surveys, which allowed them to obtain a total of 42 tissue samples. The mark and recapture surveys showed that most captured crocodiles seemed to be in good physical condition. However, adult and sub-adult crocodiles would exhibit skin discoloration, sloughing and lethargy in rare cases, suggesting a prolonged exposure to the pollutant(s). Conversely, hatchlings and juveniles commonly display an adhesive algae substance throughout their bodies impacting their ability to successfully hunt and evade predators (Fig. 1).

Part of the fieldwork was conducted in conjunction with a PhD study by Yeraldi Loera, which examines pesticide exposure using blood samples of *C. moreletii*. This study will be integral in filling knowledge gaps regarding pollution issues in Belize.

3. General information

Major threats crocodiles in Belize face (in order from highest to lowest): development/destruction of habitat, particularly of key nesting habitat; pollution; illegal hunting; and gillnets.

The CRC hosted their first half/and full marathon in October 2023. This marathon was to raise funds for various conservation efforts locally, and was also a good source of outreach to various people across country.

The CRC is currently analyzing data to draft up a Conservation and Management Action Plan for crocodiles of Belize. Given recent genetic data, there are only a few populations of Morelet's American crocs left in Belize. These particular populations will require particular action plans, however species action plans for both species have been dismissed given the majority of crocodiles in-country are hybrids.

The CRC conducted 88 outreach activities, mostly in the Stann Creek District (the majority being in-person), reaching 5080 people in 2023.

4. Related publications

Moscarelli, G. and M. Tellez (2023). Effects of illegal feeding practices and urbanization on behaviour of wild American crocodiles (*Crocodylus acutus*) on Ambergris Caye, Belize. Crocodile Specialist Group Newsletter 42(1): 9-12.
Greco, Robert M., J. Brocca, M. Tellez, R.J. Espinal, J.E. Peña, R. Peña Perez, C. Serra, S. Beckley, and A.E. Rosenblatt (2023). Population Status of American crocodiles (*Crocodylus acutus*) in the Dominican Republic. Journal of Herpetology 57(4): 418-427.
Wynne, J.J., M. Tellez, K.Hartwell, S. Reneau, G. Welch, K.D. Voyles, M. Cal, D. Castillo, and J. Champion (2023). Cave-dwelling crocodiles of Central Belize. International Journal of Speleology 52(1): 75-81.
Wilkie, C.J., M. Tellez, G. Jones, and M.J. Genner (2024). Population genetic structure of Morelet's and American crocodiles in Belize: hybridization, connectivity, and conservation. Conservation Genetics https://doi.org/10.1007/s10592-023-01590-7

Prepared by: Dr. Marisa Tellez
Date completed: 31 January 2024

Bolivia

Market issues have seriously affected the implementation of many of the management plans outlined within the National Program for the Sustainable Use of Yacare (*Caiman yacare*) in Bolivia. Currently only the Tacana Indigenous Territory continues to harvest a few hundred animals annually, mainly for meat (they have a contract and supply vacuum-packed meat to a supermarket chain), while the hides from these animals are destined for local artisans.

According to information provided by the new National Director of Biodiversity, this office is looking for funds with the intention of reactivating the national lizard program. From this, it will be important that we hold conversations with the CSG to see to what take steps can be taken, at different levels, to recover the markets that value the skins produced from wildlife.

Andres Rodriguez reports the following research carried out:

1. Publication of an article in 2022 on *Caiman yacare*, current potential distribution and effects of climate change on the species.
2. In review, in the journal "Diversity and Distributions", is an article on abundance models, distribution, and effects for the conservation of both species of *Paleosuchus*.
3. Andres Rodriguez's doctoral tesis, is in its final phase, involves ecological and modeling aspects of the 11 species of New World crocodilians. With this information, we will be able to know ecological aspects of the species in the New World and update their potential distribution based on literature records collected in recent years.

Prepared by: Alfonso Llobet Querejazu
Date prepared: 31 January 2024

Brazil

1. Northern Region

In 2023, the threats to caiman populations were more severe due to a historic lower water level in the rivers and floodplain lakes in the Brazilian Amazonia. For the first time, we identified dehydration as the cause of death for *Caiman crocodilus* and *Melanosuchus niger* in their natural habitat. The number of large *M. niger* (greater than 4 m TL) found in the harbors and beaches of Manaus was higher than in previous years. One big individual had to be rescued and relocated to a zoo due to the lack of wet habitat near the city.

From September to December 2023, we conducted 116 km of spotlight surveys to evaluate the abundance and size structure of *C. crocodilus* and *M. niger* in the municipalities of Iranduba (43 km), Careiro da Varzea (33 km) and Manacapuru (40 km), located in the Manaus Metropolitan Region. We counted 8735 caimans, of which 89% (7804) were in Manacapuru, specifically in the Piranha Sustainable Development Reserve (PSDR). Abundance (number of caimans/km of shoreline) in four water bodies of the PSDR varied from 76 caimans/km in a canal to 593/km in the confluence of a canal and a lake (mean = 304.6 ± 199.5). In this confluence, we estimated the size of 89 *M. niger*, of which 43% were larger than 180 cm SVL and 19 were larger than 200 cm SVL. In general, 93% of the 906 individuals identified in the PSDR were *M. niger*. The Wildlife Conservation Society/John Thorbjarnarson Fellowship 2022 to Washington Mendonça supported all these activities.

In November 2023, Washington Mendonça finished his PhD and published two articles. The first was published in Journal of Wildlife Management, evaluating the physiological responses of tourism activities on Amazonian caimans. This article found that the use of photographic flashes during tourism can induce acute stress with increased corticosterone levels in *M. niger* (Mendonça et al., 2023a). The second was published by Journal of Wildlife Diseases, which evaluated the reference intervals of 11 blood biochemical parameters in *M. niger* and *C. crocodilus* (Mendonça et al., 2023b). Both articles are results of studies that were supported by the IUCN SSC CSG Student Research Assistance Scheme application to Washington during fields data gathered and laboratory analyses.

During the peak of the dry season in November 2023, two caiman attacks were recorded along the Solimões/Amazon River (Manacapuru and Caapiranga municipalities). One of them was confirmed as *M. niger*. We also found, for the first time, individuals of *C. crocodilus* and *M. niger* poached by anglers from Manaus. In all cases, just tails were removed.

Reported by: Ronis Da Silveira, Idamara F. Santa Cruz and Washington C. S. Mendonça

Researchers from the Environmental Impact Characterization Laboratory (LCIA) at the Federal University of Tocantins (UFT), have been conducting research in one of Brazils' most biodiverse areas. Located in the western part of the state of Tocantins, an important ecological corridor formed by Conservation Units (Araguaia National Park, Cantão State Park, and Ilha do Bananal/Cantão Environmental Protection Area) has been visited since 2021 to expand knowledge about the reproductive ecology, population status, and environmental impacts on the Black Caiman.

From 2021 to 2023, more than 60 water bodies, including rivers, streams, and inland lakes, were visited by the Araguaia National Park (PARNA) and the Cantão State Park (PEC). After three years of intense field work, more than 30 Black Caiman nests were found by researchers. Basic information on the reproductive biology of the species is being collected, such as: nest density, egg morphometry, clutch size, hatching success, among others. These activities are part of the research projects coordinated by Professor Thiago C. G. Portelinha, and his masters' student, Barthira R. Oliveira. In her thesis project, Barthira intends to characterize the nesting areas and reproductive aspects of the Black Caiman in the northern portion of PARNA. It will be possible to understand aspects of the ecology and reproductive dynamics of the species in the region, in addition to establishing strategies and expanding efforts to conserve reproductive sites, potential areas for reproduction, and areas with high population densities. The projects aim not only to expand ecological and biological knowledge of the species, but also to assess the environmental impacts resulting from land use, human presence, and the use of pesticides on the population ecology and reproductive biology of caimans in and around Conservation Units. During 2021, other masters' (Andersom A. Caproni) and PhD. (Fábio B. Gamba) students also participated in the activities.

The research projects are supported by the Wildlife Conservation Society (John Thorbjarnarson Fellowship for Reptile Research Grant Agreement) and Fundação de Amparo à Pesquisa do Tocantins (FAPT/Naturantins - Meio Ambiente).

Reported by: Thiago C.G. Portelinha

2. Northeast Region

The Laboratório Interdisciplinar de Répteis e Anfíbios (L.I.A.R.) at Universidade Federal Rural de Pernambuco (UFRPE), Brazil, coordinated by Dr. Jozelia Maria de Sousa Correia and Dr. Ednilza Maranhão dos Santos have been conducting systematic surveys in the northeastern Brazil to better comprehend the ecology and conservation of caimans within Atlantic Forest habitats.

The institutional project: Ecology and Conservation of Crocodilians in Pernambuco – "*Projeto Jacaré*", provides logistical support and legal apparatus, to investigate aspects of abundance, distribution, reproductive ecology, health, diet, and genetics of wild broad-snouted caimans (*Caiman latirostris*) and dwarf caiman (*Paleosuchus palpebrosus*) populations. The project is coordinated by Dra. Jozelia Correia and composed professors from UFRPE and the other universities, researchers from partner institutions, PhD candidates and undergraduate students. Beyond research for conservation, the project presents several other goals. These include the promotion of scientific dissemination and popularization in schools and local communities and training local agents from environmental agencies for better practices of caiman capture, restraint, and proper release in urban areas and training human resources in herpetology.

In 2023, the *Projeto Jacaré* conducted field, conducted especially by researchers Paulo Mascarenhas-Junior and Rafael Barboza, research involving night counts, captures (Figure 1), biometrics, mark, biological sampling in three main targeted areas: APA Aldeia-Beberibe and its surroundings, which is the largest Atlantic Forest fragment within the urban area of Recife, Pernambuco's state capital, and Tapacurá Reservoir, a large water body located in São Lourenço da Mata Municipality, about 60 km from Recife. We also worked in a partnership with *Centro de Triagem de Animais Silvestres* (CETRAS- Tangará), a screening center for rescued animals hosted by Pernambuco's environmental agency. We collected information from rescued caimans and guided their release back into the wild.

In these areas, several specific research and educational activities with local communities have been conducted. Below, we detail achievements and current works developed in these areas from January to December 2023:

Figure 1. Activities of the *Projeto Jacaré* developed by Interdisciplinary Laboratory of Amphibians and Reptiles (L.I.AR/UFRPE), Pernambuco state, Brazil. a: Capture and restraint of a wild broad-snouted caiman; b: GPS-telemetry transmitted attached to an adult broad-snouted caiman; c: Hatchling of broad-snouted caiman; d: Educational activities involving reptiles with local schools in Camaragibe municipality.

Graduate student projects

- Paulo Mascarenhas-Junior: Padrões de Ecologia Populacional de *Caiman latirostris* (Alligatoridae) em Ambiente Lêntico com Fragmentos de Mata Atlântica, Nordeste do Brasil;
- Rafael Barboza: Da ecologia reprodutiva ao conhecimento ecológico local de um crocodiliano, o jacaré-do-papo-amarelo (*Caiman latirostris*);

- Rayssa Santos: Contaminação por metais e efeitos ecotoxicológicos em *Caiman latirostris* (Daudin, 1802) (Crocodylia, Alligatoridae) em ecossistemas lênticos de mata atlântica no nordeste do Brasil
- Carlos Rodrigues: Ecologia Parasitária e Ecotoxicologia de *Caiman latirostris* (Daudin, 1802) na Bacia do Rio Capibaribe
- Leandro Melo: Uso da Tomografia Computadorizada para Estudos de Fígado e Pulmões na Perinatologia de jacarés-de-papo-amarelo (*Caiman latirostris*, Daudin 1802)

Undergraduate student s

Two bachelor monographs: Mayara Negromonte and Anna Barbosa

Four undergraduate research projects: Lucas Vieira, Malu Caminha, Gabriela Lucena and Gabriel Brandão

Short communications and original articles

1. Mascarenhas-Junior, P. B., Correia, J. M., & Simões, P. I. (2023). Tracking crocodylia: a review of telemetry studies on movements and spatial use. Animal Biotelemetry, 11(1), 21. (Figure 1 b)
2. Santos, R., Mariz Jr., C., Mascarenhas-Junior, P. B., Barboza, R. S., Santos, E., Correia, J. M., Carvalho, P. S. Nondestructive evaluation of metal bioaccumulation and biochemical biomarkers in blood of broad-snouted caiman (*Caiman latirostris*) from northeastern Brazil. Environmental Toxicology and Chemistry. Accepted.
3. Barboza, R. S. L., Negromonte, M. G., Neto, C. F. R. S., Mascarenhas-Junior, p. B., Caminha, M. M., Santos, E. M., Correia, J. M. S. First record of twin hatchlings in *Caiman latirostris* (Daudin, 1802) in the Atlantic Forest, Brazil. Journal of Environmental Analysis and Progress. Accepted.
4. Neto, C. F. R. S., Barboza, R.L.S., Santos, E. M., Correia, J. M. S. Predation of a neonate caiman, Caiman latirostris (Daudin, 1802) by red fire ants Solenopsis sp. in Atlantic Forest, North-eastern Brazil. Tropical Ecology. Accepted.
5. Mascarenhas-Junior, P. B., Strickland, B., Heithaus, M., Simões, P., Correia, J. Factors influencing detection, distribution and population dynamics of the broad-snouted caiman (*Caiman latirostris*) in an altered environment in north-eastern Brazil. Journal of Zoology. Submitted.
6. Mascarenhas-Junior, P. B., Strickland, B., Heithaus, M., Santos, R, Barboza, R., Simões, P., Correia, J. Effects of fishing activities on the broad-snouted Caiman (*Caiman latirostris*) population in a Brazil reservoir. Aquatic Conservation: Marine and Freshwater Ecosystems. Submitted.
7. Mascarenhas-Junior, P. B., Barboza, R., Caminha, M., Lucena, G., Rodrigues, C. F., Simões, P., Correia, J. GPS-telemetry as a method to access nest attendance by a female broad-snouted caiman (*Caiman latirostris*). The Herpetological Journal. Submitted.
8. Barboza, R.L.S., Correia, J. M. S., Souto, A., Schiel, N. "I prefer a safe place": The influence of anthropic disturbance on nesting and parental care of a crocodilian, the broad-snouted caiman. Animal Ecology. Submitted.

Workshop Conservação de crocodilianos na Mata Atlântica

The workshop was aimed at the conservation of caimans within Atlantic Forest, with an overview of the current research on caiman within the biome. Moreover, this meeting was an opportunity to discuss conservation strategies, strengthen the connection between professionals in different areas of herpetology, and encourage more early-carrier researchers to study caimans in Brazil. The workshop was made possible through a partnership between the Marcos Daniel Institute (IMD) through the Caiman Project, the Chico Mendes Institute for Biodiversity Conservation (ICMBio), and the Federal Rural University of Pernambuco (UFRPE) through the Interdisciplinary Laboratory of Amphibians and Reptiles (represented in the presentations by researchers Jozelia Correia, Paulo Mascarenhas-Junior, and Rafael Barboza).

Educational activities

Researchers and collaborators of *Projeto Jacaré* were involved with several educational actions during 2023. Those activities included multiple expositions in school, public commons, parks and Conservation Units (legally protected areas). The main target group were students from local schools, but also involved the general public, including professors, tourists and residents from areas surrounding forest fragments. The exposition gathered 11 schools. One of most important exposition made by the project was the "*Semana Nacional da Ciência e Tecnologia: Vida na Água, vida na Terra – O Conhecimento Abrindo Fronteiras e Rompenod Barreiras Por Meio das Ciências Básicas*", funded by the Brazilian government. This activity was performed within L.I.AR. lab and in *Dois Irmãos* State Park, a Conservation Unity within urban area of in Recife, spanning an entire week of reptile and amphibian expositions. Moreover, in partnership with the environmental rescue agency of Camaragibe city, another exposition was made with local schools. The incredible world of amphibians and reptiles joined 10 schools during this activity. In total, more than 2000 people visited those expositions (Figure 1).

Reported by: Jozélia Correia and Paulo Braga Mascarenhas-Jr

The Caatinga domain, in northeastern Brazil, is the largest seasonally dry tropical forest biome in the world (Fernandes et al. 2022). The region is characterized by semiarid climate with severe water scarcity, being highly vulnerable to the impacts of climate changes.

Despite the predominance of ephemerous rivers and provisory water bodies, the region harbors three crocodilian species: *Caiman crocodilus*, *C. latirostris* and *Paleosuschus palpebrosus*. However, basic information about the ecology, natural history and conservation aspects of these species is scarce (Correia et al. 2021), making it difficult to establish conservation strategies.

In the state of Ceará, two species are known to occur: *C. crocodilus* and *P. palpebrosus*. *C. crocodilus* occurs along the Poti River drainage and the western coastal basin (Roberto et al. 2020), being classified as least concern in the list of endangered fauna species of Ceará (SEMA, 2022). On the other hand, *P. palpebrosus* is classified as vulnerable in the state of Ceará, with restricted distribution in the Mundaú and Poti Rivers (Lima and Borges-Nojosa, 2011; Roberto & Loebmann, 2016). Recently, *C. latirostris* was recorded in the state (Barreto-Lima et al., 2023), but there are still doubts about the origin of the individual recorded and if there is an established population.

To develop conservation strategies for the crocodilian species of Ceará, it is necessary to know the basic aspects of their distribution, natural history, and potential threats. We have been mapping the species distribution using different tools, interviewing local communities and searching the popular press about crocodilians such as local television and social media. This is the initial step to develop future monitoring and conservation projects for the species in the state of Ceará.

Reported by: Igor Joventino Roberto

3. Midwest region

Global climate change has different negative effects around the world, and the 2019-2021 extreme drought observed in the Pantanal appears to stem from these effects. Aquatic and semi-aquatic species occur in abundance in the Pantanal, due to the large supply of seasonally floodable environments. The pantanal Caiman, *C. yacare*, which in the 1990s had an estimated population of around 3 million individuals, is experiencing population decline due to the scarcity of water in the remaining rivers, lakes and reservoirs. The species responds to droughts by adopting survival strategies such as estivation in the mud and inside the forest.

On a regional scale, the lack of rain in the summers of 2019-2021 may be caused by the reduction in the flow of warm, humid air from the Amazon to the Pantanal. This phenomenon is known as “flying rivers”, which carry moisture from the Amazon forest, determining the occurrence of rain in the Central-West and Southeast of Brazil (Pearce 2020). Recently, “flying rivers” are being replaced by dry winds, which increase evapotranspiration rates, resulting in drought. The presence of dams on the rivers that flow into the Pantanal is another factor that contributes to this water scarcity. There are 144 hydroelectric projects installed or under construction which may have cumulative impacts on the Pantanal flood pulse.

The destruction of riparian forests also threatens the Pantanal, through sediment deposition, accelerating the silting of Pantanal rivers. Additionally, forest fires intensify every year, reaching areas of the plain that would normally be flooded. In 2020, around four million hectares burned in the Pantanal, killing approximately 17 million vertebrates, including 85,000 caimans.

We recommend three general measures for the conservation of the Pantanal as a whole and five specific management actions to minimize the effects of drought on caiman populations in the Pantanal.

The most important recommendations for the maintenance of the Pantanal caiman are: 1) the non-implementation of infrastructure that affects the annual pulse of floods of the Paraguay River and its tributaries, whether large or small dams or permanent changes in the course of water such as landslides and/or straightening of the course, which aim to “optimize” the existing natural waterway; (2) the creation of a National Park to conserve the sources of the Paraguay River; (3) cease deforestation in the southern Amazon and begin the recovery of deforested areas, aiming to restore the “flying rivers”, and avoid disruption of the rain in the Pantanal. Is it too much to ask to save caimans? Perhaps, but by saving it, we will be saving the Pantanal as a whole and probably contributing to the climate stability of important productive areas in southeastern Brazil.

In addition to these, we make some specific recommendations: 1). Do not interfere with the behavioral responses of caiman to water scarcity, such as when they are buried in mud or foliage or grouped in shallow lagoons or migrating on dry ground. Avoid translocations of individuals due to the risk of introducing and spreading pathogens and zoonoses. In extreme cases, we recommend consulting groups of experts and debating the scientific basis of the action, which, if carried out, must follow IUCN recommendations. Increase water supply in pre-existing artificial or natural water bodies, either through drilling semi-artesian or artesian wells, or digging wells with a backhoe. These measures aim to minimize the caimans mortality, but can benefit all of the Pantanal's terrestrial and aquatic fauna in dry years; 4). Do not collect eggs, hatchlings, or adults for economic purposes (captive breeding) during years of severe drought in the Pantanal, as these populations are under water and food stress, with reduced reproductive potential and population recruitment. Establish a large-scale population and genetic monitoring program for the

Pantanal caiman and other vertebrates associated with the seasonal environment, in order to allow conservation actions to be implemented in a timely manner if a reduction in populations to critical levels is detected. (Campos et al. (2022). Direções para mitigar os impactos da seca extrema nas populações de jacarés (Caiman yacare) no Pantanal. Oecologia Australis 26(3): 403-410).

Reported by: Zilca Campos

Normally, the Pantanal region has cycles of drought and fire, but in recent years, mainly due to climate change and anthropogenic modifications, these have worsened, especially in 2020 and 2021. However, in 2023, 92.6% of the authorized nests were collected, denoting a change in the pattern observed in previous years. This represents an improvement in nest production estimates, as well as in the organization of fieldwork. Thus, of the 1266 nests authorized in 2023, 1173 nests were collected resulting in 29,498 eggs being collected (average of 25.15 eggs/nest).
Within this scenario, the numbers of eggs collected in the two management programs and during the years are presented below:

Caimasul Farming Program

Year	# females	Nests Collected	Eggs Collected	Hatchlings
2022	1300	213	5968	
2023	1500	403	11,641	7205

Caimasul Ranching Program

Year	# Caimans observed	Harvested area (ha)	Nest quota authorized	Nest quota requested	Nests Collected	Eggs Collected
2017	143,169	38,378	9,702	2451	747	21,338
2018	135,856	55,349	8,233	3810	1336	32,270
2019	145,628	42,319	4617	2708	1374	35,453
2020	129,172		8199	7305	379	9257
2021	6857	64,244	28,885	2000	442	10,902
2022		126,867	3781	2000	1002	24,595
2023	131,526	47,558	1266	1398	1173	29,498

Reported by: Eduardo Borges and Flávia Mantero da Silva

4. **Southeast Region**

Luciano Verdade is retiring from his position at the University of São Paulo. He is also finishing his Thematic Project Intitled "Wildlife management in agricultural landscapes: patterns and processes", funded by São Paulo Research Foundation (FAPESP), which included studies on applied ecology of the broad-snouted caiman, besides mammals and birds. For a brief period, he will act as the head of the Wildlife Management Consultancy (WMC), which will focus on the development of a wildlife monitoring program in agricultural landscapes of southeastern South America and Southern Europe. Luciano will keep cooperating with Luis Bassetti on the management and conservation of Brazilian caimans.

Reported by: Luís Bassetti

Environmental Education is a cornerstone of the Caiman Project, serving as a direct interface with individuals. We believe that Environmental Education, and its various foundations are powerful in shaping ways of being and existing in the

world. In 2022 and 2023, the Environmental Education of the Caiman Project worked to propagate that the environment is a place for all living beings, emphasizing the need to preserve and respect all forms of life on the planet.

In 2022, the Environmental Education program of the Caiman Project reached 33,850 people in events (29,395), schools (3616), and the Conhecer Program (613). In 2023, the Environmental Education activities of the Caiman Project focused on inclusion and diversity in their actions. The "Caiman Project for Everyone - Inclusive Environmental Education" aimed to cater to children and young people with disabilities or Global Developmental Disorders (GDD). The goal of this work is to understand the need to expand Environmental Education activities to make them accessible and inclusive for everyone. We made accessibility adaptations in our work materials, such as 3D pieces for diversities, high-relief materials for the visually impaired, clay and/or playdough resources for children with autism and Asperger's, and a sensory line for children and young people with Downs syndrome.

Approximately 1000 people have been served since the implementation of the diversity project. At the same time, we maintained our regular activities in events, courses, and schools, totaling 42,721 people so far. Starting in 2024, the Environmental Education activities of the Caiman Project will be extended to the new project hub, the Caiman Cultural Center, located in Serra, ES, aiming to embrace and serve a larger audience, emphasizing Brazilian culture and biodiversity.

During the years 2022 and 2023, the Caiman Project, focused on the conservation of crocodilians in Brazil, playing an essential role in preserving this species. The project concentrated its activities on field excursions in various conservation units and private properties, focusing on population surveys and carrying out operations to rescue and rehabilitate urban alligators. The results indicated a total of 47 individuals captured and evaluated during rescue and field capture operations, while the population census counted 256 caimans within and in the surrounding areas of the state's conservation units, as well as in the population census fields in the green belt of ArcelorMittal Tubarão, where the largest free-living population in Espírito Santo is found. In total, in 2022, the Caiman Project operated for 160 days in the search for the capixaba alligators. In the following year, 2023, the Caiman Project intensified its efforts, recording captures of 47 individuals and counting 266 records during the population census, totaling 114 days in campaigns. These numbers reflect the project's ongoing commitment to monitor, protect, and promote harmonious coexistence between the human population and this species, which is fundamental to the local ecosystem.

Reported by: Yhuri Nóbrega

Crocodylia Brasil - CrocBR

During 2023, Crocodylia Brasil promoted a series of online presentations with different themes, encouraging students and professionals to learn more about crocodilians. These presentations took place throughout the year, providing free and open-access knowledge.

27/04/2023 - Luís Bassetti: Conflitos humanos x crocodilianos - A importância de se conhecer a microflora presente no ambiente.

18/05/2023 - Ronis Da Silveira: Abundância espaço-temporal do gigante amazônico.

15/06/2023 - Alejandro Larriera: Convención CITES – La biopolítica en el campo de la conservación.

10/08/2023 - Fábio Muniz: Contribuições para o conhecimento genético e evolutivo do *Paleosuchus palpebrosus.*

21/09/2023 - Augusto Kluczkovski: Apontamentos sobre o processamento de carne dos jacarés amazônicos.

01/11/2023 - Washington Mendonça: Avaliação e implicações do estresse de interação e intervalo de referência bioquímica do sangue de *Melanosuchus niger* e *Caiman crocodilus.*

In 2024, CrocBR intends to invite speakers from other parts of the world, presenting different realities, but with the same goal: Conservation of crocodilians.

Reported by: Ronis Da Silveira and Luís Bassetti

Prepared by: Luís Bassetti
Date prepared: 31 January 2024

Costa Rica

Interactions with *C. acutus* continue to occur and the protocol that had been approved to deal with them is not being used The government does not justify why, which leads to situations such as last year when there was a fatal attack (a boy jumped a drugged river) and the crocodile was killed. Unfortunately, more than one Crocodile was killed in the attempts to rid the targeted crocodile.

Last year, the government approved a project to create a new protocol for attention to interactions. This project includes objectives related to monitoring, the human dimension and the assessment of the issue.

I am starting a project to try to design a counting and monitoring protocol using drones.

Prepared by: Laura Porras
Date prepared: 1 February 2024

Cuba

The crocodile conservation program in Cuba includes the *in situ* and *ex situ* management of the two species Crocodylus that inhabit the Cuban archipelago. In addition, it aims to make sustainable use of the population of *Caiman crocodilus fuscus* introduced on the Isle of Youth.

The *in situ* program includes nine closed-loop breeding farms, of which three maintain populations of *C. rhombifer* and the rest *C. acutus*. Currently, the objective of these institutions is conservation and research, and the programs for raising and release within the species distribution range is a priority. A project is currently being carried out to rebuild the Zapata breeding farm, and the incubation area was improved with the help of the Cuban government and foreign organizations (see list below). Unfortunately, the current state of other infrastructure, and the limitations in general to support captive populations, demand the execution of strategies aimed at the reorganization of the entire animal mass.

Ex situ conservation actions are carried out in eight localities within the Cuban Protected Areas System with research projects focused on the practical applications of *C. rhombifer*. Among others, a baseline of hematological values for *C. rhombifer* adults was obtained, and the potential of environmental DNA for the monitoring of crocodiles in natural spaces and the biodiversity of the ecosystems they inhabit, were shown.

The SMART monitoring tool was also implemented to update the distribution map of the species present in Cuba. Also, an initiative is being promoted to resume the management of the population of babillas (*C. crocodylus fuscus*) on the Isle of Youth and the release of specimens of *C. rhombifer* raised in captivity. However, the threats that *C. rhombifer* and *C. acutus* face today persist in some regions and intensify throughout their range of distribution. The increase in illegal harvesting, mainly motivated by the growing economic crisis existing on the island, and the modification of habitat caused by human activity and climate change, are additional challenges.

Finally, with the support of Cuban government and foreign organizations, training actions were developed for Cuban specialists (National Workshop of the GECC), along with environmental education actions in several of the local communities near crocodile habitat. Also, funds from these institutions facilitated the participation of Cuban specialists in a symposium entitled "Current paradigms in the conservation and use of crocodiles in Latin America," within the framework of the CIMFAUNA held in November 2023 in Colombia.

Institutions that support the conservation of crocodiles in Cuba:
Antonio Núñez Jiménez Foundation for Man and Nature, Bronx Zoo, Company for the Conservation of the Zapata Swamp, Flora and Fauna Company, Gatorland, Saint Louis Zoo and Wildlife Conservation Society.

Prepared by: Gustavo Sosa and Etiam Perez
Date prepared: 31 January 2024

Guatemala

Research regarding crocodiles has been focused on *C. moreletii* populations in Guatemala with population density studies initially conducted by Castañeda (1998/99) and Castañeda *et al.* (2000), mainly in El Petén. Later, Corado-García *et al.* (2020) estimated encounter rates and anthropogenic threats toward *C. moreletii* populations in ten different water bodies in El Peten. Before 2018, there were no records of *C. acutus* populations in Guatemala. In 2019, Corado-Garcia and collaborators carried out the first population density study and insights into anthropogenic impacts on *C. acutus* in Río Dulce National Park, Sarstún River, and Bocas del Polochic Wildlife Reserve, located in the Caribbean slope. A total of 56.3 km was surveyed, spotting 120 crocodiles in the three water bodies, largely concentrated in the wildlife reserve, which resulted in an overall encounter rate of 2.13 crocodiles/km. However, only one capture was possible since most of the individuals were very wary. Due to misconceptions toward the crocodiles, since the locals perceived them as dangerous and man-eating, which leads to negative interactions during fishing, aquatic transportation activities and nests invasion.

Then in 2022, Corado-Garcia and collaborators along with the Protected Areas Council of Guatemala (CONAP), a project in Petén Itzá Lake was carried out due to conflicts between crocodiles and cattle farm owners. During consultation workshops between cattle owners, restaurant and hotel owners located near the lake, it was concluded that some hotels were feeding the crocodiles as an attraction activity to tourists. This has a negative impact on livestock farms since the young cattle were being attacked by crocodiles. In order, to promote the correct coexistence between crocodiles and humans, a conservation management plan was developed and approved in 2023 by the honorable council of CONAP. In 2024, it will be locally implemented in Petén, by the government, to mitigate illegal feeding of crocodiles and encourage its conservation by regulating some tourist activities with the species.

A project with *C. acutus* will be executed in the south coast of Guatemala this year in collaboration with the CrocDocs. This is the first time a crocodile project will be implemented in the Pacific slope. The project is focused mainly on the American crocodile but since there are no previous studies in the area, we might find *C.crocodilus* or *C. moreletii* as well based on some reports received by CONAP last year.

Prepared by: Valerie Corado García
Date prepared: 31 January 2024

French Guiana

Since the summer 2022, four new projects on caimans have been launched in French Guiana as well as some diverse talk that were open to everyone.

Regarding publications

Lemaire, J. 2023. Using crocodylians for monitoring mercury in the tropics. *Ecotoxicology*. https://doi.org/10.1007/s10646-023-02703-1
Lemaire, J., Mangione, R., Caut, S., Bustamante, P. 2024. Mercury biomagnification in the food web of Agami Pond, Kaw-Roura Nature Reserve, French Guiana. Helyion, in Press.

Prepared by: Jeremy Lemaire
Date prepared: 31 January 2024

Jamaica

The American crocodile is Jamaica's largest native reptile and is currently threatened by habitat loss through wetland reclamation for development and human encroachment. In Jamaica, there has been an increase in the number of human-crocodile interaction cases as the animals become displaced and seek out new areas (storm drains, sewage and fish ponds). Since the early 2000s there have also been increased reports of crocodiles being illegally hunted for local consumption. The National Environment and Planning Agency (NEPA) has the mandate to ensure the conservation of the American crocodile *(C. acutus)*, under both national laws and international agreements. The revised Crocodile Management Plan (2020) aims to *'ensure the maintenance of viable populations in the wild through research and effective conservation strategies'* with the first short term objective to '*Conduct a country wide crocodile survey to determine its population status and to evaluate the suitability of habitats for the American crocodile in Jamaica'*.

In March 2022, the first island-wide crocodile survey was completed. This collaborative project between the NEPA, in collaboration with the University of the West Indies (UWI), Mona Campus and the University of Florida (Croc Docs), and spearheaded by Treya Picking as part of her Masters thesis. During this time, 105 spotlight surveys were conducted across 35 habitats. A habitat analysis has been completed using historical and current data. The next stage is to publish the research and work towards implementing the recommended conservation strategies.

Treya Picking is now working towards establishing a crocodile initiative, working closely with Government and non-government entities, to implement various projects including outreach programs, research and long-term monitoring. Funding has been secured to develop new educational material to raise awareness and to implement the monitoring programs. In addition, other activities such as community-based warden programs, enforcement exercises and strengthening wetland protection are also a part of the initiative.

The Holland Crocodile Conservation Sanctuary established by Lawrence Henriques has been continuing its conservation program, which involves captive breeding, rescue and rehabilitation, outreach and head-starting. Since 2021, five health screens of the facility's captive population have been conducted. This has become an important training exercise which brings together both local and international entities such as NEPA, Veterinary Services Division, the Hope Zoo, Gatorland Global, professional individuals and volunteers. The results from the island-wide crocodile research continue to guide the head-start program. Currently, the focus of the program is recovering the crocodile population of the Holland Bay wetlands, which has become depleted overtime due to illegal hunting and habitat degradation.

To date, the Hope Zoo continues to work closely with NEPA and other government stakeholders to assist with crocodile rescue and rehabilitation, human-crocodile conflict issues, the on-going island-wide population survey, and various necropsy examinations involving the mortality of wild crocodiles. These efforts have been spearheaded by Joey Brown, General Curator at Hope Zoo.

Prepared by: Treya Picking
Date completed: 31 January 2024

México

1. Research and new information

Researcher	Project
Asela Marisol Buenfil-Rojas, Hisato Iwata (Host Researcher) Collaborators in Mexico: 7; Collaborators in Japan: 5	Integrated assessment of chemical pollution and its impacts on wild *Crocodylus moreletii* Main updates: Metal analysis of scutes, blood and claws of 30 crocodiles from 5 sites. POPs analysis of 29 samples of blood plasma of crocodiles from 5 sites. RNA extracted, sequenced by Illumina RNA-seq and 32 libraries generated from 16 individuals from 3 sites. Working on exportation of the 2nd batch of samples. Preliminary results will be presented at the 27th Working Meeting.
Birgit Schmook, Jonathan S. Pérez Flores, Pierre Charruau	Negative human-crocodilian interactions in the RB Banco Chinchorro and the APFF Mangroves of Nichupté. PROREST-CONANP. June-December 2022

Emigdio Marín Enriquez, Pierre Charruau	The use of unmanned vehicles for ecology and oceanography studies in the area of Mazatlan, Sinaloa. 1 year (2022). Program for the Promotion and Support of Research Projects (PROFAPI), Autonomous University of Sinaloa.
CONABIO GEC-MX	The Mexican CITES Scientific Authority coordinated the implementation of the Monitoring Program of the American crocodyle with the support of Universities and Civil Society Organizations in four regions that includes the Caribbean Sea and the Mexican Pacific. The report of the first season (2021) of monitoring of river crocodile (*Crocodylus acutus*) will be published by mid-2024.
Benjamín Castillo Elías and Herlinda Gervacio Jiménez	Management of the river crocodile (*Crocodylus acutus*) under captivity conditions in the municipality of Acapulco, Guerrero, Mexico: 1. To determine the population structure and morphological variations in river crocodile specimens in captivity conditions to promote the conservation of the species in the locality San Andrés Playa Encantada, Barra Vieja, Municipality of Acapulco, Guerrero, Mexico (Years 2022 and 2023 in the process of publication). 2. To perform statistical tests to determine the correlation between Rostral Length and Total Length in *Crocodylus acutus* individuals in Acapulco, Guerrero, Mexico (Years 2022 and 2023 in the process of publication). 3. Proposal for the establishment of a Management Unit for the Conservation of Wildlife "UMA: Centro Recreativo Cocodrilario Acutus" for the *Crocodylus acutus* species in Acapulco, Guerrero, Mexico (in process from 2023 to date).
Yessenia Sarmiento Marina – YEDMALIM A.C.-FMCN-USFS-REBIEN	Monitoring the health and quality of the mangrove ecosystem on the Pacific coast of Chiapas, Mexico, March 2023-January 2024: 1. Monitoring of crocodilians (Crocodylus acutus and Caiman crocodilus) in Laguna Buenavista of the La Encrucijada Biosphere Reserve. 2. Social appreciation of crocodiles and caimans in three ejidos of the core area "El Palmarcito" of the La Encrucijada Biosphere Reserve (REBIEN). 3. Environmental education events: ecological importance of crocodilians and preventive measures of human-crocodile interactions in the La Encrucijada Biosphere Reserve.
Edgar Sarmiento Marina CONANP, CI MEXICO, BIOCONCIENCIA A.C. Y YEDMALIM A.C. Periodo 2022 - 2024	Monitoring of populations of the river crocodile (Crocodylus acutus) and caiman (Caiman crocodilus), use of phototrapping in localities of the palmarcito nucleus zone in the REBIEN. Chiapas-Oaxaca Sustainable Landscape Project.

2. Management and conservation actions

Leader	Project
CONABIO GEC-MX	The Crocodilian Specialists Group of Mexico (GEC-MX) prepared its work plan for the year 2024 where activities will be carried out on monitoring and ranching, use of specimens from the wild, traceability of skins, S.O.S. groups on human-crocodile interactions and environmental education, and organization of the next ordinary meeting on the second half of 2024.
CONABIO GEC-MX	The "Programa de monitoreo de los cocodrilianos de México: *Crocodylus moreletii, Crocodylus acutus* and *Caiman crocodilus*" was an adaptation of the "Programa de monitoreo de cocodrilo de pantano (*Crocodylus moreletii)* Mexico-Belice-Guatemala" (Sánchez-Herrera et al., 2011) to extend it to the three species of crocodilians of Mexico. It aims to lay the foundations for monitoring the status and trends of the main wild populations of these species, throughout their distribution range in our country. The data obtained supports a better decision making process regarding the conservation, management and sustainable use of the species.
CONANP/REBIEN GEC-MX	S.O.S. Crocodile Training Workshop for personnel of the Municipal Civil Protection Secretariats; at the National School of Civil Protection, Chiapas Campus on preventive

Edgar Sarmiento Marina	measures and attention to negative interactions with crocodiles and caimans in the localities located in the Puerto Arista Beach Sanctuary and La Encrucijada Biosphere Reserve. August 05, 2023.
CONANP/REBIEN GEC-MX Edgar Sarmiento Marina	Exchange of Experiences of Community Monitors of the Sustainable Landscapes Project Oaxaca - Chiapas, Mexico, with priority species: River Crocodile, Jaguar, Spider Monkey and Bicolor Mangrove. From August 16 to 19, 2022 at Centro Ecoturística, Escobilla; Oaxaca
CONANP/REBIEN GEC-MX Edgar Sarmiento Marina	Workshop on the Training of Community Civil Protection Committees in Human – Crocodile Contingency Prevention Actions. Crossroads; Chiapas, Mexico. October 2022
CONANP/REBIEN GEC-MX Edgar Sarmiento Marina	Participation and Exchange of Experiences "Human-Crocodile Interaction on the Coast of Chiapas" La Encrucijada Biosphere Reserve at the Centro Servicios Ecoturísticos de la Ventanilla S.C. DE R.L. DE C.V. May 2023

3. **Production and trade**

During 2022, according to the CITES Trade Database, Mexico reported two export events of Crocodylia. The first one involves export of leather products of *C. crocodilus* to Guatemala (GT). These were registered for trade purposes, originating as bred in captivity (source code C). The second event involves skins of *C. moreletii* to France (FR). These were also registered for trade purposes from captive breeding (source code C).

For the same year, Mexico reported 10 re-export events of Crocodylia: four regarding *Alligator mississippiensis*, three for *Crocodylus niloticus*, two for *C. crocodilus*, and one *Crocodylus porosus*. These re-export events were also for leather and skins, all for trade purposes. Source codes did vary, five events were reported as wild origins (W), four as ranched origins (R) and only one as bred in captivity (C).

Also, during 2022 according to the CITES Trade Database, Mexico reported 58 import events of Crocodylia. All of them involve import of leather and skin products from the species *C. crocodilus, C. porosus, C. niloticus, C. latirostris,* and *A. mississippiensis*. Source codes varied with 24 reporting wild origins (W), 17 from ranched origins (R),16 from captive breeding (C) and only one reported it as Appendix-I animals bred in captivity (D). The main exporters were Italy (30) followed by France (12) as well as Spain (5), Colombia (3), Germany (2), Austria (2), Tanzania (1), Ireland (1), Panama (1), and Portugal (1).

It is worth noting that not all trade information for the year 2023 has yet been captured in the CITES database. For that reason, the Administrative Authority of CITES in Mexico (DGVS-SEMARNAT) was consulted. In 2022 they granted 23 CITES authorizations for exports of *C. moreletii*, 21 of them were reported as bred in captivity (C) and two of them were biological samples reported from wild origins (W). 19 of them were for the USA and one for France. The biological samples were exported to Canada and Japan. In 2023, DGVS-SEMARNAT granted 49 CITES authorizations for exporting *C. moreletii* to the USA, all from captive breeding (C). So far, for 2024 DGVS-SEMARNAT has granted 2 authorizations for exporting *C. moreletii* to the USA from captive breeding (C).

4. **Publications**

Book chapters

- Charruau P, J Ávila-Cervantes, JS Pérez-Flores. 2022. Chapter XII. The American crocodile of Banco Chinchorro atoll. Pp: 129-140. In: L Sigler, D Navarro (eds.) The Crocodylia of México by Miguel Álvarez del Toro. Independently published. ISBN: 979-8449785329. https://www.researchgate.net/publication/361439246_The_American_crocodiles_of_the_Banco_Chinchorro_atoll
- Cruz-Morales, G. y G. Barrios-Quiroz. 2022. Implementación y desarrollo de una estrategia socioambiental para la coexistencia humano-cocodrilo en la costa de Oaxaca (México).Pp: 90-104 En del Moral S. J. F. et al. Coexistencia entre fauna silvestre y seres humanos. Análisis de experiencias en el contexto latinoamericano. Comfauna-Fundación Natura

Scientific papers

- Castillo Ipiña, Jesús Alfredo; Rivas Eguia, Pedro de Jesús Osiris; Alfaro de la Torre, Ma. Catalina; Espinosa Reyes Guillermo. 2023. Uso y aplicación de Vehículos Aéreos No Tripulados (VANT) para la búsqueda de nidos de cocodrilo de pantano en la Ciénaga de Tamasopo, San Luis Potosí, México. Ciencia, Tecnología e

Innovación para el Desarrollo de México. Año 14, PCTI 227-2023-12-07. ISSN 2007-1310. https://pcti.mx/articulos/pcti-227-uso-y-aplicacion-de-vehiculos-aereos-no-tripulados-vant-para-la-busqueda-de-nidos-de-cocodrilo-de-pantano-en-la-cienaga-de-tamasopo-san-luis-potosi-mexico/

- Cedillo-Leal, C. G. Cruz-Morales and G. Barrios-Quiroz. 2023. NON-FATAL HUMAN-CROCODILE INTERACTION WITH Crocodylus moreletii IN ALTAMIRA, TAMAULIPAS. Crocodile Specialist Group Newsletter. 42(3):13-15
- Charruau P, D Ichbia, GA Gónzalez-Desales, SG Platt. 2022. Reproductive dynamics of an isolated population of American crocodiles (*Crocodylus acutus*) based on long-term monitoring data. *Journal of Herpetology* 56(2): 196-202. https://doi.org/10.1670/21-019
- Charruau P, MA Morales-Garduza, MA López-Luna, JG Reyes-Trinidad, MA Ramírez-Pérez, JA López-Hernández, R García-Morales. 2023. Herpetofauna of the Chaschoc lagoon wetlands, Tabasco, Mexico. *Revista Latinoamericana de Herpetología* 6(2): 75-92. https://doi.org/10.22201/fc.25942158e.2023.2.616
- González-Desales GA, P Charruau, MM Zarco-González, O Monroy-Vilchis. 2023. Factors influencing egg predation of two sympatric crocodilians in Mexico. *Herpetological Conservation and Biology* 18(2): 404-414. https://www.herpconbio.org/Volume_18/Issue_2/Gonzalez-Desales_etal_2023.pdf
- González-Sánchez VH, JD Johnson, O Frausto-Martínez, LM Mejía Ortiz, A Pereira-Corona, M del P Blanco-Parra, P Charruau, CA Niño-Torres. 2023. The Herpetofauna of the Insular Systems of Mexico. *Diversity* 15(8): 921. https://doi.org/10.3390/d15080921
- Marín-Enriquez E, P Charruau, LA Félix-Salazar. 2023. Discovery of a suburban wetland refuge for a depleted American crocodile (*Crocodylus acutus*) population in northwestern Mexico, using a commercial Unmanned Aerial Vehicle. *Tropical Conservation Science* 16: 1-7. https://doi.org/10.1177/19400829231209848
- Rainwater TR, SG Platt, P Charruau, SA Balaguera-Reina, L Sigler, JR Cedeño-Vázquez, JB Thorbjarnarson. 2022. *Crocodylus acutus* (amended version of 2021 assessment). The IUCN Red List of Threatened Species 2022: e.T5659A212805700. https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T5659A212805700.en
- Sánchez Álvarez B, F Pérez Garduza, A Monroy Ojeda, VM Santiago Plata, S López Mondragón, P Charruau. 2023. Bird-herpetofauna interactions in the Usumacinta river basin, Mexico. *Revista Latinoamericana de Herpetología* 6(1): 127-134. https://doi.org/10.22201/fc.25942158e.2023.01.594

Thesis

- 2022. Distribución y preferencia de hábitat del cocodrilo de pantano (Crocodylus moreletii) en la zona norte de la Reserva de la Biosfera Sian ka´an, Quintana Roo, México/ thesis presented by Jesus Vazquez Ramos in order to obtain the degree of Bachelor of Biology; advisor Alejandro Villegas Castillo
- 2022. Metales pesados en la población cautiva de *Crocodylus acutus, Crocodylus moreletii y Caiman crocodilus chiapasius* del Zoológico Miguel Álvarez del Toro (ZooMAT) y el campamento tortuguero de Puerto Arista, Chiapas / diagnosis of the situation that to opt for the degree of Master in Veterinary Medicine and Zootechnics, presented by Kristell Jimena Zapatero Vázquez; main thesis tutors Carlos Gutiérrez Olvera, Juan Carlos Ramírez Orejel, José Manuel Aranda Coello
- 2022.Propuesta de programa de manejo, aprovechamiento y conservación del cocodrilo de pantano (Crocodylus moreletii) en la Ciénega de Tamasopo, San Luis Potosí. Thesis to obtain the degree of Master of Environmental Sciences. Submitted by: LCAS. Castillo Ipiña Jesús Alfredo, under the direction of Guillermo Espinosa Reyes, Valente Vázquez Solís, Javier Fortanelli Martínez, Ma. Catalina Alfaro de la Torre.

Talks

- 2023 Ponencia: 1er Curso-Taller de atención integral para primera respuesta a la interacción humano-cocodrilo (Instructor). La Ventanilla, Santa Maria Tonameca, Oaxaca, Gabriel Barrios Quiroz
- 2023 Ponencia: Translocación y movimientos de Crocodylus moreletii en una zona urbana de Tamaulipas México. XV Congreso Internacional de Manejo de Fauna Silvestre de la Amazonía y Latinoamérica, Santa Marta, Colombia. CIMFAUNA, César N. Cedillo Leal, Gabriel Barrios Quiroz y Armando H. Escobedo Galván
- 2023 Ponencia: Atención de interacciones negativas humano-cocodrilo en zona urbana, Grupo SOS Cocodrilo Tampico. XV Congreso Internacional de Manejo de Fauna Silvestre de la Amazonía y Latinoamérica, Santa Marta, Colombia. CIMFAUNA, César N. Cedillo Leal, Gabriel Barrios Quiroz, Sergio Padilla Paz y Mauricio González Jauregui
- 2023. Ponencia: Datos de ecología reproductiva de *Crocodylus acutus* obtenidos del monitoreo a largo plazo en una Reserva Natural Privada en Guatemala. XV Congreso Internacional de Manejo de Fauna Silvestre de la Amazonía y Latinoamérica, Santa Marta, Colombia. Javier A. Benítez-Moreno et al.
- 2023. Del apareamiento a la eclosión: los retos del cocodrilo para nacer. 1er Simposio Conservación de vertebrados silvestres y su ambiente: Reptiles y aves, Ciudad de Xalapa, México. Ponente Magistral Invitado. Pierre Charruau.
- 2023. Adaptaciones de una población aislada de cocodrilo Americano en un atolón del Caribe mexicano. XVI Reunión Nacional de Herpetología, Ensenada, México. Ponente invitado. Pierre Charruau.
- 2023. ¿Qué, cómo y con qué fin se recogen datos y muestras sobre los cocodrilos? Conferencia impartida durante el LagartoFest 2023, Villahermosa, Tabasco, México. 20 de agosto. Pierre Charruau.

- 2023. ¡Preguntale al Sr. Cocodrilo! 1er Encuentro de Celebrando la Biodiversidad. El Colegio de la Frontera Sur y Ayuntamiento de Centro, Villahermosa, México. 27 de mayo. Pierre Charruau.
- 2022. Y …¿Cómo se reproducen los cocodrilos? Conferencia impartida durante el LagartoFest 2022, Villahermosa, Tabasco, México. 27-28 de agosto. Pierre Charruau.
- 2023. "Los Crocodylia de México: Ciencia y Sociedad". Clan de Herpetología: Día Nacional del Cocodrilo, realizado el 23 y 24 de agosto en la Universidad de Ciencias y Artes de Chiapas (UNICACH), sede Tuxtla Gutiérrez, Chiapas. Ponente. Yessenia Sarmiento Marina.
- 2023. Importancia ecológica de crocodilianos y medidas preventivas de interacciones humano-cocodrilo en la Reserva de la Biosfera La Encrucijada (REBIEN). Eventos de educación ambiental realizados en comunidades de la REBIEN durante los meses de junio, noviembre, diciembre 2023, y enero 2024. Se realizó la distribución de materiales de difusión del tema. Yessenia Sarmiento Marina y Edgar Sarmiento Marina.
- 2023. CONVERSATORIO SOBRE EL CONOCIMIENTO DE LOS CROCODYLIA en Conmemoración del 23 de agosto Día Nacional del Cocodrilo: MVZ. Luis Sigler Moreno. - Gerente de la colección de reptiles del Dallas World Aquarium (DWA), USA; Biol. Edgar Sarmiento Marina. - Técnico Superior de la Reserva de la Biosfera La Encrucijada; S.O.S. Cocodrilo Chiapas – México; Biol. Armando Andrade Esquivel. - Representante del S.O.S Cocodrilo Nayarit; Nayarit – México; Biól. Gabriel Cruz Morales. - Asesor y responsable técnico de Servicios Ecoturísticos de la Ventanilla S.C. DE R.L. DE C.V S.O.S. Cocodrilo Oaxaca – MÉXICO. 23 de agosto de 2023
- 2023. Charla en el Programa Defensa Animal con Franny Garibaldi con el Tema: Importancia del Cocodrilo en la Reserva de la Biosfera La Encrucijada 29 de agosto del 2023. Edgar Sarmiento Marina Conanp – Encrucijada.
- 2023. Ponencia: Análisis de hidrocarburos aromáticos policíclicos y sus efectos en cocodrilo de pantano (Crocodylus moreletii) en la Ciénega de Tamasopo San Luis Potosí. XV CIMFAUNA. Santa Marta, Colombia; noviembre 2023. Pedro de Jesús Osiris Rivas Eguia; Jesús Alfredo Castillo Ipiña; Omar Cruz Santiago; María Catalina Alfaro de la Torre; Eleno Uriel Sanjuan Meza; César Arturo Ilizaliturri Hernández y Guillermo Espinosa Reyes.
- 2023. Ponencia: Estrategia de conservación y estructura poblacional del cocodrilo de pantano *(Crocodylus moreletii*) en un sitio Ramsar, SLP., México- XV CIMFAUNA. Santa Marta, Colombia; noviembre 2023. J. Alfredo Castillo, P.J Osiris Rivas, Catalina Alfaro, Eleno Sanjuan, César Ilizaliturri y Guillermo Espinosa.
- 2023. Conferencia: Importancia de los cocodrilos para el bienestar de los ecosistemas. Día Internacional de la Madre Tierra en el Museo Laberinto de las Ciencias y las Artes, San Luis Potosí, México, abril 2023. Guillermo Espinosa Reyes, Jesús Alfredo Castillo Ipiña, Pedro de Jesús Osiris Rivas Eguía, Uriel Alexander Herrera.

5. Other issues

Leaders	***Activities***
26° Reunión CSG-IUCN, Chetumal, México. 3-9 july 2022. CONABIO SEDARPE ECOSUR UMA Cocodrilia along with a National Coordinating Committee	More than 200 participants from at least 35 countries attended the event. Three workshops (drones, veterinary and taxonomy) and four working groups (human-crocodile interaction, zoos, industry, IUCN Red List) were held. There were 4 keynote lectures, 84 oral presentations and 66 posters on display. In the parallel public forum, 25 talks were presented and 77 audiovisuals were screened. This parallel forum reached over 11 thousand people through the social networks of the National Commission for the Knowledge and Use of Biodiversity (CONABIO) and the National Commission of Natural Protected Areas (CONANP) The proceedings of the Meeting with all the abstracts of the oral presentations and posters can be consulted at: https://www.biodiversidad.gob.mx/planeta/csg2022/pdf/CSG26-Abstracts-Program.pdf
Get Together – GEC-MX, Chetumal, México. 4 july 2022.	The meeting with 35 national experts reviewed topics of interest, including advances in the monitoring of Mexican species, ranching, traceability of skins, S.O.S. crocodile groups on human-crocodile interaction and planning of the next formal meeting of the group (see section 2 on GEC-MX work plan for 2024).

Prepared by: Hesiquio Benitez
Date prepared: 31 January 2024

Perú

Assessment Guide for C. acutus in Northern Peru - It is reported that an assessment guide for *C. acutus* in the northern region of Peru is being finalized. This document is in the validation stage and awaits approval from the competent authorities. The implementation of this guide will be crucial for the monitoring and conservation of the local crocodile population.

Export of C. crocodilus - The legal export of five individuals of *C. crocodilus* was carried out with an average size of 1.50 meters in total length. It is important to note that these specimens come from captive breeding facilities, thus ensuring traceability and sustainability of the activity. One of the exported individuals was albino. These specimens were destined for the Asian market, and the export was carried out in accordance with both national and international legal frameworks.

Seizure of Illegal Meat from C. crocodilus and M. niger - In June 2023, a significant intervention related to the illegal exploitation of crocodiles was carried out. A boat transporting illegal meat from *C. crocodilus* and *M. niger* was intercepted. This shipment was intended for the local market in Iquitos. The intervention demonstrates the ongoing need for law enforcement efforts to combat poaching and the illegal trade of protected species. For more information on this intervention, the following link here.

AIDER is currently developing a monitoring protocol for *C. acutus*, commonly known as the "Tumbes crocodile," in the Tumbes National Reserve. This initiative is led by Angel Llompart, a biologist specializing in herpetology. As part of this effort, field trips are conducted in collaboration with park rangers to spot the species and identify nesting areas. So far, three nesting zones have been identified. Subsequently, park rangers reported sightings of small individuals near these zones. This activity follows AIDER's assumption of a management contract with SERNANP for the National Protected Areas (NPA), including the El Angolo Hunting Reserve, Cerros de Amotape National Park, and Tumbes National Reserve. The latter two areas are known to have populations of *Crocodylus acutus*.

Prepared by: Diego Joao Freitas and Angel Llompart
Date prepared: January 2024

Venezuela

1. ***Caiman crocodilus crocodilus* wild harvest**
   In 2022 the wild harvest was only 5000 individuals to be exported the flanks to Europe, while in 2023, the wild harvest was 2500 individuals.

2. ***Crocodylus intermedius* conservation program**
   362 Orinoco crocodiles were released in both 2022 and 2023. With the support of Indianapolis Zoo, we built 7 new ponds in Leslie Pantin Zoo in Paya Aragua state, with the capacity to raise 250 *C. intermedius* per year, individual to be released into the wild. In January 2023, we transported 7 Orinoco crocodiles to Krokodille Zoo (Denmark) to establish the first breeding center in Europe. There was one mature male and female pair as well as five juvenile males to create 5 new couples in the zoo. All hatchlings produced will be sent to Venezuela to release into different areas. The journey of these crocodiles from Venezuela to Denmark was filmed and a documentary was produced by Rio Verde (here) with the name “Caiman del Orinoco, un largo viaje a Dinamarca”. A collaboration between Herpetofauna Foundation (Holland), Rio Verde and the Venezuela Crocodile Specialist Group design edited and

printed a drawing book for children in Spanish and Pume (indigenous) languages to be distributed in the communities close to Capanaparo river.

4. Regional trade

The statistic is updated to 2021. During 2021, the number of crocodile skins exported increased, in comparison the previous year, to 1,060,028 skins from all the world. From Latin America only 335,229 skins were exported where 315,630 coming from Colombia principally to Mexican market. After realized conversation with some Colombia traders, they communicated that one on the reason affected the interest of Colombia and South American skins is the illegal skins from South of Asia to China.

Prepared by: Alvaro Velasco B
Date prepared: 31 January 2024

Trinidad &Tobago

The island of Trinidad boasts of its oil and gas production which fuels the country's economy. However, over time ageing assets within the oil sector poses many threats such as oil spills in the area of operation as well as upstream and downstream pollution plumes. Much of the country's native biota is affected by the direct and indirect effects of the hydrocarbon pollution within the terrestrial and aquatic environments (Fig 1).

The Serpentarium & Reptile Conservation Centre of Trinidad and Tobago (RCCTT) have been busy rescuing spectacled caimans and various wildlife which were exposed to these oil spills (Figs. 2 & 3). The Serpentarium and RCCTT have place recognition of crocodilians individuals, that have been completely immobilized by the direct impacts of human wildlife conflicts and oil spills hence, they must be place in permanent housing for ongoing rehabilitation and solace. Additionally, observations are noted on feeding pattern, mobility, and mortality rates.

There were six areas affected by the oil spills from the period June 2022-January 2024 in Trinidad. These areas are as follows: 2022 - Guayaguayare; 2023 - Oropouche River, Cedros, Guapo, Rancho Quemado.

There is a dire need for further research on toxicological effects including mortality rate and offspring bone deformity effects to determine the future of the species. Moreover, outreach programs are conducted in public spaces such as local malls and other venues throughout the county. This conservation drive targets all members of the public in all age groups (Fig 4). Much emphasis is placed on crocodilian conservation and taxonomy since Trinidad is now known for having two species of crocodilians.

Figure 1 (left): Hydrocarbon leakage into the Guayaguayare river 2022; Figure 2 (right): *Caiman crocodilus* rescues from the oil spill in the area of Guayaguayare 2022.

Figure 3 (left): *Caiman crocodilus* rescued from the oil spill from the area of Rancho Quemado 2023. Figure 4 (right): Outreach at Trincity Mall, August 2023.

Prepared by: Marisa Tellez
Date completed: 31 January 2024

Agenda Item: SC. 2.5.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

South Asia and Iran

BANGLADESH

Crocodylus porosus
The Sunderban mangrove forest in southwest Bangladesh is the stronghold *C. porosus*, and the population was estimated as 150-210 individuals in 2014-2016. The fate of 100 juveniles/hatchlings from the Karamjal Wildlife Breeding Centre, and released on 16 December 2021 is unknown as no monitoring was carried out. Saltwater crocodiles captured by fishermen outside the Sunderbans (Table 2) were released in the Sunderban RF.

Table 2. Records of saltwater crocodiles captured outside of Sunderban Reserve Forest

Year	District	River
April 2022	Bagerhat	Rupsha
July 2023	Barishal	Jayanti

The Forest Department regularly organizes training programs on crocodile conservation for front-line staff, including lectures and hands-on training sessions at Sheikh Kamal Wildlife Centre (KWBC), Gazipur. Adnan Azad assisted FD staff of KWBC, Sunderban Reserve Forest, on harvesting, cleaning and incubation of saltwater crocodile eggs. A solar-powered incubator has been set up at KWBC and staff were trained in the operation.

Crocodylus palustris
Considered extinct in the wild, and all Muggers exist in captive conditions (shrine pond and zoos). In 2004, 40 Muggers were imported from the Madras Crocodile Bank (India) and distributed among zoos and safari parks, as well as Khan Jahan Ali shrine pond and Karamjal Wildlife Centre, Sunderban. However, in recent years Muggers have been captured from rivers and ponds in different parts of the country (Table 1) - captive individuals are reported to have escaped and bred in the wild.

Table 1. Records of Muggers captured from different rivers.

Year	District	River
December 2018	Pabna	Padma (Ganges)
February 2019	Pabna	Padma (Ganges)
July 2021	Faridpur Sadar	Pond
August 2021	Faridpur	Padma (Ganges)
August 2021	Bogra	Jamuna
November 2022	Shariatpur	Padma (Ganges)
October 2023	Faridpur	Bhubaneshwar
October 2023	Narail	Chitra

Gavialis gangeticus
Historically distributed in the Padma (= Ganges) and Jamuna (=Brahmaputra) River systems, no adult Gharials have been sighted in recent years. However, juvenile and hatchling Gharials have often been captured by fishermen almost every year, raising the question of their origin. Interestingly, three Gharials were found basking on a sand bar in the Bhairab River, Abhaynagar, Jessore, in December 2022. There were no previous records of the species from this area in southwestern Bangladesh. The very small Gharial population in Bangladesh is considered to be declining due to habitat loss and opportunistic killing. However, few hotspots have been identified.

Public awareness on the conservation of Gharials has increased, and youth clubs have been formed advocating the conservation of Gharials, and other wildlife. The Team for Energy and Environmental Research (TEER), a student group of Gaibandha Government College, was awarded the Bangabandhu Wildlife Award 2023. Further, the Wildlife

Crime Control Unit (WCCU) of the Forest Department is vigilant and is extending support to youth groups and individuals to rescue wildlife in captivity or captured accidentally or intentionally, and to arrest illegal wildlife trade all over the country.

A captive breeding initiative involving Gharials in different zoos has largely been unsuccessful.

Recent Publications

Rabbe, Md. Fazle, Akter, Sumaiya, Rahman, Md. Mahfuzar, Barkat, Azizul Islam (2023). New insights into the distribution of the Gharial *Gavialis gangeticus* in Bangladesh from the analysis of news reports. The Herpetological Bulletin. 163: 28-30.

Report prepared with contributions from: Md. Fazle Rabbe, Adnan Azad, Dr. Gawsia Wahidunnessa Chowdhury, Saiful Islam, Golam Mostofa and Sahadat Hossain

INDIA

Gavialis gangeticus

1. Wild Population: 1500-1600 various-sized animals in Chambal, Katarniaghat, Beas, Hastinapur, Gandak, Corbett National Park, Ken and Son Rivers, with other populations distributed across Ganges, Hugli and Mahanadi.

2. Captive Stock: Over 500 sub-adults and adults in 38 captive facilities (CZA, 31 March 2022)

3. Distribution: Across India, including Chambal, Son, Ken, Gandak, Kosi, Sarda, main streams of Ganga River, Ramganga and Mahanadi Rivers; and Katerniaghat Wildlife Sanctuary.

4. *Ex-Situ* Activities: Captive-bred and -reared Gharials are being released into Nature through re-introduction programs regulated by the Central Zoo Authority (CZA), Ministry of Environment and Forest, as part of the *ex-situ* conservation policy. The Government of India is developing infrastructure and renovating "Freshwater turtles & Gharial at Kukrail Gharial Rehabilitation Centre, Lucknow" for expanding the conservation breeding program under the Namami Gange Program to Uttar Pradesh Forest Department with a cost of Rs. 3.13 Cr.

5. Surveys**:** In 2023, the State Forest Department carried out a Gharial survey in the Mahandi River and Satkoshia Gorge with the help of the staff of Nandankanan Biological Park, Bhuvneshwar, Orissa. The report is under preparation.

   Wildlife Trust of India (WTI) initiated the "Gharial of Gandak River Project" in 2013-14, under the expert guidance of Prof B.C. Choudhury, Subrat Kumar Behera and Samir Kumar Sinha, and other team members of WTI. The aim is to recover the Gharial population in this non-protected river. In 21-28 February 2023, a comprehensive population survey was conducted, covering a 284-km stretch of the Gandak River, from Gandak Barrage to Rewa Ghat Bridge. This survey observed a total of 217 Gharials, comprising 37 adults, 49 sub-adults, 50 juveniles and 81 yearlings.

   Saryu River Survey: Dr. Shailendra Singh surveyed a 119-km stretch of the Saryu River from Chahlari ghat to Ayodhya and covering parts of Bahraich, Sitapur, Barabanki, Gonda and Ayodhya districts. There was noted a significant increase in the Gharial sightings, with 174 observations in the present survey compared to 43 individuals (43% females, 5% males and 52% juveniles) recorded previously in a survey conducted by TSA in March 2013.

   Ghaghara River Survey: A Gharial survey was conducted in out downstream of the Ghaghara River by the Forest and Chief Wildlife Warden, Environment, Forest and Climate Change Department, Government of Uttar Pradesh, and CSG, Student Research Assistance Scheme recipient Gaurav Vashistha and other team members with financial support by a Conservation Leadership Programme Future Conservationist. A total of 84 Gharials, comprising a high proportion of juveniles, were counted in a 100-km stretch of the Ghaghara River from the Girijapuri Barrage to Chahlari Ghat.

6. Improving Gharial Hatching Success: Gharial nesting in the Gandak River faces challenges such as erosion of nesting banks and predation by floodplain predators like jackals. Since the discovery of Gharial breeding in 2016, we have focused our efforts on monitoring and protecting Gharial nests, engaging with local fishing and farming communities playing a crucial role. In 2022, five Gharial nests were located, with three hatching successfully, yielding 148 hatchlings. In 2023, 10 nests were found, but predation by jackals and exposure to gusty winds presented significant challenges. Despite these adversities, 6 nests produced 130 hatchlings. Given the inaccessible

wide floodplain and intensive human activities in the riverine habitat, the need for more trained personnel to monitor this long river stretch is evident.

Proposed Conservation Reserve

A proposal has been proposed to designate the 140-km stretch of the Gandak River as a conservation reserve under the Indian Wildlife (Protection) Act, 1972. This river stretch is home to over 80% of the Gharial population in the river. This initiative has progressed to preliminary community consultations in 24 villages gram panchayats along the proposed river stretch. A comprehensive management action plan is developing, encompassing local biodiversity, threats, ecological services, and community perceptions and recommendations. The concerted efforts of conservation organizations, local communities, and government agencies are vital for the sustained recovery and protection of the Gharials in the Gandak River.

Restocking Activities

The re-stocking and re-introduction programs are well endured, and monitoring activities of the species continue at Ken Wildlife Sanctuary (Madhya Pradesh), Hastinapur Wildlife Sanctuary (Utter Pradesh) and Beas Conservation Reserve (Panjab) by relevant state forest departments and with the help of WWF-India under the supervision and expert guidance of B.C Choudhury.

Gharial Re-introduction Program in India

Beas Conservation Reserve: The Gharial re-introduction conservation programme was initiated in 2017, under the expert guidance of CSG member Prof B.C Choudhury and Gharials are regularly monitored by Gitanjali Kanwar (WWF, India) and a qualified and dedicated team of individuals from four Wildlife Divisions of the Department of Forests and Wildlife Preservation, Punjab, and WWF-India and aimed to re-establish a breeding population of Gharial in the rivers of Punjab and ensure their long-term survival.

A total of 94 juvenile Gharials (*Gavialis gangeticus*) reared at Deori Gharial Rearing Centre in Morena, Madhya Pradesh, has been reintroduced in five batches since 2017 on different mid-channel islands falling in the Beas Conservation Reserve in Tarn Taran, Amritsar, and Hoshiarpur districts of Punjab. A qualified and dedicated team of individuals from four Wildlife Divisions of the Department of Forests and Wildlife Preservation, Punjab, and WWF-India is constituted to monitor the Gharials and their habitat. 30-40% of the total released Gharials were sighted during field surveys conducted in different seasons throughout the last year. Gharial have dispersed both upstream and downstream of their release location. The farthest upstream location is Chakki River in the Pathankot district of Punjab, India, and the farthest downstream location is Ganda Singh Wala in the Kasur district of Pakistan, located just after crossing the International Border with India.

Hastinapur Wildlife Sanctuary: The Gharials reintroduction and monitoring program is continued in Hastinapur Wildlife Sanctuary. The program was initiated in March 2019 as an initiative by WWF, India, and Uttar Pradesh Forest Department Gharial Conservation Program, under the expert guidance of Prof. B.C. Choudhury. Mr. Sanjeev Yadav and his team members completed the recent monitoring survey. The final report is under preparation.

Species Recovery & Reintroduction at Mahanadi: The program is continuing with the help of Prof. Sudarsan Maharana, Advisor Species Recovery Project, Nandankanan Biological Park and the state Forest Department, Orissa, with technical assistance from CSG members, exert and Indian biologists have taken new implementations for the project 'Special Recovery & Reintroduction of Gharials in Mahanadi.'

Research Activity

Prof. Dr. R.J. Rao studied Ecotourism Prospects in the National Chambal Sanctuary-2023 and Gharial nesting census. The sanctuary is not located on the tourist maps, so many eco-tourists have no information regarding the existence of such well-managed and wildlife-rich areas in the region. Field studies have been conducted in the National Chambal Sanctuary at Rajghat and Palighat to assess the potential of ecotourism and identify factors needed to promote ecotourism.

A survey was carried out by Prof. Dr. R.J. Rao and Dr. R.K Sharma at Gharial Nesting in Chambal River and its tributaries. The Gharial nesting information was gathered from previously identified nesting sites and from new sites identified during the survey. The survey was conducted during the nesting season from 10 March to 15 April 2023 and during the hatching period (ie from 25 May to 30 June 2023. Nesting sites in the Upstream from Pali to Rajghat were surveyed by moving vehicles on the road and reaching individual nesting sites. Nesting sites downstream from Rajghat were visited by moving on motorboats and collecting information from the Madhya Pradesh Forest Department field staff. Processing of the census data and report is in progress.

An SOP (Standard Operating Procedures) for rescuing stranded Gharial *Gavialis gangeticus* is formulated and published with the help of Prof. B.C. Choudhury and Sanjeev Kumar Yadav, with the help of Uttar Pradesh Forest Department and WWF-India. Also, funding support from Thames River Restoration Trust (UK) and the HSBC Water Programme is highly appreciated. We thank Mr .Ravi Singh (Secretary General & CEO, WWF-India), Dr. Sejal Worah (Program Director, WWF-India) and Mr. Suresh Babu (Director, Rivers, Wetlands & Water Policy Programme, WWF-India) for providing infrastructural support and encouragement.

Gharial Ecology Project (GEP)

The GEP launched in the winter of 2007-08 after the mass die-off of Gharial (*Gavialis gangeticus*) in Chanbal River, and now it has successfully completed its 16th year with target objectives. The project was designed and directed by renowned crocodilian scientist and CSG member Dr. Jeffrey Lang (Senior Scientific Adviser), an associate with the Director of Madras Crocodile Bank Trust (MCBT). It is facilitated by the State Forest Departments of Uttar Pradesh, Madhya Pradesh, and Rajasthan, as well as the Ministry of Environment, Forests, and Climate Change, Gov't of India. The objectives of the project have three main goals: 1) to develop a comprehensive assessment of Gharials in the National Chambal Sanctuary (NCS); 2) to identify and protect the species' critical riverine habitats; and, 3) to reduce threats and challenges to the species' continued survival.

The GEP field activities continue with the supervision of Jailabdeen A. (MCBT), Pankaj K., Anand K., Guddhu K., The GEP program continues with various scientific aspects: Tracking Gharial tagged with radio telemetry, monitoring seasonal movements, Iridium satellite GPS tracking units, Outreach Activities, Drones deployed, Gharial Population Surveys, Breeding observations/filming, Nest survey Hatching, Creche counts, male transfer to Son Gharial Sanctuary, Capture and tagging Gharial, Head-starts vs. wild juveniles and Gharial communication study.

GEP 2022-2023 Update

The Gharial Ecology Project (GEP) completes its 16th field season in 2023 and it is a brief summary of recent activities during 2022-23. The primary study covers ~450+ km of the lower mainstream Chambal and its tributaries, comprising a major portion of the National Chambal Sanctuary (NCS). Altogether, 31 Gharials outfitted with radio tags (20 from 2021 tagging; 11 from 2020 tagging) were monitored continuously by 3 trackers during 2022, mostly biweekly or monthly, throughout the year. In addition, 5 Iridium satellite units provided detailed information (186-436 data points; for 236-522+ days) on a subadult (a male) and 4 adults (3F;1M). Each individual displayed one of three residential patterns: a) minimal movements (~1 km), b) short movements (~3-5 km), or c) longer movements (>20 km). In 2022, we used DJI quadcopter drones to create 2D and 3D maps of riverine habitats using geo-referenced JPEGs. Drone imagery facilitates species identification (Mugger vs. Gharial), quantification of numbers present, as well as accurate estimates of animal sizes. As in previous years, the GEP field team conducted systematic stationary and boat counts surveys in the NCS, e.g. upstream, midstream, and downstream stretches. In early 2022, the total Gharial population in the NCS was 1673 individuals, consisting of 148 males, 696 females, 442 sub-adults, 262 juveniles, and 125 yearlings. In 2022, 506 Gharial nests were recorded. This number represents an increased nesting effort of 84 nests, relative to the nests tallied in 2021, n= 422. Of the 506, 414 nests hatched, whereas 85 were predated (early= 21; late= 64). Counts at large and small creches are available for 2022 at 15 sites, with nest numbers ranging from 1 to 51. The highest number of hatchlings was in 2015 at Nadigoan, with 51 nests hatched, but hatchling numbers dropped to 880 less than 3 weeks later. In December 2021, the GEP field team transported a big ghara male Gharial (4.9 m TL; ~560 kg BWT) from the lower Chambal to the Son Gharial Sanctuary (SGS) ~800 km, which took 33+ hours from capture to release. In late 2022, we tagged 35 wild Gharials, including 10 more with Iridium GPS units. The majority of tagged Gharial were females (27 of 35), including 16 adults or 'near' adults (>2.9 m total length), and 11 sub-adults (<2.9 m). Two "big ghara" males were also tagged (3.5m and 4.2 m TL), as well as 6 sub-adult males. In December 2022, we also radio-tagged 20 "head-starts" with small VHF radios to track their survival, growth, and movements post-release. Discovery of the importance of the Kuno National Park as a seasonal Gharial habitat, through its connections with the NCS, has spurred a newfound interest by the Madhya Pradesh Forest Department (MPFD) in Gharial conservation and protection in this specially designated and protected area. In 2022, we finished furnishing our new upstream base at Katrinapur, a small riverside village located within a 15-minute walk to the Baroli sandbank on the Chambal River

Gharial genetics: The part of the GEP project, a Gharial genetics study of Chambal Gharial, was completed with the help of Scientists Dr Karthik Vasudevan and Ravi Singh from the Centre for Cellular & Molecular Biology (CCMB).

Being a part of GEP, Dr. Ashutosh Tripathi, and an assistant for conducting targeted village meetings and programs about the Chambal River species, riverside environments, and conservation topics, such as recycling, tree planting, and watershed ecology. The GEP is now a present-day avatar of the Gharial Conservation Alliance (GCA).

Future Action

1. A management plan for other Gharial distribution areas, especially transboundary regions/neighbouring countries, must be communicated with Pakistan and Bangladesh.

2. Extension and monitoring of the new potential sites in the Brahmaputra River systems may be required.

3. Assessment of the success or the effectiveness of the Gharial Conservation program during the subsequent phases of the Gharial Restocking Program. Need for periodic monitoring of restocked/reintroduced Gharials at newer release sites [River Sutlej and Beas (tributaries of Indus)], to assess the success and effectiveness of this conservation program.

Saltwater Crocodile (*Crocodylus porosus*)

1. Wild Population: estimated as 3000-3500 at three locations, namely - Andamans (archipelago), Sundarbans (West Bengal) and Bhitar Kanika (Orissa).

2. Captive Stock: Over 500+ animals of various ages/sizes across captive facilities in India, including Zoos of West Bengal, Orissa, Andhra Pradesh, MCBT, Tamil Nadu and Andaman & Nicobar.

3. Distribution: East coast of India, from Orissa to Sundarbans, West Bengal, and Andaman Nicobar.

Andaman-Nicobar Forest Department and Orissa Forest Department have initiated news surveys targeting saltwater crocodile population estimation, habitat assessment, and training programs for field forest staff Human-crocodile conflict reports involving the species are being reported increasingly from Andaman & Nicobar, Sundarban, West Bengal, Bhitarkanika, and Orissa coastal areas.

Survey & Ongoing Activity

ASCPC BWC - 2024: Annual Saltwater Crocodile Population Count, in the first and second weeks of 10-12 January 2024, was conducted under the expert guidance of CSG member Dr Sudhakar Kar and Sudarshan G. Yadav, DCF, Forest Department, Orrisa at the Bhitarkanika Wildlife Sanctuary (BWC) and its surrounding crocodile habitats. The final count revealed a population of a total of 1811 crocodiles, including, 582 hatchlings (0.6 m), 387 yearlings (0.6-0.9 m), 327 juveniles (0.9-1.8 m), 167 sub-adults (1.8-2.4 m) and 348 adults (>2.4 m). There was an increase of 88 crocodiles compared to the January 2023 census results.

Sundarban Saltwater Croc Count: The Saltwater Crocodile Count will begin on 20 January 2024 in the 4600 km^2 Mangrove Forest of Sundarban Tiger Reserve, West Bengal. The Estuarine crocodile count technique, population assessment and staff training were completed under the direction/guidance of Prof. B.C. Choudhury with the help of the State Forest Department of West Bengal. This will be the third time count after 2012 and 2021.

Outstanding Achievement:
Lifetime Achievement Awarded to Dr Sudhakar Kar, CSG member and former Senior Research Officer of the Odisha Forest Department, was honoured with the "Odisha Wildlife Conservation Award" jointly by Nature and Wildlife Conservation Society of Odisha (NWCSO) and Ever Green Forum, for his dedicated and outstanding research work on Estuarine crocodiles (*Crocodylus porosus*) and other wildlife species over 47 years.

Mugger Crocodile (*Crocodylus palustris*)

Estimation of Wild Population: 10,000 to over 12,000, various aged/sized animals distributed across most Indian States.

Captive Stock: 2400+ (in various captive facilities including MCBT, India: Annual Inventory of Animals in Indian Zoo, CZA, 2022)

Distribution: Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Goa, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Telangana, Uttarakhand, Uttar Pradesh, Orissa, Tamil Nadu, Rajasthan, and West Bengal.

Status: Vulnerable

Survey Activities:

State Forest Departments of Gujarat, Orissa, Maharashtra, Bihar, Goa, some local NGOs, and some individuals, Ph. D Schoolers/Programs have initiated surveys to estimate wild Mugger populations, habitat assessment, citizen awareness, and training programs.

Cauvery River Delta Mugger Count: CSG member Mugger Mr Allwin Jesudasan, Director, Reptile Conservancy Alliance-RCA, a fresh survey carried out in the Cauvery River Delta of Tamil Nadu, estimated 90-100 Muggers of various age groups.

Kerva and Kaliyasot Dam Croc Count: Crocodile Population Count, February 2022, was conducted at Kerva and Kaliyasot Dam, Bhopal, Madhya Pradesh, under the advice of CSG member Dr Rishikesh Sharma and staff members of the State Forest Department, Madya Pradesh. However, a detailed report shows a total of 22 all-sized Muggers sighted in the survey; the adult population was 9 (40.90%), the population of sub-adult 12 (54.54%) and juvenile 1 (4.54%). The presence of a single juvenile supports a viable breeding population, indicating a positive trend in the Mugger population in Kaliyashot reservoir.

Pench National Park Mugger Count: A Mugger survey was carried out in June 2023 at Pench National Park, Seoni, Madhya Pradesh, by the Forest Department, Madhya Pradesh, with the help of the local TINSA NGO. A total of 30 animals of various sizes were noted in the waterbodies of the national park.

Charotar Crocodile Count: The program was founded in 2013 as a citizen science initiative devised to bring together diverse participants from around the globe to monitor the crocodile population in the Charotar region in Gujarat, India. Mugger Crocodile Count, January 2023, was carried out in various village waterbodies of Charotar Region, Central Gujarat, India, under CSG member Anirudh Vasava, and volunteers of VNC (Voluntary Nature Conservancy, Ananda, Gujarat), as the Citizen Science incentives. A total of 255 all-sized Muggers were counted in 25 waterbodies of villages.

Human-Crocodile Conflict

Human-crocodile conflict reports involving the species are being increasingly reported from various states of India, led by Gujarat, Tamil Nadu, Maharashtra, Uttar Pradesh, and a few other states.

The direct and indirect instances of HCC (Human-Crocodile Conflict) have been recorded from Gujarat, Maharashtra, Rajasthan, Orissa, Uttar Pradesh, Uttarakhand, Karnataka, West Bengal and Tamil Nadu. Therefore, an action plan will indicate these areas of concern to be immediately addressed.

Mr Baijuraj M.V., Director Conservation Project, Wildlife SOS (WSOS), work in collaboration with the Uttar Pradesh Forest Department to address human-animal conflict mitigation in the state of Uttar Pradesh. From October 2021 to November 2023, a total of 16 Muggers of various sizes were rescued from human habitation in Firzobad and Mainpuri Districts, U.P. and released into their natural habitat to avoid/mitigate HCC.

Human-Crocodile Conflict Guidelines: A landmark guideline was published by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India for mitigating HCC, entitled Guidelines for Mitigating Human–Crocodile Conflict Taking a Harmonious-Coexistence Approach. This guideline manual document is prepared under the expert leadership of Prof. B.C. Choudhury, CSG members and other scientists from the Wildlife Institute of India (WII), along with members of the National Technical Group of India, and technical support extended by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) and collaborative project of managing Human-Wildlife Conflict.

Ongoing Activity

An ongoing study, 'Monitoring endocrine physiology of wild Muggers within the human-dominated landscape of Central Gujarat: a molecular approach towards creating a sustainable environment', is being pursued doctoral research focusing on reproductive behaviours and endocrine correlates of Mugger crocodiles (*Crocodylus palustris*) the developed baseline data will further aid in understanding ecological adaptation in free-ranging Muggers across diverse habitats. as a Ph.D. research program by Ms. Brinky Desai. She started an Early Career Crocodile Network (ECCN) along with Dr. Phoebe Griffith from Oxford University in January 2022, where we have regular (every month) online talks by senior scientists in the field from across the globe with our ECCN members, students and individuals from 8 different countries in Asia.

A study is carried out by Utkarsha Chavan, under a PhD program and research on various aspects of the species, including a Population Trend of Mugger Crocodile and Human-Crocodile Interactions, Cooperative fishing and use of flowers and sentient Behaviour, Basking Behaviour and the Use of Riparian Tunnels by Muggers in a Small Stretch of River Savitri River at Mahad, Maharashtra-India.

Brinky Desai and the team developed a method of individual identification of free-ranging Mugger crocodiles by applying deep learning methods on UAV (Unmanned Aerial Vehicle) imagery.

A radio-telemetry study on home range and temperature selection in Mugger crocodiles at a human-dominated landscape of Anakarai Town, Cauvery River, Tamil Nadu, was carried out by Nikhil Whitaker, Curator, MCBT, Tamil

Nadu and its team members Jason Gerad and R Surya, with financial assistance of Rufford Grant and Mahim Pandey Wildlife Foundation and the Madras Crocodile Bank Trust.

The non-profit Voluntary Nature Conservancy-India (VNC-India) has worked to conserve crocodiles and reduce human-crocodile conflicts in Gujarat. VNC has equally focused on research and education. Recently, the organisation celebrated the 'Children Crocodile Festival,' this community-based conservation initiative designed to encourage the local community, especially children living alongside crocodiles in this region, to emphasise their relationship with reptile species. This event is a celebration of Crocodile Conservation through fun and games. Promote wildlife conservation education through various games in the Charotar Region, Gujarat, India. To promote awareness among the children as the next generation of Mugger preservationists/Mugger guardians in the area.

General: Zoo & Captive Crocodilians

Dr. Gowri Mallapur, with the help of Wildlife Institute of India (WII), carried out workshops regarding health, handling and zoo management in numbers of Indian zoos and assisted to Central zoo Authority, India (CZA) in various aspects of captive crocodilians for in-house facilities and health-related issues, including designing and developing a housing guideline for crocodilians in Indian zoos, captive husbandry, management and enrichment and training workshop for zoos keeper and veterinary offices, capacity building and handling of reptiles.

MCBT Report & Activities

Muggers Transfer: In the last two years, Madras Crocodile Bank Trust (MCBT) transported 850 surplus Muggers 2100 km away from the Green Zoological Rescue and Rehabilitation Kingdom, Jamnagar, Gujarat. This was the largest transfer in crocodilian history, without any injuries or mortality of Muggers. Also, it is a great relief for the Croc Bank, which has housed these animals in overcrowded conditions for more than last 25 years.

PhD awarded: Curator of Madras Crocodile Bank Trust, Nikhil Whitaker, completed his PhD degree in September 2023. The research was conducted on various aspects of the Marsh Crocodile on the Cauvery River in Tamil Nadu, including tolerance of salinity, human Mugger conflict, thermal selection in adults, allometric relations between head length, hind foot length, and snout-vent/total boy length, nest defence in captivity, and an analysis of the unique phenomena of double clutching Mugger females at MCBT.

MCBT Veterinary laboratory and other facilities have been expanded and updated to carry out some standard protocols and more veterinary research on crocodilian disease diagnosis by the trust with the help of Dr Ruchika Lakshmanan and Dr Bhushan Krishnamoorthy, with external consultants and expert guidance from Drs. Cathy M. Shilton (Principal Veterinary Pathologist, Berrimah Vet Lab, Australia) and Paolo Martelli (Managing Director, Ocean Park, Hong Kong) providing invaluable advice. Also, MCBT reptilian research and crocodilian survey was carried out in collaboration with the Stutggart Museum, Germany, Ahmedabad University, Gharial Conservation Alliance (GCA) and the State Forest Department of Tamil Nadu, India.

Celebration of Crocodilian Conservation in India

The year 2024 celebrates 50 years of crocodilian conservation in India. The year 2024 is a landmark year for Indian Crocodile Conservation. Crocodile conservation started nationwide in India next only to Project Tiger. It quickly developed local knowledge and skills when international collaboration with UNDP/FAO ended in 1982. The foundation was able to be built and succeed because of research for conservation purposes, as recommended by H. Robert Bustard, who was at that time FAO Chief Technical Advisor.

The Golden Jubilee Year program is in the final stage, and the national and state-wise celebration program schedules will be declared soon by renowned crocodilian scientist Prof. B.C. Choudhury.

Dr. Lala A.K. Singh is the first crocodilian biologist from the nation. He describes a first-person account of how he stepped out of university and was selected as a crocodile researcher to work on Gharial (*Gavialis gangeticus*) and how Dr. Sudhakar Kar and Mr. Binod C. Choudhury were inducted into the project for Saltwater crocodiles (*Crocodylus porosus*) and Muggers (*C. palustris*), respectively.

Dr. Lala Singh presented his journey during the occasion of a book launch on 9 September 2022. The journey through Satkoshia Sanctuary, the field tests we had to undergo for selection, the development of India's first crocodile research base at Tikarpada-Odisha, the central crocodile institute at Hyderabad, and the field camp at Chambal for long-term ecological studies. Among other aspects, Lala narrates experiences of facing dacoits (bandits) in Chambal, capturing wild Gharials for radio-tracking, the Mugger project in Similipal, and the resumption of Gharial breeding in Satkoshia Sanctuary in 2021.

Publications

- Pooley, S. (2022). The challenge of compassion in predator conservation. Frontiers Psychology 13:977703. DOI: 10.3389/fpsyg.2022.977703

- Desai, B., Mukherjee, S. Whitaker, N. & Ghosal, R. (2022). Anecdotal observations of 'double clutching' behaviour in captive Mugger crocodiles (*Crocodylus palustris*). Behaviour (2022). DOI:10.1163/1568539X-bja10153
- Gour, Rahul, Whitaker, Nikhil & Kartik, Ajay. (2022). Status and distribution of Mugger Crocodile *Crocodylus palustris* in the southern stretch of river Cauvery in Melagiris, India. Journal of Threatened Taxa. 14. 20733-20739. 10.11609/jott.7575.14.3.20733-20739.
- Yadav, S.K., Khan, M.S., Choudhury, B.C. & Panwar, N. (2023). Standard operating procedures for rescues of stranded Gharial (*Gavialis gangeticus*). CSG Newsletter 42(2): 9-13.
- GOI. (2023). Guidelines for Mitigating Human–Crocodile Conflict Taking a Harmonious-Coexistence Approach. Ministry of Environment, Forest and Climate Change Government of India. 23pp.

Prepared by: Raju Vyas and Prof. B.C. Choudhury (with valuable inputs from Dr R.K. Sharma; Dr Sudhakar Kar (Orissa Forest Department); Anirudh Vasava (Voluntary Nature Conservancy, Gujarat); Brinky Desai (Ahmadabad University); Dr R.J. Rao (Gwalior, Madya Pradesh); Mr Allwin Jesudasan (Director, Reptile Conservancy Alliance); Dr Shailendra Singh (Turtle Saving Alliance, Lucknow, UP); Mr Gaurav Vashistha; Dr Sitaram Taigor (Environmental Specialist, State Mission for Clean Ganga, UP); Ms Gitanjali Kanwar (Coordinator, Aquatic Biodiversity, WWF-India, Punjab); Mr Subrat Kumar Behera, Samir Kumar Sinha and Kamalika Bhattacharyya (Wildlife Trust of India); Prof. Sudarsan Maharana (Advisor, Species Recovery of Gharials in the River Mhanandi, Orrisa); Mr Sanjeev Yadav (Aquatic Biodiversity, WWF-India); Mr Baijuraj M.V. (Wildlife SOS, Agra, U.P.); Dr Gowri Mallapur (Deputy Vice Chair CSG Veterinary Science Group); Dr Jeffrey Lang (Emeritus Professor, U. North Dakota, Senior Scientific Adviser, GCA & MCBT); Dr Nikhil Whitaker (Curator, Madras Crocodile Bank Trust) and Mr Romulus Whitaker (Co-founder Madras Crocodile Bank Trust/Centre for Herpetology Chennai, India).
Date prepared: 24 January 2024

IRAN

1. The population of Mugger crocodile seems to be stable in the country, although lack of raining remains as a problem.
2. Based on a cooperative paper published on Climate Change effects on Muggers in the region, the future of the species seems to be threatened severely by Climate change, which needs more regional cooperation for conservation (Mobaraki et al. 2023, Last chance to see? Iran and India as strongholds for the Mugger Crocodile (*Crocodylus palustris*). This puts more importance for more serious attention on the subject.
3. Annual budget is allocated by department of environment to provincial office in Sistan and Baluchestan for monitoring and consensus of the species.
4. Drought and lack of raining remains as the main threat for the habitats of the species, although flooding in nesting season is usual too, but the role of 2 main dams (Zirdan and Pishin) seems to be critical in maintaining and supporting the crocodile population. Based on the information gained from local people, crocodile population in Zirdan Dam is increasing. The dam supports the ponds on the dup stream and have made the situation more suitable for the Muggers. Population survey of the dam is planned. Another Dam was constructed in the region, but there was no record of crocodile presence there, but should remain as a source for reintroduction (needs for study).
5. Conservation farm (Pajhoohan Arashid Makoran), continues its work and its stock increased more than 120 crocodiles, providing a secure source for more breeding in future leading to more conservation plans. The plan is under development to act more as a public awareness and education center. In past years several nesting inside the burrows have been recorded in the farm.
6. The guard staff of Department of environment provincial office of Sistan and Bauchestan are continuing their public awareness and education works to may have more control on HCC.
7. In respect to increase legal support, the fine for illegal harvest or killing of any crocodile increased again.
8. Private sectors, charity holding groups and persons, help and support local communities to establish and use pipelines to decreased direct contact with ware bodies.
9. Iran proposes its interest for more regional cooperation on conservation of the species in Baluchistan region and sustainable use schemes.
10. More research work on climate Change effects based on modeling is underway.
11. Iran strongly proposes cooperative work with range states, specially working on Baluchistan region with Pakistan, and relies on its potential in increasing the population size. Moreover, the cooperative genetic work on all range states is recommended. To be considered as a suggestion for steering committee meeting, establishment of Mugger Crocodile Task Force is proposed too.
12. Man-made or artificial habitats remains as a reliable source for Muggers, making close contact with local communities which in turn, increases the HCC possibilities too.

NEPAL

Species and Current Status
In Nepal two species of freshwater crocodiles: Mugger (*Crocodylus palustris*), and Gharial (*Gavialis gangeticus*) occur primarily in major rivers and wetlands in Southern Terai region.

Gharial (*Gavialis gangeticus*)
Distribution: In Nepal, Gharials occur primarily in the Chitwan National Park (Narayani-Rapti River system) and Bardiya National Park (Karnali and Babai rivers). Two former populations of Gharials in Koshi and Mahakali have become extinct. Reintroduction efforts have been initiated to re-establish the Gharial populations with release of captive-raised Gharials from Gharial Conservation Breeding Center (Kasara, Chitwan). In Koshi River 95 Gharials released between 1981 and 2010[1] but no evidence of their survival. Additional 20 Gharials were released in Koshi in 2022. Similarly, 10 Gharials (5 male, 5 female) were released in West Rapti River (Banke National Park) in 2023 The Department of National Parks and Wildlife Conservation is also planning to reintroduce Gharials in Chaudar River, a tributary of Mahakali River, in Shuklaphanta National Park this year (2024).

Population:

a) Gharial population in the wild: Recent population survey in Chitwan shows 265 Gharials in Rapti and Narayani Rivers. Details of the population structure is not available for recent survey. Following table shows the population structure based on survey in 2018/2019.

Location	River	Adult	Sub-adult	Juvenile & yearling	Total	Remarks
Chtiwan NP	Rapti	36	12	70	**118**	Poudyal et al. 2018
	Narayani	31	54	16	**101**	
Bardiya NP	Babai	10	6	3	**19**	Bashyal et al. 2021
	Karnali	1	0	0	**1**	
Koshi Tappu WR	Koshi	NA	NA	NA	**NA**	20 released in 2022
Banke NP	West-Rapti	NA	NA	NA	**NA**	10 released in 2023
Shuklaphanta NP	Chaudhar	NA	NA	NA	**NA**	Planned for release of 20 gharials in 2024

b) Gharial population in the captivity: There are over 800 individuals at Gharial Conservation Breeding Center, Kasara Chitwan NP. Similarly, the Gharial Breeding Center in Bardia has >100 Gharials.

Conservation measures: Gharials are legally protected in Nepal by the 'National Parks and Wildlife Conservation Act 2073'. Gharial Conservation Breeding Center was established in 1978 Chitwan National Park (Kasara) and another breeding center has been established in Bardia National Park. Over 1500 Gharials raised in these breeding centers have been released in the various Rivers. Nepal formulated and implemented the Gharial Conservation Action Plan (2018-2022). Management plans of Chtiwan and Bardia has also prioritized Gharial conservation. Various initiatives by community and conservation organizations for Gharial conservation has been initiated to ensure long-term survival of Gharial in Nepal.

Mugger (*Crocodylus palustris)*
Distribution: Mugger crocodile has a wider distribution compared to Gharials. They occur in the rivers and lakes of Koshi Tappu WR, Chitwan NP, Banke NP, Bardiya NP, Shuklaphanta NP. Outside of the PA system, Muggers are also recorded in Ghodaghodi lake, a Ramsar site in western Nepal.

Population: The population survey of Mugger crocodile is not conducted on a regular basis, thus comprehensive information is not available. Survey of Muggers in Chitwan's lakes and ponds showed 245 Muggers in 2014 (Khadka *et al*. 2014). In Koshi, 35 Muggers were reported in 2022 (Lamichhane *et al.* 2022). Basyal *et al.* (2021) reported sighting of 65 Muggers during survey of Gharials in 2019. In Ghodaghodi lake, 26 Muggers.

[1] DNPWC. 2018. Gharial Conservation Action Plan for Nepal (2018-2022) Department of National Parks and Wildlife Conservation, Kathmandu, Nepal.

PAKISTAN

Pakistan is home to two crocodile species:

i. The Gharial *Gavialis gangeticus*, once a common sight in the rivers in the Indus Basin is now considered to be extinct from within Pakistan (last seen in 1978).
ii. The Mugger or Marsh Crocodile *Crocodylus palustris* still exists in different areas of Sindh and Balochistan provinces but considered to be extinct from the Punjab province. Some efforts have been made to breed them in captivity in the public sector in Sindh and Balochistan where the progress has been somewhat slow. However, there has been a commendable progress in the Private sector where more than 10 private breeding farms are being managed efficiently. The oldest farm, Jatoi Crocodile breeding center in Nawab Shah is probably the oldest and thriving.

Sindh province
Wild Mugger populations in Sindh occur in DehAkro, Nara canal, Nara desert, Chotiari Reservoir Complex and Haleji lake. Bakar, Paksiri, Makhi, Dangewari lake and Nadiasir lake are important wetlands in Chotiari and DehAkro Complex areas. Captive populations in the public sector are being maintained at Haleji lake, and Khar breeding center in Khirthar National Park. Estimated wild population in Sindh is about 560 individuals.

Balochistan province
The Mugger remains widely distributed in Balochistan with confirmed locations on the Nari, Hab, Titiani, Hingol and Dasht rivers and Nahang and KachKuar.Dasht river and Nahang and KachKuar are close to the Iranian border and reportedly Crocodiles keep on moving from one country to other hence the population remains unsteady. Hingol has the maximum population as compared to other rivers. All rivers in Balochistan flow intermittently i.e. after the rains (which are few and far between) the rivers tend to dry up. Water stays in different sized pools all along the river. Crocodiles occur in these pools. It seems that the people have accepted living with them. No concerted effort has however, been made to estimate the population after 2005 when 92 individuals were reported to occur in the rivers (Zoological Survey Department Records).

The Mugger is considered as a threatened reptilian species in Pakistan. In Province of Balochistan, the population of Marsh Crocodile is confirmed reported in the Hingol River (Hingol National Park and Lasbela District), Dasht River (Kech District), Hub River, Fitiani, KuchKuar, Nahang River (border with Iran), Aari Peer, Nari Gauge River (Sibi District), Dasht River, Gwadar-Turbat, Nahan/Nehang River, Ketch River, Mirani Dam and Nari Gage/ Kacchi River. The Marsh Crocodile was once commonly observed in the Balochistan province, especially in Hingol River, when Hingol was famous for its rich biodiversity, developmental access to the area was restricted and local communities lived in harmony with the creatures of the region. A study on population status, conservation and threats to Marsh Crocodile population was conducted in the Balochistan province. The total number of Marsh Crocodiles was counted 357 in Balochistanincluding220 adults, 73 juveniles and 64 hatchlings. In some areas of Balochistan, the muggar still faces threats due to the anthropogenic activities such as hunting, recreation, stealing eggs and hatchlings, destroying nesting habitats, fishing practices, increasing agricultural practices, land encroachment and global warming. Because of lack of funding, conservation activities and breeding programs have not been progressing. To ensure the continued existence of this reptilian species and the overall health of the Balochistan's riverine ecosystem, immediate and concerted efforts towards habitat preservation are of paramount importance. Protecting this unique ecosystem is not only an ecological necessity but also a cultural, social, economic, ecological and historical obligation, as the river holds a significant place in Balochistan's heritage.

Punjab province
The Mugger is considered to be extinct in the province. A captive population is being maintained at Wildlife Breeding Centre Gatwala, Faisalabad. Four adult females and one sub adult male are present at the facility. For the last two years there has been no breeding. In 2020 two adult females had died that reduced the population. Recently two (2) females and one male have been transferred from Lahore Zoo to further restock the facility. Hopefully Efforts are being made to procure an adult male to spur up the process in the hope to start reproduction.

At Bahawalpur Zoo four females, one male and nine hatchlings are being maintained.

Human-Crocodile Conflict
Reports of Crocodile attacking livestock are occasionally received from Nari river, and Dasht river and Nahang and KachKaur areas in Balochistan. No reports of a Crocodile attack on human beings have ever been received. A crocodile was reported to have been killed by the villagers in Mirpur Khas district in Sindh in retaliation of killing a goat. The residents of Mureed Khan Marri village located at Khaan Road, some 12 km from the Mirpur Khascity, claimed that the crocodile had attacked a goat in their village on 8 February 2022. "It [reptile] has killed our goat," said a villager. "We have killed it with an axe," he added.

In a video available with *The Express Tribune*, the villagers can be seen transporting the reptile tied with a rope to another village. "We will hand over the body to a landlord and will get some reward," the man added. Muhammad HashamShar, a local journalist from Mirpur Khas told *The Express Tribune,* that "There is no awareness among the local people about the value of wildlife around." Criticizing the role of the Sindh Wildlife Department (SWD), Shar said that despite killings of innocent animals, the officials were not taking appropriate measures. "This is not the only incident in Mirpur Khas," he pointed out. "We see people killing animals regularly and the department [SWD] is aware of these killings," he said, adding that some influential individuals were supporting the poachers and killers of wildlife. *The local residents said that there were a number of crocodiles in the area and they barely attacked livestock or humans.*

Crocodile population in Pakistan, March 2023

S. No.	Area/Crocodile habitat	Estimated population
Sindh		
1	Chhotiari reservoir complex and adjoining seepage ponds	130-160
2	DehAkro complex and adjoining seepage areas (some lakes in the Sanctuary have dried up)	80-100
3	Nara canal and adjoining seepage pools	80-90
4	Nara desert (some lakes in the Sanctuary have dried up)	30-40
5	Haleji lake	35-40
6	Stragglers in irrigation canals and the fish farms	20-25
Total		**375 to 425**
7	Khar Breeding Centre, Khirthar National Park (captive)	54-60
8	Manghopir(captive)	120
Balochistan		
1	Hingol River, Hingol National Park	25-30
2	Hub River	25-30
3	Dasht River along Pak-Iran border and adjoining seepage ponds (176 reported in 2007)	70-90
4	Spin Tangi in Harnai	20-30
5	Mirani Dam and adjoining seepage ponds	25-30
Total		**165-210**
Punjab		
1	Punjab Wildlife Breeding Centre, Gatwala, Faisalabad (captive)	Six females, two males and one juvenile male
2	Lahore Zoo, Lahore(captive)	Stock to Wildlife Breeding CenreGatwal, Faisalabad
3	Bahawalpur Zoo (captive)	

Captive Crocodiles in the Private Sector

Crocodile farming is gaining popularity in the Private sector; more than 50 breeding centers have been established in suburbs of Karachi and interior Sindh and more than 20 in Punjab. Captive Breeding Farms have mostly been established in association with Fish Farms. Captive Breeding Farms are registered with the Government. Because of lack of veterinary cover, survival percentage of hatchlings is however very low. The commercial activities have not yet started in earnest; the only commercial activity is the sale of hatchlings to other crocodile breeding farms for building up their stock. No estimates of number of individuals are available. Sporadic information trickling down is that one farm in Karachi has 45 breeding individuals and another farm in NoshehroFeroze has about 70 breeding individuals. The total number could be anybody's guess. These breeding farms are however open to the public and the owners earn handsome amounts through gate money. Commercial activities at the captive breeding farms may start now as the sizeable crocodile populations are now available.

Human Crocodile Conflict

Human Crocodile Conflict (HCC) in Pakistan stems from the fear of damage to property and life of both livestock and human beings. Fish eating habit of crocodiles also annoys fishermen who try to entangle crocodiles in fishing nets and subsequently kill them. The fear has also been transmitted into tribal customs and traditions to an extent that not killing a crocodile on sight leads to social taboos.

The conflict mainly arises from the economic losses that the crocodiles are believed to inflict on the fish, as well as livestock that may fall prey to crocodile while visiting the wetlands to drink water or graze near the banks of water bodies. Direct attacks on human beings have recently been reported: *A woman while washing clothes along the bank of Spin Tangi in Harnai was reported to have been dragged into water and consumed in 2017; recently a female teenager*

was attacked by a crocodile that came out of a canal and into the village. The people however forced the crocodile to retreat and then chased it to the canal. An instance of a woman being dragged into river Dasht was reported a few years back. It seems not improbable that many cases might have gone unreported. Two cases of the death of a woman and a child at Halejilake have also been reported in the past. The fear, therefore, remains.

Crocodiles have also been reported to be hunted/killed for their hides but presently there have been few reports of such a trade perhaps due to government vigilance. The fact that in recent years dead crocodiles have been found in water bodies with skins intact thus gives credence to the belief that the crocodile was killed in retaliation for damage to fish, livestock or human beings, and not for its skin.

Because of the fear for life and property, the tribal (especially in Balochistan---Hingol National Park) customs required that the crocodile be killed at the site otherwise it would be *zantalaq* i.e. the wife of the person would stand divorced. The custom however is redundant now with the increasing awareness.

The crocodiles are distributed in areas which do not normally come under surveillance of government wildlife departments hence the occasional killings go unreported. Lack of funds and facilities at the part of government wildlife departments is another reason of slackness in vigil.

Public awareness campaigns and community empowerment projects undertaken by WWF Pakistan in the River Dasht and its watershed areas in the past (2007-14) were helpful in reducing the conflict and making local communities aware of the role of crocodiles in the ecosystem but with the project coming to an end, the awareness campaign was stopped, and the impact of the project vanished. Now only occasional reports of crocodile sightings are made whereas hardly any conflicts are reported. There could only be two possibilities i.e. either there have been no conflicts, or the crocodiles are discreetly removed. Because of low government capacity such incidences remain obscure.

In Sindh specifically because of the presence of WWF teams, awareness education is imparted to the people hence hardly any conflicts are reported.

Another form of damage to wild crocodile populations recently coming into light is the illegal capture of young crocodiles from the wild for local use for captive breeding. These young ones are used to stock the captive breeding farms in the private sector.

Threats to crocodile population and conservation actions

Threats to crocodile population include habitat alteration due to human and natural factors, habitat destruction like construction of dams/reservoirs, drought periods, predation of eggs by feral dogs, shooting by local people (retaliatory killings of nuisance crocodiles), frequent tropical cyclones/high floods in the area, and illegal smuggling of crocodile juveniles/hatchlings.

Based on survey findings, the WWF Pakistan under a World Bank/GEF Funded program started a Conservation Program in Metang and ZarinBaig villages located along Dasht River that continued from 2007 to 2014. Wetland Conservation Committees were formed. The local community-initiated advocacy and awareness raising program on the conservation of Crocodiles. The Program also introduced demonstrations on freshwater conservation initiatives such as efficient irrigation techniques like drip irrigation systems for freshwater conservation, alternate energy models (Solar and Wind) and other Natural Resource Management initiatives with Women Communities to improve their livelihood. This initiative proved to be a step towards building the confidence of communities and they started adopting conservation initiatives. The impact continued even after the end of the project however it has slackened now because of lack of interest on the part of Government. Similar initiatives have also been taken in Hingol National Park where Village Conservation Committees have been formed with similar objectives.

Research and Awareness

- Pakistan Zoological Survey Department has recently been tasked to conduct population surveys throughout Sindh and Balochistan.
- Sindh University Jamshoro has taken the initiative and planned to undertake two research projects financed by Higher Education Commission Pakistan and WWF-Pakistan. The studies are:
  - Temperature-dependent sex determination in Mugger crocodile population in Sindh, Pakistan;
  - Population genetics implications for the conservation of Mugger crocodiles in Sindh, Pakistan.
- Awareness campaigns are being carried out in areas where crocodiles occur;
- Community participation programs have been started in areas where crocodiles occur.

SRI LANKA

The following are few activities carried out in Sri Lanka:

1. An island wide survey was conducted on *'The genetic re-evaluation of the Indian black turtle Melanochelys trijuga in Sri Lanka'* from January to December 2022 by Anslem de Silva, Kanishka Ukuwela, and Suranjan Karunarathna during this survey we were able to check the current status of crocodiles too.
2. The following books were published which included on crocodiles of the country:
   - Anslem de Silva and K. Ukuwela. 2020. *A Naturalist Guide to Reptiles of Sri Lanka*. (2nd Edition. Revised) John Beaufoy Publishing ltd. England. 176 pages. ISBN 978-1-912081-23-3
   - Anslem de Silva, N. P. Daundasekara and S. Karunarathna (2021) *Testudnes and Crocodilians. (An annotated Bibliogprahy and a checklist of the herpetofauna of Sri Lanka)* Vol 1. 209 p + 24 plates. AMP Print Shop, Gampola.
3. A 300-page (90 color photos) monograph of "Crocodiles of Sri Lanka" by Anslem de Silva will be published this year by the Dept. of Wildlife Conservation, Sri Lanka.
4. 16 February 2024 an 11-year boy was killed by a saltwater crocodile while bathing in Kelani River (Kaduwela close to Colombo) along with the grandmother and a friend. This incident will be be published some printed media (Sunday leading papers 21.1.2024) which will inform the people about preventive aspects of crocodile attacks.
5. The first comprehensive Mugger National censes survey was conducted by members of the Department of Wildlife Conservation and Anslem de Silva (Table).

Distribution of Mugger crocodiles in nine provinces, 2015-2017

Province	**Number of crocodiles**	**Water source where the highest Mugger populations were observed**
North Province	1362	Largest Mugger population was observed at Kanagarayan aru Iranamadu Tank
North Central Province	965	Largest Mugger population was observed at Yan Oya
Southern Province	1480	Largest Mugger population was observed at Bundala and Yala National Park
Uwa Province	529	Largest Mugger population was observed at Kubukan Oya
Sabaragamuwa Province	496	Largest Mugger population was observed at Walawe Gaga
Western Province	45	Largest Mugger population was observed at Kelani River from Avissawela – down wards
Central Province	88	Largest Mugger population was observed in the tributaries of Bowathenna Tank
North Western	683	Largest Mugger population was observed at Rajanganaya Tank
Eastern Province	1868	Largest Mugger population was observed at Panama Tank
Total	**7516**	

Source: RATHNASIRI, G.W.R.P., ANSLEM DE SILVA, D.C. MAHANAMA, A. JAYASOORIYA and P. PRIYADHARSHANA (2018). Preliminary report of the status of the Mugger Crocodile (*Crocodylus palustris*) in nine provinces during the years 2015-2017 in Sri Lanka. *Wildlanka* 6(4): 159-167.

Mugger Action Plan

Finally, I am happy that many members of the region contributed important information for the Mugger Action Plan. A specific Conservation and Management Action Plan for crocodiles of Sri Lanka has been a longstanding omission. Thus, the revised and expanded Mugger account for the CSG Action Plan was completed in 2022 by Colin Stevenson, Anslem de Silva, Raju Vyas, Tarun Nair, and Asghar Mobaraki. Since the Action Plans are being coordinated with concurrent revisions to the Red List accounts, Colin Stevenson, has completed the Red List training and is preparing the Red List revision for the species. We are now gathering locality data points from colleagues within the region for the CSG Red List team to prepare an accurate range map, which also will permit the assessment of AOO and EOO to determine the status and criteria we need to assign for the species. The aim is to have the draft Red List account ready for submission and review by the CSG steering committee by 1 April 2024.

Prepared by: Dr. Anslem de Silva, with inputs from Dr. Raju Vyas, Prof. B.C. Choudhury and for names of other scientists who contributed for the India Country Report please see report for India. Bangladesh report by: Dr S.M.A. Rashid. Nepal report by: Dr. Babu Ram Lamichhane, Pakistan report by: Dr. Abdul Aleem Chaudhry. Iran report by: Dr. Asghar Mobaraki.

Date prepared: 27 January 2024

Agenda Item: SC. 2.6.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Australia and Oceania

Three species of crocodilian are endemic to the Australia & Oceania region; *Crocodylus porosus*, *C. novaeguineae* (Papua New Guinea only) and *C. johnstoni* (Australia only). A fourth "species", *Crocodylus halli* (PNG), has yet to be formally confirmed (see SC Red List report).

Australia
In late-2021, the Department of Agriculture, Water and the Environment (DAWE), now Department of Climate Change, Energy, the Environment and Water (DCCEEW), initiated a process to review the *Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles* ("the Code") in conjunction with the relevant State/Territory Governments (Western Australia, Northern Territory, Queensland). The code sets out the framework and standards for the humane capture, restraining and housing of both wild and farmed crocodiles in Australia. The Code was endorsed by the Natural Resource Management Ministerial Council (NRMMC) and came into effect on 21 May 2009. While the intention was for the Code to be reviewed after 10 years, this has not occurred and given recent advances in science, technology, and husbandry practices, it was broadly accepted by the relevant State/Territory Governments and industry stakeholders that a review was merited. On 30 July 2023, an independent review of the Code began, to ensure the Australian crocodile farming industry continues to be managed to world class standards. Key stakeholder consultation will commence in early-2024 with the review expected to be finalized by late-2024.

Northern Territory
The Saltwater crocodile population in the Northern Territory has been increasing since intensive unregulated hunting (1945-1971) and is now estimated at around 102,000 non-hatchlings, with 42.2% of crocodiles estimated at >2.1 m total length (Fukuda *et al.* 2021). Monitoring of the population has consistently occurred since 1975, with only minor gaps in the record (Fukuda *et al*. 2021). Despite the COVID-19 pandemic restricting survey coverage in recent years (2020-2021), results have been consistent with recent trends, showing either stable (believed to have reached an asymptote) or increases in both numbers and in biomass (more larger crocodiles observed) (Clancy and Fukuda 2021).

Saltwater crocodiles in the Northern Territory are managed under the *Northern Territory Saltwater Crocodile (Crocodylus porosus) Risk Management Framework 2021-2026*. The NT Crocodile Management Program is currently under review (2024).

The number of problem crocodiles removed for public safety and to protect stock in pastoral areas has been increasing over the last two decades, in line with the increasing crocodile population (Clancy and Fukuda 2021). In 2022 and 2023, 279 and 272 problem *C. porosus* were removed from the wild, respectively, with the majority (85-86%) from Darwin Harbour (NTG 2024).

In the Northern Territory, there is an annual ceiling of 90,000 viable eggs and 1200 non-hatchling crocodiles that can be collected from the wild under permit. These eggs and crocodiles are used to supply the crocodile farming industry. Twelve crocodile farms are currently operating in the Northern Territory with the economic value of the industry estimated at around $25.4 million over the last five years (Clancy and Fukuda 2021).

Recent research involving *C. porosus* in the Northern Territory includes modelling to examine the impact of the harvest of eggs and adults since protection and to predict future scenarios (Fukuda *et al*. 2021), landscape genetics approaches to quantify dispersal patterns and demonstrated environmental influences on emigration, movement, and settlement (Fukuda *et al.* 2022, 2023), use of eDNA to detect estuarine crocodiles (Rose *et al.* 2020), examination of spatial events implicated in the homing ability of large translocated males and genetic structure across the NT coast (Fukuda *et al.* 2019), and exploration of dietary changes that may have accompanied population recovery by comparing the isotopes in bones (Campbell *et al*. 2022).

Queensland
Unlike in the Northern Territory, saltwater crocodile monitoring in Queensland has been sporadic and inconsistent over time, with comprehensive state-wide monitoring only occurring in the late 1980s, late 1990s/early 2000s and again in

2016-2019. A summary report of the 2016-2019 survey results and historical analyses (1985-2019) was released by the Department of Environment and Science in mid-2021. The results revealed a current population of 20-30,000 non-hatchlings at an average density of 1 crocodile/km, which has increased since the 1980s. However, recovery has been relatively slow and highly variable across the state at around 2% on average each year (Taplin *et al.* 2020). While numbers in some rivers appear to have stabilized as early as the 1980s (eg Wenlock River, northwestern Cape York), in other rivers (eg Norman River, Gulf of Carpentaria) numbers continue to increase (Taplin *et al.* 2020). Saltwater crocodiles occupy a diverse range of habitat types in Queensland (13 defined crocodile bioregions), most of which are considered marginal or sub-optimal for crocodiles (Taplin 1987; Taplin *et al*. 2020). The population is also largely riverine with the majority (>90%) found below 20 m elevation (Taplin *et al*. 2020).

Saltwater crocodiles in Queensland are managed under the *Queensland Crocodile Management Plan*. Because of increasing crocodile and human populations, especially along the populated east coast between Cooktown and Ayr, there has been increasing human-crocodile conflict in Queensland over the last two decades (Brien *et al*. 2017). Since 1975, there have been 47 crocodile attacks (17 fatal, as of January 2023) on humans, with a record 5 in 2021 (1 fatal). However, while non-fatal attacks have been increasing, fatalities (0.3 per year) have not. In response to the increasing conflict, the department has removed a record number of problem crocodiles (>450 total, mostly >2 m in size) over the last decade largely from the populated east coast (Cooktown-Ayr; Taplin *et al.* 2020). While the average size of crocodile has been increasing throughout the state, it has decreased along the populated east coast and this is believed to be a consequence of the removal program (Taplin *et al.* 2020). Australian Freshwater crocodiles pose little threat to humans with attacks rare.

The commercial utilization of saltwater crocodiles in Queensland has historically been restricted to captive bred animals, problem crocodiles received through the management program, and eggs and stock imported from the Northern Territory. It only became lawful to harvest wild saltwater crocodile eggs in Queensland in 2018 under the *Nature Conservation (Estuarine Crocodile) Conservation Plan 2018*, with only one group currently permitted to collect in the Pormpuraaw region.

Recent genetic research found that the saltwater population in Queensland is broadly divided into six populations with ~90% of crocodiles dispersing less than 50 km from their place of birth (Lloyd-Jones *et al*. 2023). Other recent research includes ongoing tracking of crocodiles in the Proserpine River and Torres Strait (DES), and the Wenlock River to describe movement patterns, social interactions, and nesting behaviour using acoustic telemetry (Baker *et al*. 2019; 2022), utility of digital surveillance, sonar and associated algorithms, and sound to detect, alert and deter saltwater crocodiles (Brien *et al*. 2021), use of drone technology to detect (CrocSpotter - Little Ripper) and capture crocodiles (Brien *et al.* 2020), aversive conditioning as a non-lethal management tool for saltwater crocodiles (Booth *et al.* 2020), modelling to examine the impact of the removal of adults on the populated east coast as part of the management program since protection and to predict future scenarios, and use of eDNA to detect crocodiles in the wild.

Western Australia

Regular monitoring of the saltwater crocodile population in the Cambridge Gulf region (Ord River, West Arm) previously occurred via aerial survey between 1992 and 2012, with spotlight surveys occurring sporadically. Currently, monitoring is restricted to an annual spotlight survey of the King River, which has been surveyed consistently since 1989 (1989-1990, 1992-2015, 2017-2020; Corey *et al.* 2020). The most recent survey results indicate relatively high rates of increase in *C. porosus* populations in West Arm (4.1% per year in 2008), the tidal Ord River (6.9% per year in 2008), the non-tidal Ord River (4.7% per year in 2019) and King River (3.3% per year in 2020) (Webb *et al.* 2010; Corey *et al.* 2020), with no sign yet of stabilising. Cattle grazing is a potential threat to some nesting habitats, and some illegal harvesting of eggs is known to have occurred in 2009-2010. The increasing *C. porosus* population has led to increasing conflict which prompted authorities to implement a public safety program, like the "Be Crocwise" program in the Northern Territory and Queensland. Legal harvesting of juveniles, sub-adults, adults and eggs was undertaken in West Arm between 1989 and 1994 to provide stock for crocodile farms. However, only one farm is currently in operation, in Broome, and it is based solely on captive breeding.

In 2019, Barrow and Hartford described a new biopsy method for the collection of DNA samples from free-ranging saltwater crocodiles that does not require capture or handling. The method employs a modified standard biopsy needle mounted on the end of a harpoon pole that is plunged into the neck or tail of the crocodile. In the study, a total of 69 free ranging crocodiles (size range 0.9-4.4 m TL) from two remote rivers of Western Australia were successfully sampled using the method, with a 95% success rate. This method has since been adopted by researchers in the Northern Territory and Queensland.

Recent research involving Australian freshwater crocodiles includes population genetic analyses from the Ord River, Fitzroy River, and Lennard River basins using single-nucleotide polymorphisms (SNPs) (Cao *et al*. 2020). The population structure found here indicates that delimitation of management units should be based on river basins with the proximity of adjacent river basins taken into consideration when gene flow exists. With the continued spread of cane toads across Western Australia, studies are also focused on the impact on the Freshwater crocodile population. Clarke *et al*. (2020)

described encounters between freshwater crocodiles and invasive cane toads in Lake Argyle and found that most predation attempts did not result in toad consumption. Instead, often only a limb was removed from the toad which facilitated taste aversion learning in the crocodile. In another study, Aiyer *et al.* (2022) demonstrated that freshwater crocodiles rapidly avoid consuming toads and shift almost exclusively to aquatic foraging.

Palau

Palau has a small stable population estimated at 500-750 (Brazaitis *et al.* 2009) and human-crocodile conflict is very uncommon with only two attacks recorded (1965, 2012; CrocBite 2018). Crocodiles are not currently protected by law, and are sometimes killed and eaten, but at a rate not considered detrimental to their conservation. The population is considered to be stable (Joshua Eberdong, pers. comm. 2022).

Papua New Guinea

The latest report published by the Conservation and Environment Protection Authority (CEPA) indicated a fluctuating but stable saltwater crocodile population within the area surveyed in 2020. Degradation of habitat by introduced fish species and burning during dry years continues to affect nesting habitats, although nest monitoring indicates positive trends for both *C. porosus* and the New Guinea Freshwater crocodile (*C. novaeguineae*). Due to financial constraints, the CEPA has not been able to conduct any biennial nest counts survey for *C. novaeguineae* or *C. porosus* since March 2020.

As previously reported, the quantity of wild skins exported from PNG is still experiencing a downward trend that was further accelerated during the COVID19 pandemic. This is mainly due to a combination of low prices, the prohibitive cost of domestic transport, challenging Law & Order issues in some regions of PNG and the ever-stricter grading standards imposed by the tanneries, making it often uneconomical for the local hunters living in the remote areas to sell and deliver their croc skins. Mainland Holdings Ltd is now the only active buyer and exporter of wild crocodile skins in PNG and, despite the many business challenges and the high inflation affecting the PNG economy, is also still committed to continue supporting the crocodile conservation program in PNG with its annual wild crocodile eggs harvest in the Middle Sepik River that has the full backing of the local communities.

The drafting of an Amendments Bill to amend the *Crocodile Trade (Protection) Act 1974* was announced by the Managing Director for Conservation and Environment Protection Authority on 21 June 2021. The process is currently being delayed by the Department of Justice and Attorney General for vetting before it goes to the First Legislative Counsel and the National Executive Council. The process was completed through with the involvement and review of the current legislation and a series of consultations to assess the needs and priorities of Papua New Guinea's crocodile skin trade. Since the last update of the 1974 Act, over 35 years ago, the approach to management and commercial use of crocodiles has changed considerably in Papua New Guinea. The Act was designed to regulate the trade of crocodile skins and protect wild crocodile populations. The structure of the industry has also changed significantly, evolving into a more efficient, quality-controlled system in which the roles and responsibilities of the various participants have become more stringently defined and the cultural and socio-economic profiles of the individuals involved in the different sectors of the industry are becoming more clearer as to the market demands for quality rather than quantity *per se*.

The proposed amendments to the legislation will reflect these industry changes as well as changes to the management and conservation of crocodiles in Papua New Guinea. In summary the proposed changes will: improve licensing arrangements and fee collections for crocodile skins and wild harvested eggs, provide for regulations of skin processing and exports, update enforcement provisions (such as forms and penalties), and transfer the export permit provisions of the Act under the International Trade (Fauna and Flora) Act. The review of the Crocodile Management Plan is envisioned to eliminate wild hunting in the future, and there will also be a review of the existing exemptions on sales, export of crocodile meat and by-products from registered crocodile farms. The amendments will also enable improvements to the quality of information provided by the industry to the CEPA.

Supported by a crocodile expert, the CEPA has consulted with provincial governments, community leaders, industry and local conservation and NGO groups on the proposed changes before the Amended Crocodile Trade (Protection) Act 1974 and Crocodile Trade (Protection) Regulation (1980) and Schedules are submitted to the National Executive Council and Parliament for endorsement. The review of the Act and consultations are being supported by the By-catch and Integrated Ecosystem Management (BIEM) Initiative implemented by the South Pacific Regional Environment Program (SPREP) under the Pacific-European Union Marine Partnership (PEUMP) program funded by the European Union and the Government of Sweden.

Timor-Leste

Political unrest since independence has hampered efforts to assess the *C. porosus* population in the country. Aerial surveys of marine coastal habitat undertaken in 2008 resulted in some opportunistic sightings of *C. porosus* (Kiki Dethmers, pers.

comm. 2009). A reasonable population may also exist in Lake Iralalaro.

The wild saltwater crocodile population in Timor-Leste and rate of fatal attacks on people are both increasing (Brackhane *et al*. 2019). From 2007 to 2019, there were 59 fatalities and 21 non-fatal attacks on people (CrocBITE 2019), but many are believed to go unreported. In response, the Timor Leste Government has set up warning signs at known crocodile spots and is regularly visiting affected communities to raise public awareness. The government has also constructed a crocodile enclosure in Hera, near Dili, to enable the housing of problem crocodiles. Community-based monitoring has been conducted in various communities in Lautem and Viqueque to assess data on crocodile habitat and attacks, integrating the knowledge of local stakeholders (Brackhane *et al.* 2019).

Local authorities recently raised the concern that crocodiles dispersing from Australia could be responsible for the increase in crocodile attacks in Timor Leste. Brackhane *et al.* (2018) provided circumstantial evidence to support this theory, but it remains unproven. Brackhane *et al.* (2018) recommended that future research and management should focus on testing the dispersal hypothesis, and on the removal of problem crocodiles from areas where crocodile habitat and human activity frequently overlaps, as well as on developing an ecotourism strategy including "crocodile watching". A team of Darwin-based researchers (including Yusuke Fukuda and Grahame Webb) funded through CrocFest recently travelled to Timor Leste and collected DNA samples from multiple crocodiles to determine the origin and nature of dispersal and potential for migration from Australia, with the results yet to be analyzed.

Crocodiles are culturally very important to local people in Timor Leste, and *C. porosus* is the national animal. A small number of *C. porosus* are held in captivity in the capital, Dili. Recent social research conducted by Brackhane *et al*. 2019 examined cultural beliefs and traditional ecological knowledge underlying human-crocodile interactions and conflict in Timor Leste. Local beliefs based on Timor Leste´s creation myth "Lafaek Diak - The Good Crocodile" are anchored in the east Timorese traditional belief system lulik and involve worship of the widely distributed, but dangerous, saltwater crocodile (Brackhane *et al.* 2019). Interviewees knew this species was a risk (respect, fear) and its population was expanding, and had culturally determined beliefs (ceremonies, rituals) that included differentiating between local "ancestor" crocodiles and invasive "troublemakers." Cost-effective management could integrate stakeholder groups, especially traditional elders and local knowledge holders (Brackhane *et al.* 2019).

In other recent research, Brackhane *et al.* 2018 performed habitat analysis of East Timor based on Geographic Information Systems (GIS) to identify: 1) core habitats (including perennial waterbodies such as lakes, swamps, billabongs and rivers providing possible breeding sites for *C. porosus*); 2) coastal marine habitats, *inter alia*, *C. porosus* perennial range for hunting; and, 3) seasonal range, namely potential habitat for *C. porosus* during the wet season.

Solomon Islands

The only spotlight surveys of the saltwater crocodile population in the Solomon Islands occurred in the 1980s (Messel and King 1990). The results of these surveys revealed low numbers throughout the islands with a total population size estimated at ~720. Since this time, the saltwater crocodile population has recovered rapidly, leading to increasing conflict including attacks. As noted by Messel and King in 1990, the Solomon Islands is one of the most logistically challenging places to survey crocodiles, due to the many small rivers and creeks spread across the remote island chain.

Therefore, more recent efforts to estimate the population size and the nature and extent of human-crocodile conflict have focused on interviews with community members throughout the Solomon Islands (Van der Ploeg *et al.* 2019). The results estimated that the saltwater crocodile population had increased since the 1980s to between 1400 and 2300 non-hatchlings. A total of 225 crocodile attacks on people were recorded, 83 of which were fatal (37%), and included 31 children. Attacks have been increasing over the last decade, with an estimated average of 5/year nation-wide (Van der Ploeg *et al.* 2019).

The results of the study by Van der Ploeg *et al.* (2019) reported that communities recognize the risk posed by saltwater crocodiles and take measures to avoid interactions such as supervising children, avoiding fishing alone, and being alert at night and during floods. It was also found that crocodiles were killed by local hunters with traps and spears as a precautionary measure or in retribution for attacks on humans. Cultural restrictions on killing and eating crocodiles remain pervasive throughout the country, and they are widely regarded as taboo (sacred) animals that need to be treated with respect. Crocodile attacks are often attributed to the wrath of ancestors or to sorcery.

The study provided a range of recommendations, including raising public awareness, removing problem crocodiles, legalizing the sale of crocodile products, and developing community-based monitoring. This latest research provides a basis from which to determine population levels against the estimated virgin population and at what point it can sustain any harvest. With support from the By-catch and Integrated Ecosystem Management (BIEM) Initiative, the Solomon Islands Government has drafted and is currently finalizing a national crocodile management plan as initially identified in their National Biodiversity Strategic Action Plan 2016-2020. This commenced in 2021 and is due for completion in late 2024.

References

- Aiyer, A., Shine, R., Somaweera, R., Bell, T., and Ward-Fear, G. (2022). Shifts in the foraging tactics of crocodiles following invasion by toxic prey. *Scientific Reports*, *12*(1), 1-9.
- Baker, C.J., Franklin, C.E., Campbell, H.A., Irwin, T.R. and Dwyer, R.G. (2019). Ontogenetic shifts in the nesting behaviour of female crocodiles. *Oecologia*, *189*(4), pp.891-904.
- Baker, C.J., Frère, C.H., Franklin, C.E., Campbell, H.A., Irwin, T.R. and Dwyer, R.G. (2022). Crocodile social environments dictated by male philopatry. *Behavioral Ecology*, *33*(1), pp.156-166
- Barrow, D. and Halford, A.R. (2019). A modified biopsy needle with pole for repeatable tissue extraction from free-ranging crocodiles. *Wildlife Society Bulletin*, *43*(2), pp.308-312.
- Booth, S., Taplin, L., Brien, M., Campbell, H., and Christian, K. (2020). Aversive conditioning as a potential non-lethal management tool for estuarine crocodiles (*Crocodylus porosus*) in Queensland. Thesis, Charles Darwin University.
- Brackhane, S., Xavier, F. M., Gusmao, M., and Fukuda, Y. (2018). Habitat mapping of the saltwater crocodile (Crocodylus porosus) in Timor-Leste. *Herpetological Review*, *49*(3), 439-441.
- Brackhane, S., Webb, G., Xavier, F.M., Gusmao, M. and Pechacek, P. (2018). When conservation becomes dangerous: Human-Crocodile conflict in Timor-Leste. *The Journal of Wildlife Management*, *82*(7), pp.1332-1344.
- Brackhane, S., Webb, G., Xavier, F. M., Trindade, J., Gusmao, M., and Pechacek, P. (2019). Crocodile management in Timor-Leste: drawing upon traditional ecological knowledge and cultural beliefs. *Human Dimensions of Wildlife*, *24*(4), 314-331.
- Brien, M.L., Gienger, C.M., Browne, C.A., Read, M.A., Joyce, M.J. and Sullivan, S., 2017. Patterns of human–crocodile conflict in Queensland: a review of historical estuarine crocodile (Crocodylus porosus) management. *Wildlife Research*, *44*(4), pp.281-290.
- Brien, M., Booth, S., Beri, P., Coulson, S., Frisby, T., Perera, D., and Joyce, M. 2020. A novel method of using a drone to capture saltwater crocodiles (*Crocodylus porosus*). Herpetological Review 51: 32-37.
- Brien, M., Taplin, L., Talmage, R., Booth, S., Bignell, C., Beri, P., Freeman, P. and Joyce, M. (2021). The Suitability of Digital Video Surveillance and Multi-beam Sonar to Monitor Saltwater Crocodiles. *Acoustics Australia*, *49*(1), pp.43-52.
- Campbell, M. A., Udyawer, V., Jardine, T. D., Fukuda, Y., Kopf, R. K., Bunn, S. E., and Campbell, H. A. (2022). Dietary shifts may underpin the recovery of a large carnivore population. *Biology Letters*, *18*(4), 20210676.
- Cao, R., Somaweera, R., Brittain, K., FitzSimmons, N.N., Georges, A. and Gongora, J. (2020). Genetic structure and diversity of Australian freshwater crocodiles (Crocodylus johnstoni) from the Kimberley, Western Australia. *Conservation Genetics*, *21*(3), pp.421-429.
- Clancy, T.F. and Fukuda, Y. (2021). NT Saltwater Crocodile (*Crocodylus porosus*) Wildlife Trade Management Plan: 2020 Monitoring Report. Northern Territory Department of Environment, Parks and Water Security: Darwin.
- Clarke, G. S., Hudson, C. M., and Shine, R. (2020). Encounters between freshwater crocodiles and invasive cane toads in north-western Australia: does context determine impact?. *Australian Zoologist*, *41*(1), 94-101.
- CrocBITE (2019) Worldwide Crocodilian Attack Database. http://www.crocodile-attack.info/ [accessed 2019].
- Fukuda, Y., Webb, G., Manolis, C., Lindner, G., and Banks, S. (2019). Translocation, genetic structure and homing ability confirm geographic barriers disrupt saltwater crocodile movement and dispersal. *PloS one*, *14*(8), e0205862.
- Fukuda, Y., Webb, G., Edwards, G., Saalfeld, K., and Whitehead, P. (2021). Harvesting predators: simulation of population recovery and controlled harvest of saltwater crocodiles *Crocodylus porosus*. *Wildlife Research*, *48*(3), 252-263.
- Fukuda, Y., Moritz, C., Jang, N., Webb, G., Campbell, H., Christian, K., Lindner, G. and Banks, S. (2022). Environmental resistance and habitat quality influence dispersal of the saltwater crocodile. *Molecular ecology*, *31*(4), pp.1076-1092.
- Fukuda, Y., Moritz, C., FitzSimmons, N.N., Jang, N., Webb, G., Lindner, G., Campbell, H., Christian, K., Leeder, S. and Banks, S., 2023. Natal origin and dispersal of problem saltwater crocodiles in the Darwin Harbor, Australia. *The Journal of Wildlife Management*, p.e22525.
- Lloyd-Jones, L.R., Brien, M.L., Feutry, P., Lawrence, E., Beri, P., Booth, S., Coulson, S., Baylis, S.M., Villiers, K., Taplin, L.E. and Westcott, D.A., 2023. Implications of past and present genetic connectivity for management of the saltwater crocodile (*Crocodylus porosus*). *Evolutionary Applications*.
- Messel H and King FW. 1990. The status of *Crocodylus porosus* in Solomon Islands. Proceedings of the 10th Working Meeting of the Crocodile Specialist Group 2:39–69.
- Rose, A., Fukuda, Y., and Campbell, H. A. (2020). Using environmental DNA to detect estuarine crocodiles, a cryptic-ambush predator of humans. *Human–Wildlife Interactions*, *14*(1), 11.
- Taplin L.E. 1987. The Management of crocodiles in Queensland, Australia. In: Webb GJW, Manolis SC & Whitehead PJ. Wildlife Management: Crocodiles and Alligators. Surrey Beatty & Sons. 129-40pp.
- Taplin, L., Brien, M., Beri, P., Booth, S., Mastromonaco, S., Browne, C., and Joyce, M. 2020. Estuarine crocodile population monitoring in Queensland (1979-2020). Internal Technical Report, Queensland Parks and Wildlife Services and Partnerships. Pp. 124.

- Van der Ploeg J, Ratu F, Viravira J, Brien M, Wood C, Zama M, Gomese C and Hurutarau J. 2019. Human-crocodile conflict in Solomon Islands. Penang, Malaysia: WorldFish. Program Report: 2019-02.
- Webb G.J.W, Manolis S.C. and Brien M.L. 2010. Saltwater crocodiles, *Crocodylus porosus*. In: Crocodiles. Status Survey and Conservation Action Plan. Third Edition. Crocodile Specialist Group, Darwin. 99-113pp

Prepared by: Matthew Brien, with input from Sebastian Brackhane (Timor-Leste), Yusuke Fukuda (Australia), Josef Hurutarau (Solomon Islands), Eric Langelet (Papua New Guinea), Godfrid Solmu (Papua New Guinea) and Ruchira Somaweera (Australia)

Date prepared: 18 February 2024

Agenda Item: SC. 2.7.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Europe

Zoos

Within the European Association for Zoos & Aquaria's (EAZA) Reptile Taxon Advisory Group there is a crocodilian subgroup led by Fabian Schmidt (Zoo Basel, Basel, Switzerland). Samuel Martin (La Ferme aux Crocodiles, Pierrelatte, France) is the veterinary advisor for this group. This group oversees all existing managed breeding programs in Europe.

After the new European Regional Collection Plan was introduced in detail in the last European report, the procedures to implement it were started. The necessary bureaucratic procedures to upgrade the European StudBooks (ESBs) to European Ex-situ Programmes (EEPs) were completed and finally approved for the programs for Philippine crocodile, Siamese crocodile, African Dwarf crocodiles and Tomistoma. They are still outstanding for the Chinese alligator, Cuban crocodile, African Slender-snouted crocodiles and Gharial.

We had a change of program coordinator in the EEP for Siamese crocodiles. Jan Vasak from Jihlava stepped down and Gonzalo Fernandez Hoyo, with institutional support from Zoom Torino (Italy), took over. He is an experienced EEP coordinator and was responsible for the Tomistoma program for several years. He is already in contact with the SSP coordinator for this species, Lauren Gruny at St. Augustine Alligator Farm, and is also to establish contacts to *in-situ* projects, namely with the former SSP coordinator Lonnie McCaskill who remains active in WCS *in-situ* projects, but also with Philipp Wagner from Allwetterzoo Münster and Romain Legrand from Raising Phoenix, a Cambodian-based NGO which is reintroducing the species in Siem Pang Wildlife Sanctuary near the border to Laos. In addition, Gonzalo is in contact with 8 non-EAZA institutions keeping 22 animals. Within EAZA, only 23 individuals remain in 12 institutions. One of the biggest challenges in this species is that both purebred and hybrid animals occur in farms in Southeast Asia but also in the small European population. As far as known there is only one potential pure breeding pair in Europe, which is kept at Terra Natura in Benidorm (Spain). For most individuals, the exact genetic status is not known. Therefore, it is one of the most important goals in this program to establish a genetic study for these captive animals.

Since the last CSG Working meeting, the EAZA Reptile TAG met three times in person, on 29 September 2022 in Albufeira (Portugal), on 30 May 2023 in Biotropica Val de Reuil (France) and 13 September 2023 in Helsinki (Finland). Topics discussed included the introduction to Phnom Tamao Breeding Facility for *Crocodylus siamensis* by Iri Gill from Chester Zoo, a new enclosure for subadult *Gavialis gangeticus* by Francois Huyghe from Biotropica Val de Reuil and updates and perspectives on the monitoring of *Crocodylus suchus* and the programs for African Slender-snouted crocodiles as well as Tomistoma, for which new holders are eagerly wanted. A more comprehensive report including the history and situation *in-situ* was given by Ivan Rehak on Indian Gharials. As usual, practical examples were given for transportation of large individual crocodiles, this time Zoltan Molnar reported on a large *Alligator mississippiensis* from Tierpark Berlin to Budapest Zoo. Guido Westhoff from Hagenbeck Tierpark Hamburg reported on the loss of a *Crocodylus niloticus* through accumulation of foreign objects in the stomach which resulted in a discussion of potential measures to protect crocodilians from the influence of visitors. Jan Vasak from Jihlava Zoo presented on one hand about problems of nesting in a female Siamese crocodile, on the other on the first data on a successful natural reproduction of Chinese alligator in an EAZA institution.

Jérémy Lemaire and Rosanna Mangione held practical training sessions for zoo staff on crocodilian capture and constraint at Martinique Zoo (2022) and "Zoo de Guyane", French Guiana (2023).

After the successful repatriation of two Philippine crocodiles (*Crocodylus mindorensis*) in 2020, another three animals, hatched and mother-reared in 2021 at Cologne Zoo, were also released in the summer of 2023. As with the last time, the repatriation took place in cooperation with the partners in the Philippines, Crocodylus porosus Philippines Inc. (CPPI). The animals are kept in large enclosures with semi-wild conditions in Tarlac before they will be moved to Paghungawan Marsh Semi-wild enclosure and Education Center for Philippine Crocodiles at Siargao Island, where they can acclimatize to their future life in the wild.

The repatriation was carried by our Thomas Ziegler, Curator at Cologne Zoo and his assistant Anna Rauhaus. Thomas Ziegler was invited as plenary speaker to the 3rd Forum on Crocodiles on the Philippines in November 2022 in Manila.

There, he prepared the repatriation of the animals with the Philippine authority and attracted the attention of Philippine TV, which accompanied the repatriation of the animals. In addition, members of the program continue to financially support the Mabuwaya Foundation, which focuses on crocodile conservation in the North of the Philippines, whereas CPPI covers the southern part.

Research

Phoebe Griffith is currently working on a study on the cultural significance of crocodilians worldwide, with Sebastian Brackhane, among others. She continues to support Gharial conservation and research in Nepal, and is developing future Gharial conservation work in collaboration with Nepal's Department of National Parks and Wildlife Conservation, as well as the National Trust for Nature Conservation.

Phoebe also chairs the European Croc Network, which held its annual meetings in October 2022 and October 2023, and the Early-Career Croc Network for Asia, which has a monthly online meeting.

In July 2022, Jérémy Lemaire and Rosanna Mangione received funding from local governmental agencies in French Guiana to secure their long-term study on the local four caiman species in that country. In 2023, Rosanna Mangione additionally received National Geographic funding for her ongoing Black caiman study in French Guiana.

Simon Pooley guest edited "Coexisting with Reptiles", special issue of Current Conservation, 17.4, (2024), available here, and contributed to several chapters, some including crocodile-related material of IUCN (2023). *IUCN SSC guidelines on human-wildlife conflict and coexistence*. First edition. Gland, Switzerland: IUCN.

Colin Stevenson continued to help maintain the CSG website and is part of the CSG's Social Media team. Colin undertook Red List Assessor training and is currently working on the Mugger Red List account, and rewrote the Mugger Action Plan, along with colleagues from South Asia. Colin is also part of Mugger Conservation Genetics group to move Mugger conservation and research projects forward, instigated by Asghar Mobaraki in Iran and Thomas Ziegler in Germany. Colin was also a co-author on the global *Tomistoma schlegelii* Red List assessment published in late 2023.

Talks related to crocodilians

Phoebe Griffith: Presentation to Britain-Nepal Society on Gharial Conservation in Nepal, November 2022, London. In 2023, Phoebe gave a presentation at the Student Conference on Conservation Science in Cambridge, UK, and at the Wildlife Research and Conservation Conference in Berlin, Germany, both on evaluation of Gharial head starting program success in Nepal.

Rene Heedegaard: Rene gave a presentation at the European Croc Networking meeting in October 2023 on Orinoco crocodile conservation, a collaboration with Alvaro Velasco.
Jon Hutton: Jon gave a presentation at the European Croc Networking meeting in October 2023 on sustainable use of crocodilians for conservation.

Jérémy Lemaire: Jérémy and Rosanna provided a podcast episode for the CNRS (French National Center for Research) on their ecotoxicology project on *Paleosuchus trigonatus* in French Guiana.

Rosanna Mangione: Rosanna gave a presentation at the European Croc Networking meeting in October 2022, and at the Austrian Herpetological Society in January 2023, both on Black caiman in French Guiana. Rosanna gave a series of workshops in 2023 on crocodilians within the framework of "Wildlife Crime", a project by the Natural History Museum Vienna, Austria, in collaboration with the UNODC, WWF Austria, and others.

Simon Pooley: "Beyond incident response in mitigating human-crocodylian conflicts", in Paulino Ponce's series of HCC talks, December 2023. "Disentangling coexistence and conflict in human-wildlife interactions", Zoological Society of London seminar, May 2023 (case studies from Simon Pooley's croc fieldwork in Gujarat). "Human-crocodilian interactions: conflict, compassion and coexistence", International Conference on Human-Wildlife Conflict & Coexistence, on the panel Simon Pooley devised and chaired, entitled 'A focus on reptiles', which included 2 croc papers, which can be viewed here. "Crocodiles and Cultures", CWS Wildlife Chronicles, webinar with Rom Whitaker hosted by Yashendu Joshi. You can see this on YouTube here. "Lessons in compassion and coexistence with crocodiles", seminar for Coexistence Consortium, talk on YouTube here. Simon participated with Professor Amy Dickman (WildCRU, Oxford) and Professor Adam Hart (University of Gloucestershire) in the panel discussion "Living with Dangerous Wildlife" at the Cheltenham Science Festival, UK, in late summer 2022.

Colin Stevenson: Colin gave a presentation at the European Croc Networking meeting in October 2023 on behalf of Asghar Mobaraki and Eltham Abtin on Iranian crocodiles.

Clare Wilkie: Clare gave a presentation at the European Croc Networking meeting in October 2023 on parental care in captive crocodilians.

Publications

Ashepet, M.-G., Dahdouh-Guebas, F., Redpath, S., Pooley, S. & Huge, J. (2023), The state and perceptions of human-crocodile interactions around Murchison falls conservation area, Uganda, *Human Dimensions of Wildlife*, 1-16.

Griffith, P. *et al.* (2022), Using functional traits to identify conservation priorities for the world's crocodylians, *Functional Ecology*, pp. 1-13.

Jensen, T.R., Anikin, A., Osvath, M., & Reber, S.A. (2024), Knowing a fellow by their bellow: acoustic individuality in the bellows of the American alligator, *Animal Behaviour*, *207*, 157-167.

Khadka, B.B., Bashyal, A., & Griffith, P. (2024), Population changes in Gharial (Gavialis gangeticus) vary spatially in Chitwan National Park, Nepal, *Reptiles & Amphibians*, *31*(1).

Lemaire, J., Brischoux, F., Marquis, O., Mangione, R., Caut, S., Brault-Favrou, M., ... & Bustamante, P. (2022), Relationships between stable isotopes and trace element concentrations in the crocodilian community of French Guiana, *Science of the Total Environment*, *837*, 155846.

Lemaire, J., Mangione, R., Caut, S. & Bustamante, P. (2024), Mercury biomagnification in the food web of Agami Pond, Kaw-Roura Nature Reserve, French Guiana (IN PRESS).

Lemaire, J. (2023), Using crocodylians for monitoring mercury in the tropics, *Ecotoxicology*, *32*(8), 977-993.

Mathevon, N. (2023). *The Voices of Nature: How and Why Animals Communicate*. Princeton University Press.

Mobaraki, A., Erfani, M., Abtin, E., Brito, J. C., Tan, W. C., Ziegler, T. & D. Rödder (2023), Last chance to see? Iran and India as strongholds for the Mugger Crocodile (*Crocodylus palustris*), *Salamandra* 59(4),327–335.

Pooley, S. (2022), The challenge of compassion in predator conservation, *Frontiers in Psychology*, 13.

Rehak, I. (2023). Looking back at the WAZA Gharial Resolution. WAZA News.

Thévenet, J., Kehy, M., Boyer, N., Pradeau, A., Papet, L., Gaudrain, E., ... & Mathevon, N. (2023), Sound categorization by crocodilians, *Iscience*, *26*(4).

Thévenet, J., Papet, L., Campos, Z., Greenfield, M., Boyer, N., Grimault, N., & Mathevon, N. (2022), Spatial release from masking in crocodilians, *Communications Biology*, *5*(1), 869.

Thévenet, J., Papet, L., Coureaud, G., Boyer, N., Levréro, F., Grimault, N., & Mathevon, N. (2023), Crocodile perception of distress in hominid baby cries, *Proceedings of the Royal Society B*, *290*, 20230201.

Wilkie, C. J., Tellez, M., Jones, G., & Genner, M. J. (2024), Population genetic structure of Morelet's and American crocodiles in Belize: hybridization, connectivity and conservation, *Conservation Genetics*, 1-6.

Zeiträg, C., Reber, S. A., & Osvath, M. (2023), Gaze following in Archosauria—Alligators and palaeognath birds suggest dinosaur origin of visual perspective taking, *Science Advances*, *9*(20), eadf0405.

Ziegler, T. (2023). The IUCN/SSC CPSG's One Plan Approach and the role of progressive zoos in conservation: case studies from herpetology. – Proceedings of the 14th national congress of the Italian Society for Herpetology, Torino, 195-222.

Prepared by: Fabian Schmidt and Rosanna Mangione
Date prepared: 20 February 2024

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

North America

The following states and research entities reported back to a request for updates on their conservation, management, and research programs for the American alligator and the American crocodile:

Arkansas: Mark Barbee (Arkansas Game and Fish Commission)

Since 1984, alligator populations in Arkansas have increased and continue to be stable and in sufficient numbers to support a regulated sport hunt.

The Commission's Alligator Management Team currently administers three alligator related management programs (Alligator Farmer, Nuisance, and Harvest) in Arkansas. The Alligator Farmer Program was established in 1991 and provides for the permitted commercial captive propagation and sale of alligators. Currently, there are no permitted alligator farmers in Arkansas. In 2001, the AGFC initiated the Nuisance Alligator Program to provide improved coordination, response, and documentation of nuisance alligator complaints in Arkansas. This program is staffed by a network of regional nuisance alligator coordinators who respond to complaints from the public or enforcement agencies by removing alligators that pose a threat to the welfare of the public, pets, livestock, or property. The Alligator Harvest Program was implemented in 2007 to enable the harvest of alligators (>4 feet TL) within specific zones open to alligator hunting. Each permit authorizes the take of one alligator within a specific harvest zone on either public or private lands. Hunting opportunity is allowed in two Alligator Management Zones (AMZ 1 and AMZ 3). These two zones represent the highest and most sustainable populations. In 2020, AMZ 2 was opened up to limited private land hunting. The remaining AMZ's remain close to alligator harvesting.

2022 marked the sixteenth season for hunting in Arkansas. AGFC continues to utilize the "zone quota" for open Alligator Management Zones (AMZ). The state quota was 167 alligators across open zones. 157 CITES tags were issued to successful hunters for public and private lands. Alligator sport hunting continues to be the only legal avenue to harvest alligators in Arkansas. The harvest sex ratio was 1.3:1 (M:F) with males making up 57% of the total harvest. AMZ 1 produced the second highest harvest rate with 64 alligators ahead of AMZ 2 with 6 alligators. AMZ 3 continues to be the highest harvest zone with 87 alligators. The male mean TL was 8.0 ft and the female TL was 6.8 ft. AMZ 3 yielded a slightly higher mean TL for both male and female alligators harvested.

A complete analysis of harvest data from the 2023 season has not been finalized at this point. Preliminarily, a total of 201 CITES tags were issued to hunters for tagging harvested alligators. Hunting was still restricted to AMZ 1, AMZ 2 and AMZ 3 with all other zones remaining closed. Overall harvest rate was 100 percent for the 2023 season. The harvest sex ratio was 1.9:1 (M:F) with males making up 65% of the total harvest. The complete data analysis for 2023 will be made available and presented in the USFWS Annual Report.

The 13' 11.5 " male alligator harvested in 2020 on public waters still remains the largest harvested alligator to date.

Florida: Dwayne Carbonneau, Vincent Deem, Dan Navarro, Brooke Talley, and Allan Woodward (Florida Fish and Wildlife Conservation Commission)

American alligator *(Alligator mississippiensis)*
The overall Florida population of the American alligator has been relatively stable since 1988, when the statewide alligator harvest and ranching programs were implemented. Significant increases in the population over that period were in the 0.3-2.7-m TL size classes, as indicated by spotlight surveys conducted annually on a sample of areas throughout the state. Populations of the largest (≥2.7-m TL) alligators showed no significant change. Florida has three alligator harvest programs (nuisance, statewide public waters, and private lands), which accounted for an average harvest of 17,855 alligators per year during 2019-2022 (Table 1). In 2022, the Florida Fish and Wildlife Conservation Commission (FWC) received 16,648 complaints about alligators, which resulted in harvest of 8245 alligators (≥1.22-m TL) and translocation of 1607 juvenile alligators (≤1.22-m TL). During 2019-2022, the FWC documented an average of 10.5 unprovoked alligator bites per year that resulted in moderate to severe injury and one incident in 2019 resulted in a fatality. Because of continued low prices for wild alligator skins ($13/foot= $2.30/belly cm), the FWC has increased the stipend it pays nuisance alligator trappers to remove alligators from $30/alligator to $50/alligator.

Table 1. Harvest of wild American alligators and alligator eggs in Florida during 2019-2022.
*Note that 2022 figures are not yet final but are not expected to change substantially.

Alligator Harvest	**2019**	**2020**	**2021**	**2022***	**Average**
Statewide Hunt	8372	8216	7944	7867	8102
Private Lands	1298	1194	1865	2752	1777
Nuisance	7669	7814	8178	8245	7976
Total Wild Harvest	17,339	17,224	17,987	18,864	17,855
Public Waters Egg	38,333	41,328	51,055	60,000	47,679
Private Lands Egg	100,589	41,117	69,653	82,638	73,499
Total Eggs	**138,922**	**82,445**	**120,708**	**142,638**	**121,178**

The Florida alligator ranching program includes collections of wild eggs and hatchlings on both public waters and private lands. In 2022, 60,000 eggs were collected on public waters and 82,638 eggs were collected on private lands. In addition to eggs, a combined total of 4542 hatchings were collected from both public and private sources. Farms produced approximately 12,507 viable eggs from closed cycle production. In 2022, 92,971 eggs (all to the state of Georgia) and 19,884 hatchlings (6225 to Georgia, 8500 to Louisiana, 5159 to Texas) were transferred to farms in other states for raising. Additionally, 18,380 non-hatchling alligators were transferred to Louisiana farms. Florida farms produced 25,647 skins (avg. 35 cm belly width) for sale in 2022, which sold for a reported $6.50/cm ($41/ft) for 1st grade skins. The high frequency of eggs and live alligator exportations from Florida to other states reflects an ongoing shift of production from smaller farms to large corporate farms in those states over the past several years.

American crocodile (*Crocodylus acutus*)

The American crocodile was listed as Endangered under the Federal Endangered Species Act in 1975 but since 2007 has been federally designated as Threatened in the United States. This is because the population has experienced considerable rebounding growth as a result of the combined conservation efforts of the Florida Fish and Wildlife Conservation Commission, University of Florida, Florida Power & Light, US National Park Service, US Geological Survey, and US Fish and Wildlife Service, among others. American crocodile sightings have been documented as far north as Cocoa Beach in Brevard County on the east coast of Florida and Lake Tarpon in Pinellas County on the west coast. An increasing crocodile population (currently estimated between 1160 and 2800 non-hatchlings) paired with a commensurate increase of approximately 3 million people in the state over the last decade has led to a logical increase in human-crocodile interactions.

FWC manages these human-crocodile conflicts on a case-by-case basis, prioritizing human safety while also taking the needs of a recovering species into consideration. During 2023, FWC received ~280 calls regarding the American crocodile which consisted mainly of complaints and reported sightings. Most of the complaints were resolved by educating the public through telephone calls as well as site visits (see below for details). Occasionally, the capture of a crocodile is required for it to be relocated, translocated, or, in exceedingly rare cases, placed in captivity or euthanized. Of the ~280 calls that were received, only 9% (26 individuals) resulted in live captures and subsequent translocation or relocation. None of the crocodiles were placed into captivity. Captured animals ranged from 0.95 m to 3.4 m TL with the average individual measuring 2.3 m. Twelve crocodiles were captured and relocated to nearby sites (relocation), thereby removing the crocodile from immediate concern. Four individuals were captured and translocated farther from the capture sites and released in suitable habitat (translocation). Two individuals were caught and relocated on two separate occasions during the year, further supporting evidence that relocation/translocation is often a short-term solution to an immediate concern. Management staff assisted research staff with capturing additional crocodiles to outfit with GPS transmitters. All crocodile captures and handling events follow the guidance found in the *American Crocodile–Human Interaction Response Plan* (2020).

During 2023, staff recovered six American crocodile carcasses (3 males, 1 female, 2 undetermined sex). Their sizes ranged from 1 m to 3.5 m TL. Four of the six mortalities were caused by vehicle strikes. One individual was killed accidentally by an alligator hunter and the case is still under investigation. The final crocodile's cause of death was undetermined.

A digital dashboard for illustrating crocodile complaint locations was developed and serves as a helpful tool to internal and external partners. This dashboard, though not available to the public, helps facilitate the coordination of management goals between agencies as it pertains to both outreach and the recovery of the American crocodile.

Research Overview: In June 2023, staff published a study on crocodile translocations in the Journal of Wildlife Management (Brunell *et al*. 2023) that showed 6 out of 7 translocated crocodiles either returned (n= 4) or attempted to return (n= 2) to their original capture site. Three crocodiles translocated 45 km or less returned in under 2 weeks. One female crocodile was translocated 152 km away and was recaptured just 0.4 km from its original capture site over 2.5 years after its release. Because of concerns regarding crocodiles returning to areas of conflict, as well as health concerns for the crocodile (stress associated with capture and translocation), the study concluded that crocodile translocations have limited conservation value in Florida and may only be worth considering after all other reasonable options are exhausted. The full article is available through open access here and there is an interactive website about the study (here).

Staff concluded a social science study on residents living within the range of American crocodiles to ascertain their knowledge and interest about the species, and their opinions on management strategies. Findings showed a large awareness gap among residents living within crocodile range with 23% of respondents being unaware that there are both alligators and crocodiles in Florida. Most respondents want the crocodile population to stay the same (47%) or increase (36%), while 17% want the population to decrease. There was overall disapproval for euthanizing (88% unacceptable or highly unacceptable) or placing a crocodile in captivity (73% unacceptable or highly unacceptable) as a management action to resolve human-crocodile conflict. Most respondents agreed humans and crocodiles can safely co-exist (69%) while 11% disagreed. A manuscript on the study is currently being written to be submitted to a peer-reviewed journal in 2024.

A new tracking study on American crocodiles living in urbanized environments began in October 2022. To date, 12 GPS tags have been deployed on crocodiles (8 in Miami-Dade County, 2 in Broward County, 1 in Brevard County, 1 in Key Largo). Three tags remain to be deployed so that the total sample size will be 15 crocodiles. This study uses satellite/GPS telemetry to learn about the movements and behaviors of crocodiles in urbanized areas. Specifically, the study aims to understand how human activities affect crocodile movements, factors involved in crocodile road crossings, and habitats that are utilized by crocodiles in urban surroundings. Information gathered from this study will be used by state, federal, and local governments to improve crocodile management decisions by incorporating land management designs and practices that would promote the safe and sustainable coexistence of crocodiles and humans in South Florida.

Literature Cited: Brunell, A.M., Deem, V., Bankovich, B., Bled, F. and Mazzotti, F.J. (2023). Effects of translocation on American crocodile movements and habitat use in South Florida. The Journal of Wildlife Management e22427.

South Florida Crocodylian Research: Venetia Briggs-Gonzalez and Sergio Balaguera-Reina (CrocDocs at University of Florida)

The CrocDocs continue crocodylian research in South Florida on native American crocodiles and American alligators as indicator species providing performance measures of Everglades restoration, and on non-native Spectacled caimans as potential containment of an invasive species to South Florida.

As a target species, the health of American crocodiles is critical to assessing Everglades restoration impacts. Given the overall lack of knowledge of baseline conditions reflecting “normal” blood conditions in American crocodiles and how to link them with health assessments, the team analyzed 40 hematological and biochemical parameters and estimated reference intervals based on 436 clinically healthy wild American crocodiles caught between 2015 and 2021 in South Florida. Blood parameters of crocodiles were similar across the South Florida population, and they did not find major health impacts as a result of altered, anthropogenic habitats. They provide a reference range for blood analytes that can be used by others for future work. In terms of nesting, a total of 3452 nests have been recorded over the past 53 years. The first successful nest in southwest Florida was recorded in 2021, and in 2023 over 100 hatchlings were captured from this new nesting area highlighting the successful range expansion of the species. The team further investigated the internal nest environment of sediment nourished American crocodile nests where supplemented sand mounds provided successful nesting habitat and yielded hatchlings over a 2-year period. A thermal profile of the nests indicates that there is more to be understood of the nesting conditions that would provide optimal hatching success. However, the successful use of supplemental sand for nesting is useful information for managers working toward crocodile conservation, particularly in areas like South Florida, where nesting habitat is declining.

The CrocDocs have monitored American alligators in the Everglades system for more than 40 years and show that alligator performance measures are well below target conditions of Everglades restoration, however, consistent monitoring indicate that while alligators are not responding positively in abundance, body condition of alligators is improving in some areas. The team provides evidence between body condition and alligator health using hematological and biochemistry parameters from 120 individuals in areas across South Florida. They identified a subset of blood parameters that could be used to predict body condition of alligators in the Everglades and can be used as a measure by others. Everglades alligators in poorer body condition are likely dehydrated or have inadequate diet, and they found that the difference across areas were most likely attributed to prey availability/quality. Continued monitoring efforts provide the tools to assess responses to Everglades restoration on spatial and temporal scales.

The University of Florida has conducted a removal and monitoring program for Spectacled caiman (*Caiman crocodilus*) in South Florida with a focus on areas affected by Everglades restoration projects from 2012 to 2021. During this removal effort, 277 caimans were removed, and removal rates increased from 5/year to 47/year, however as the population became impacted by removal efforts, fewer caimans were observed. Reproductive data from necropsied individuals show successful breeding which further informed the team on removal efforts. To date, 304 caimans have been removed and new areas are being surveyed. The team also investigated the phylogenetic history of Spectacled caimans in Florida and how it relates to populations in the native range, and they found that the Florida population originates from two distinct molecular lineages from two different locations, one from trans-Andean Colombia (most likely Magdalena River *Caiman crocodilus fuscus*) and from the Upper Branco River in northern Brazil (*Caiman crocodilus crocodilus*). The findings provide evidence of multiple introduction events and raise concerns about genetic admixture in South Florida. CrocDocs continue to forge ahead with research on caimans and are currently using more genetic markers involving microsatellite markers to provide greater genetic resolution.

American alligator research at the University of North Florida (Jacksonville, FL): Adam Rosenblatt

The Rosenblatt Lab at UNF has been studying alligator ecology in human-dominated landscapes since 2018. We have surveyed the population that resides in the portion of the St. Johns River that courses through downtown Jacksonville every summer since 2018 and our initial findings were published in 2020 (Beal and Rosenblatt 2020). We have also surveyed the population that resides in stormwater retention ponds in Jacksonville for two years. Our results show that alligator distribution in Jacksonville is strongly limited by urban development both along the river and near ponds. Our plan is to continue surveying the St. Johns River population for 10 years to determine how the population is reacting to changes in river salinity.

We have also been studying how living on golf courses affects juvenile alligator diets (Rosenblatt *et al*. 2023). We conducted this work on Jekyll Island in Georgia and found that golf course alligators on the island eat a larger proportion of insects and fish than alligators on nearby islands that do not live on golf courses. We found instead that alligators living on less developed islands ate mostly crustaceans.

Lastly, we are finishing up a study on how alligator nesting patterns in Florida may have been affected by urban development between 2011 and 2021.

For more information please contact Adam Rosenblatt at adam.rosenblatt@unf.edu

Literature Cited: Beal, E. and Rosenblatt, A.E. (2020). Alligators in the big city: spatial ecology of American alligators (*Alligator mississippiensis*) at multiple scales across an urban landscape. Scientific Reports 10: 16575.
Rosenblatt, A., Greco, R., Beal, E., Colbert, J., Moore, Y., Baglin, V. and Nifong, J.C. (2023). Golf course living leads to a diet shift for American alligators. Ecology and Evolution 13: e10495.

Georgia: Kara Nitschke (Georgia Department of Natural Resources)

The Georgia Department of Natural Resources first estimated the total alligator population in 1973 at 29,954. By 1982, the population was estimated at 101,644. It is considered fully recovered with regards to population status and occupancy of traditional range. Alligators have been observed above the Fall Line (the area where the upland region and the coastal plain meet) in Georgia, but these sightings are considered the result of illegal relocations or escapes from alligator farms, except for the few alligators observed in close proximity to the Fall Line. Using 1984-2019 spotlight data, the best fit power curve trendline (r^2= 0.53) based on the 3-year average number of alligators seen per mile has increased 2.47 times since the 1982 population estimate of 101,000. This increase is assumed to be indicative of a similar increase in the population as a whole; therefore, Georgia's current alligator population estimate is 250,000. A second methodology that included habitat type, alligator density, detectability, and occupancy rates (from published literature in other states) generated a second population estimate of 240,000. The population is widely dispersed and density is variable based on both habitat quality and condition.

Georgia's alligator population is currently monitored through a spotlight index conducted across various wetland habitats below the Fall Line. To achieve a balance between a growing alligator population and the potential nuisance conflicts that can arise from an overabundant population, Georgia has set a range-wide population goal of five (5) alligators per mile as indexed through our current spotlight index. The population density goal of five was chosen because it approximates the 20-year (1990-2009) average number of alligators seen per mile during our annual spotlight counts across the state.

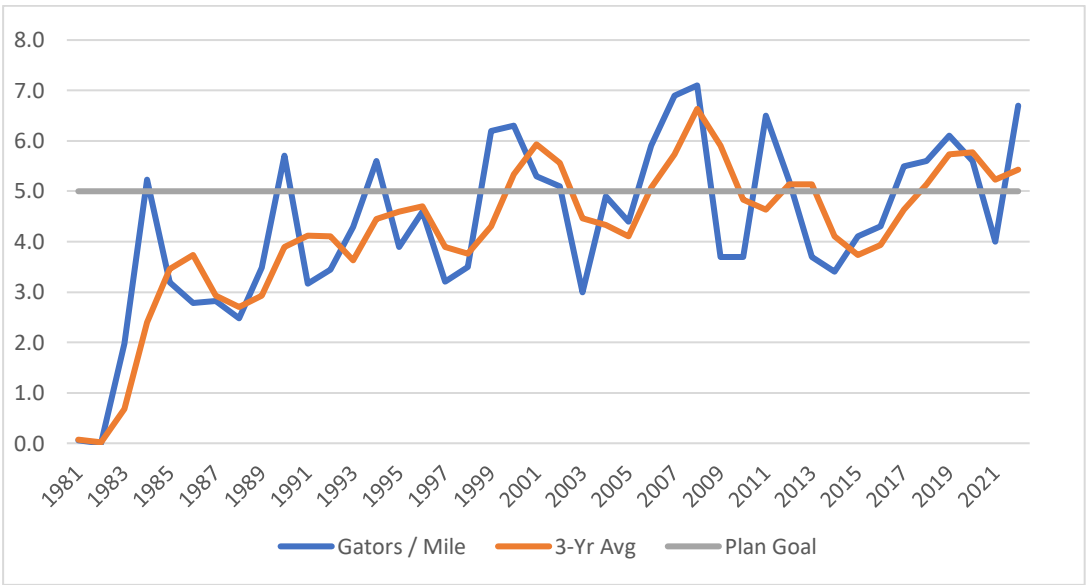


Figure 1: Georgia alligator population data, 1982-2022

Alligator nest surveys began on Rhetts Island in 1982 and have continued ever since (with a few exceptions). During the period 1982-2023, the number of nests occurring on this study area ranged from a low of 11 in 1982 to a high of 66 in 2002, with an average of 28 nests per year. Overall the trend in the number of nests appears to be stable from 1982 through 2023. However, surveys conducted post-2003 show an average of 25 nests per year and a non-significant declining trend. The number of nests will continue to be an important indicator of the alligator population status in the Altamaha River.

Plans for an alligator-hunting season in Georgia were developed in the late 1980s when regulations concerning nuisance alligators were adopted and the framework for an alligator hunting season was enacted. Public comment was supportive of the GADNR proposal to hunt alligators and the Board of Natural Resources adopted alligator hunting regulations in spring of 2003, and the season began in September of 2003. To prevent alligators from being over-harvested in any one or two areas within the state, alligator hunting zones have been established across the state. These zones are delineated where possible by watershed. Alligator harvest quotas were initially established for each zone based on nuisance alligator data, intuition about the density of alligators within each zone, and survey data. Quotas have changed since the beginning in 2003, as more counties have been included. Alligator harvest data between 2003 and 2022 are shown in Table 2.

Table 2. Overall alligator harvest in Georgia by year, 2003-2022.

Year	Avg. Length (cm)	Max Length (cm)	No. Harvested	Permits Issued
2003	97	144	72	184
2004	100	158	101	300
2005	98	162	161	500
2006	95	160	185	500
2007	100	160	192	550
2008	104	163	173	551
2009	103	161	193	700
2010	101	165	306	850
2011	102	160	219	850
2012	99	161	253	850
2013	98	167	247	850
2014	100	159	238	850
2015	102	169	326	1121
2016	101	162	248	1000
2017	104	161	194	1000
2018	103	162	278	1000
2019	104	169.75	326	1000
2020	102	164	372	1030
2021	98	150	391	1030
2022	99	142	390	1030
Totals	**100.5**	**169.75**	**4865**	**15,746**

GADNR began receiving alligator complaints in the early 1960s, but only since 1980 have personnel been required to file a detailed report on each complaint. Specific reasons for complaints vary. The most common complaint involves a concern for the safety of pets, livestock, or humans, followed by a general fear of having an alligator in an unusual place such as a swimming pool, yard, highway, parking lot, etc. Other categories of complaints, in order of importance, are as follows: 1) eating fish (eg catfish ponds), 2) an injured or dead alligator, and 3) unusually aggressive alligator. Through 2019, a total of 13,685 removal permits have been issued and 10,531 alligators not less than 4 ft have been caught since the nuisance alligator harvest program began in 1989.

The overall trend in nuisance alligator complaints and GADNR manhours per complaint is provided in Figure 2. Despite annual fluctuations, the number of complaints remained fairly stable until 2003, but have subsequently decreased with the exception of 2017-2019. This decline started at the same time alligator hunting began in 2003. As expected, most complaints occur where significant numbers of people reside in areas associated with good alligator habitat. More than 50% of the total statewide complaints through 1988 came from eight counties in the Coastal region. Chatham and Glynn Counties, home of the cities of Savannah and Brunswick, accounted for 61% of all complaints on the coast and almost a third of the statewide total.

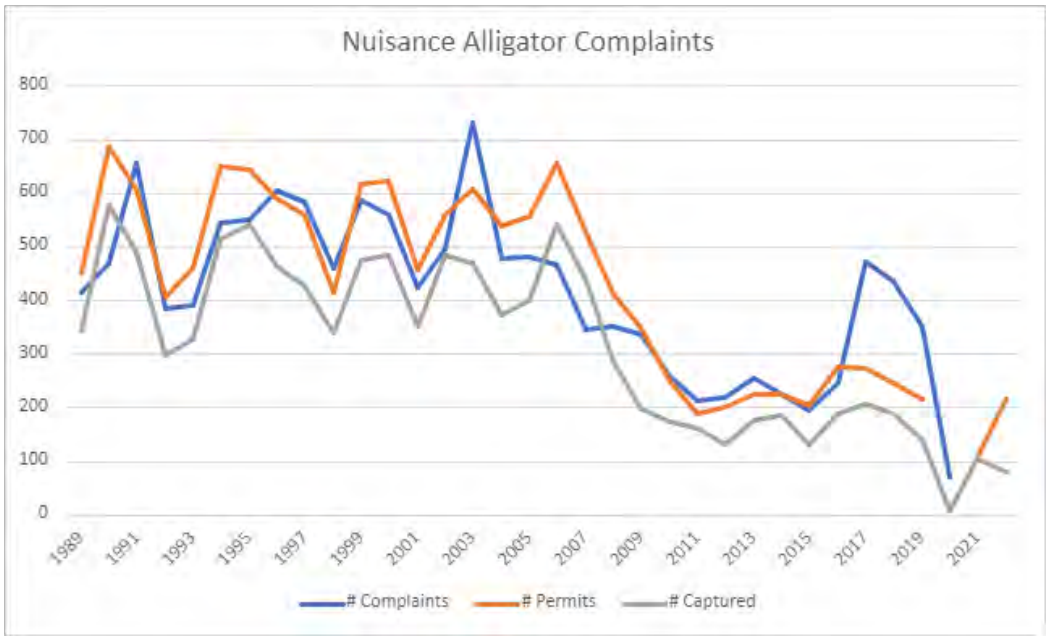


Figure 2: Nuisance alligator complaints by year

In 1989, a nuisance alligator program was initiated. Small alligators (<4 ft) that require removal are handled in one of two ways: GADNR personnel (if available) capture and remove the alligator at no charge to the landowner, or 2) the landowner can hire a licensed nuisance wildlife control operator or alligator agent-trapper to capture and remove the alligator at the expense of the landowner. These alligators are relocated to areas of suitable habitat. Larger alligators (>4 ft) that require removal are assigned to an alligator agent-trapper and are removed at no expense to the landowner. Captured alligators larger than 4 ft may be sold alive or may be slaughtered for the sale of alligator products. An extensive system of permits, meat seals, hide tags, and complaint forms are used to monitor the system. As indicated by the noticeable decline in manhours per complaint, the use of agent trappers has been very successful in improving GADNR efficiencies in handling nuisance alligator complaints.

The number of collection permits issued often exceeds the number of alligator complaints because complaints may involve multiple alligators at a site. Collection permits issued (686) and number of alligators captured (578) peaked in 1990, the second year of the program. Since 2010, the average number of permits issued each year has fallen to 232 and the average number of alligators captured each year has dropped to 172, much lower than the 1990s averages. Since 1989, nuisance trappers have averaged greater than a 75% capture rate of alligators caught per permit issued.

Alligator farms in Georgia are regulated through a permit process administered through GADNR. Some alligator farms purchase nuisance alligators that have been captured by alligator agent trappers. Egg and hatchling harvest are not currently available in Georgia. In 2022, a total of 75,577 farmed alligator hides were tagged for export, most of the stock being imported as eggs from Florida (see Florida report). To meet the statutory mandate of using the best science available to manage Georgia's wildlife resources, GADNR must acquire more scientific data before implementing such strategies.

Louisiana: Ruth M. Elsey and Jeb Linscombe (Louisiana Dept. of Wildlife and Fisheries)

In 2022, for the first time in over a decade, coastal Louisiana experienced drought conditions that lead to sub-optimal nesting conditions in some areas. Drought conditions continued into the spring and summer of 2023. Alligator egg harvests were still relatively high with 470,417 and 453,784 eggs collected in 2022 and 2023, respectively. Table 3 shows the quantities of estimated coastal nests, ranched eggs, year-end farm inventory, farm hides shipped, farm alligators released to the wild, and alligators harvested in the annual autumn season.

Table 3. Estimated coastal nests counts, ranched eggs, year-end farm inventory, farm hides shipped, farm alligators released to the wild, and alligators harvested in the annual autumn season in Louisiana.

Year	Coastal nest count	Ranched eggs	Year-end farm inventory	Farm hides shipped	Farm releases to the wild	Wild alligators harvested
2018	53,733	587,776	900,999	450,220	52,750	20,168
2019	67,935	650,878	998,152	438,577	38,543	23,828
2020	60,794	303,883	788,224	387,320	55,366	14,888
2021	64,345	462,537	701,581	338,942	35,803	14,348
2022	47,529	473,417	713,897	309,984	19,255	23,000
2023	50,699	453,784	Pending	335,736	19,255	Pending

In January 2022, there were 52 licensed farmers in Louisiana with farm inventories totaling 713,897 alligators, reflecting strong nesting and high egg ranching efforts for several years in a row. During the 2022 tag year (January - December

2022), an estimated 309,984 farm-raised alligators were harvested, with hides averaging 28.56 cm belly width. The total estimated value of these alligator hides was $US57.5 million and meat was valued at over $US6 million. In 2023, 50,699 nests were estimated on the coast-wide survey and farmers collected 453,784 eggs.

Wild alligators have been harvested in Louisiana for over 50 years (since 1972) as part of a sustained use management program. The majority of licenses are commercial licenses, although some recreational "sport" hunting licenses are also issued. In 2022, approximately 23,000 wild alligators were harvested by 3428 trappers. Harvested alligators averaged 7.73 ft TL, with an estimated value of $US5.48 million for hides and meat. Low demand for wild hides led to a reduced harvest of wild alligators in 2020-2021 (Table 3). The final 2023 harvest and shipping numbers are currently being tallied, but the 2022 figures reflect that wild alligator harvest has recovered. Although meat markets have recently created an increased demand for wild alligator harvests, low market value for wild alligator hides continues to be the number one concern for the alligator industry and management in Louisiana.

Due to recent low prices for wild alligator hides, we occasionally had trouble maintaining interest and participation of "nuisance" alligator trappers to remove problem alligators that are a safety concern. Previously, the sale of hides and meat was a mechanism of payment for the trapper's time and effort to provide this service. The LDWF established a program fund to pay a $U75 incentive payment for each nuisance alligator complaint handled by licensed nuisance alligator trappers to ensure this service is maintained for the state's citizens. In 2021, the incentive fees paid to nuisance trappers amounted to $US104,325 (1391 situations handled at $US75/situation). In April 2022, LDWF increased the nuisance hunter incentive payment from $US75 to $US100 due to gas prices and inflation in general. In 2022, the total payout was $US134,400. The payment program continues to work extremely well.

In 2011, the Department of Wildlife and Fisheries and the LSU School of Veterinary Medicine in conjunction with the Louisiana Alligator Farmers and Ranchers Association developed a document entitled "Best Management Practices for Louisiana Alligator Farming". The document details recommended practices to ensure animal welfare of captive reared alligators in Louisiana, including egg collection, hatching, rearing, release to the wild and slaughter methods. This document was again updated in January 2016 and distributed to all farmers and has been useful to educate persons interested in alligator farming or exhibiting alligators. Another updated version with changes in temperature regimes and slaughter methods, was distributed in 2023.

In October 2017, the LDWF organized an alligator session at the 71st annual conference of the Southeastern Association of Fish and Wildlife Agencies (SEAFWA) held in Louisville, Kentucky to discuss issues relevant to all management programs. The session was well attended by representatives from most southeastern states. Topics discussed included movement of live alligators between states, nuisance alligator programs, issues with marketing and hide prices, and enforcement of various aspects of these programs. Subsequently, a formal "Alligator Working Group" was established within SEAFWA and the group corresponds regularly, and meets once or twice a year to discuss common problems and solutions. In 2023, the working group met twice and has maintained exemplary representation by all range states. The AWG is currently working on several issues including the creation of "GatorWise", a comprehensive website in which all range states are represented in an effort to give the public a more uniform and cohesive understanding of alligators and how to deal with nuisance issues.

Since 1 January 2019, the LDWF began requiring veterinary certificates of health be obtained prior to our issuing export or import permits for live alligator shipments to/from licensed farmers in other states. Compliance with this new requirement has been good.

Disease monitoring for emerging infectious diseases such as *Chlamydia* and *Mycoplasma* has been conducted and amplified in 2023 and will continue in 2024. All cohorts of imported alligators are tested for both *Chlamydia* and *Mycoplasma*. Through a federally appropriated grant, Louisiana will be testing 3000 farm alligators for *Chlamydia* to better understand distribution as well as continue efforts to identify the specific strain of *Chlamydia* associated with alligators.

For the tag years 2020 and 2021, the CITES hide shipping fee was temporarily decreased from $4 per hide to $3 per hide. This fee returned to $4 per hide for 2022-year tags. The $0.25 severance tax was discontinued for all tag years in November 2021. In addition, the required percentage of alligators to be released to the wild was decreased from 10% of the quantity of eggs hatched to 5%, starting with the 2021-year egg collection permits. For 2023-year tags, the hide shipping fee was again reduced to $3, but has returned to $4 for 2024 year tags.

In March of 2023, California ruled: Under the Supremacy Clause of the United State Constitution, California Penal Code Sections 653o and 653r are hereby declared unenforceable and unconstitutional as applied to the importation, possession or sale of American alligator bodies, parts, or products thereof, and of the bodies, parts or products of saltwater crocodiles and Nile crocodiles subject to 50 C.F.R. s. 17.42. In short, this means that 653o and 653r will be permanently enjoined and it will remain legal to sell and trade alligator products in the state of California. In August of 2023, we were notified that California did NOT file an appeal and the judge's ruling was final. This was a huge win for crocodilian management globally.

The Louisiana Department of Wildlife and Fisheries has an active research program in addition to management and administration of our wild harvest, nuisance alligator control program, and commercial farming oversight. Our staff

publishes numerous abstracts and full papers annually; many in collaboration with university researchers and graduate students on a variety of topics related to alligators (physiology, ecology, food habits, nesting, etc.).

South Carolina: Morgan Hart (South Carolina Dept. of Natural Resources)

Alligator populations in South Carolina appear to be stable. Removal numbers have not changed much since the legal harvest started, and population surveys are ongoing. All harvest is recreational, and export of hides remains a small portion of hide disposition (Table 4).

Table 4. Wild alligator harvests on Public and Private Lands as well as nuisance alligator removals, in South Carolina between 2008 and 2023.

Year	Public	Private	Nuisance
2008	362	249	
2009	452	224	
2010	473	228	382
2011	472	219	426
2012	483	296	370
2013	452	377	467
2014	325	350	355
2015	333	228	294
2016	396	375	251
2017	352	374	327
2018	333	372	319
2019	336	389	336
2020	253	403	322
2021	311	450	361
2022	321	404	350
2023	Still reporting	Still reporting	Still reporting

Public Lands Hunt: The public hunting season consists of 4 hunt units in the coastal plain of South Carolina with 1,000 harvest tags available (250 in each hunt unit). In 2014, harvest tags were reduced from 1200 (300 per hunt unit) to 1000 (250 per hunt unit). Hunters are chosen in a computerized lottery drawing with a preference system to ensure all hunters that continue to apply annually will eventually be chosen. The public hunt season runs from the second Saturday in September until the second Saturday in October.

In late 2018, hunting was disallowed on the two SC Department of Natural Resources' Wildlife Management Area (WMA) properties. Prior to 2018, those properties had limited alligator hunting and were included as a separate computerized drawing with a maximum of 32 alligators taken per year.

Private Lands Hunt: In the Private Lands Program, landowners with significant amounts of alligator habitat can apply for harvest tags that are issued for use only on their specific property. Private Lands tags cannot be used on public waters. The Private Lands season runs from 1 September from one year to 31 May the following year.

Nuisance Program: The nuisance alligator program allows permitting of individuals for removal of a specific animal on their property that poses a threat to people.

*Other***:** Alligator propagation (farming) legislation was passed in 2014 and subsequent regulations were promulgated in 2015. To date, we still have not received any applications for a permit.

Annual nightlight surveys are conducted in statewide alligator habitat. Ongoing mark recapture efforts along with satellite tagging adult alligators is providing population and movement information. Clemson University also has multiple long term research studies on state properties.

Alligator Research in South Carolina: Thomas Rainwater

- Range wide survey of American alligator diet and exposure to microplastics, PFAS, and mercury (Miriam Boucher, Clemson University)
- Influence of human disturbance on frequency of raccoon predation of American alligator nests (Clarissa Tuten, Coastal Carolina University)
- Effects of natural incubation temperature on American alligator hatchling size, growth, and survival (Chris Smaga, University of Georgia)
- Nest attendance of American alligators in coastal South Carolina (Yawkey Wildlife Center)
- Faunal associates of American alligator nests in coastal South Carolina (Yawkey Wildlife Center)
- Impact of human disturbance on American alligator behaviour in human-dominated landscapes (Anje Kidd-Weaver, Clemson University)

- Size- and age-related fertility, nesting frequency, and nest site fidelity of adult female American Alligators in coastal South Carolina (Phil Wilkinson, Yawkey Wildlife Center)
- Linking American alligator nutritional subsidies, food webs, and ecosystem functions in coastal South Carolina (Clemson University STRIVE Lab)

Texas: Jonathan Warner (Texas Parks and Wildlife Department)

The following information was compiled by the TPWD Alligator Program from Department-mandated alligator hunting, farming, and nuisance control reports:

Number of Skins: Texas currently has two commercial alligator farms that produce hides for export. For 2022, Texas farms produced 15,820 hides. In 2023 (year-to-date), Texas farms produced 11,790 hides:

CITES Tag Sequence	**2022 Farmed Hides**
22000001-22002820	2820
22003001-22004400	1400
22005001-22007650	2650
22008001-22010000	2000
22015001-22017550	2550
22018001-22020000	2000
22027001-22029400	2400
	15,820

CITES Tag Sequence	**2023 Farmed Hides***
23000001-23000007	7
23001001-23001520	520
23001581-23002020	440
23002032-23002060	29
23002061-23002260	200
23002281-23002520	240
23002541-23003014	474
23003020-23003440	421
23003461-23003858	398
23003895-23004249	355
23004251-23004336	86
23004337-23004420	84
23041001-23041438	438
23041440-23041717	278
23041718-23042000	283
23040001-23040017	17
23040019-23040718	700
23040719-23041000	282
23042001-23042700	700
23042721-23043271	551
23000121-23000470	350
23005001-23006000	1000
23007001-23008000	1000
23008001-23009000	1000
23017001-23018938	1937
	11,790 (YTD)

* Please note that up to 2000 additional farmed hides are still anticipated in December 2023.

TPWD currently provides two alligator hunting seasons for its constituents; a "non-core county" spring hunt (1 April-30 June) in counties falling outside the major distribution and primary habitat of the species, and a traditional autumn "core county" season (10-30 September) in 22 southeastern counties that harbor high alligator densities in coastal marshes, rivers, and inland lakes. Texas hunters harvested 2122 wild alligators for the 2022 season (spring= 170, fall= 1952). An additional 139 nuisance alligators were harvested or relocated to permitted facilities in 2022 under the TPWD Nuisance Alligator Control Program. Texas hunters harvested 2253 wild alligators for the 2023 season (spring= 244, fall= 2009). An additional 202 nuisance alligators were harvested or relocated to permitted facilities in 2023 under the TPWD Nuisance Alligator Control Program.

Assessment of Alligator Population Status: Standardized annual aerial nest surveys and night-count data (spotlight surveys) indicate stable or increasing populations across Texas, especially in coastal marsh habitats along the upper and middle Gulf Coast, and parts of East Texas. Texas has many artificial reservoirs, and some of these larger impoundments

continue to see increases in their respective alligator populations to the extent that targeted and/or proactive nuisance control is merited in the interest of public safety.

Wild Alligators: Statewide alligator harvest recommendations are derived using aerial nest counts, spotlight surveys and harvest trends. Approximately 65% of wild harvest alligator CITES tags are issued based on aerial nest survey data, with the remaining 35% based on spotlight data and harvest trends. With overall increasing alligator numbers and shifting demands on the resource (eg trophy and meat hunting favored over traditional commercial hunting for wild skins), TPWD is currently in transition to a more user-friendly online alligator permitting system. Additionally, as Texas urban areas (primarily Houston, but also San Antonio, Dallas-Fort Worth and Austin) continue to expand into alligator habitats and perceived "nuisance" complaints from the public increase, there is a continuing need for TPWD to provide high-quality alligator educational content to the public across multiple platforms. The Alligator Program is currently working with TPWD Communications on various outreach products; a major goal for 2024 is to run an alligator awareness/safety campaign on digital billboards along Interstate 10 in the heart of Houston, the fourth most populous city in the US. Discussions also continue with the SEAFWA Alligator Working Group about building a centralized website for alligator information in North America, similar to the BearWise program.

TPWD trains and licenses qualified individuals to respond to nuisance alligator complaints. All public nuisance alligator complaints are directed through TPWD Law Enforcement Dispatch, where a complaint number is generated, and the caller is provided contact information for permitted alligator trappers in their area. As evidenced by survey data, lower hunter demand, feedback from landowners, nuisance trappers and the public, and relatively low overall wild harvest numbers, the Texas wild alligator population is currently healthy and appears sustainably managed given the stability of the commercial egg collection and farming industries over the past decade.

Egg collection: Texas permits wild alligator egg collection and incubation, and the subsequent sale of hatchlings to alligator farming operations. Alligator nest stamps are issued only for privately owned lands. After airboat and/or helicopter surveys, egg collectors must provide TPWD with detailed geospatial nest distribution data to obtain nest stamps. With few exceptions, egg collectors are allowed to harvest 50% of the nests on a given property. To ensure sustainability, TPWD staff fly annual nest surveys along predetermined transects in primary habitat and conduct selected "spot check" surveys with Law Enforcement on properties where eggs have been collected. Under the current model, Texas does not require a subset of farmed alligators originating from wild eggs to be returned to the wild. Environmental and habitat conditions were optimal in late spring leading into nesting season for both 2022 and 2023, but prolonged summer droughts across much of the alligator range in Texas likely affected the wild hatch rates in coastal areas that completely dried up.

Changes in Laws and Regulations: There were no regulatory changes for alligators in either the Parks and Wildlife Code or Texas Administrative Code in 2022-2023. In March 2024, staff hope to present a proposal to the TPW Commission seeking adoption of an extended September alligator hunting season, with opening day falling on 1 September instead of 10 September.

Other information:
Existing laws and regulations regarding alligators and the alligator industry in Texas can be found here.
The alligator section of the TPWD website can be found here.
The Texas Parks and Wildlife Outdoor Annual can be found here.

Prepared by: Allan Woodward and Ruth Elsey
Date prepared: 31 January 2024

Agenda Item: SC. 3.1.

Crocodile Specialist Group Steering Committee Meeting

Double Tree Hilton, Darwin, Australia

(15 April 2024)

Industry Report

The interdependence of conservation, sustainable practices, livelihoods, and the crocodilian industry is significant, with conservation efforts being intricately linked to industry demands. The market for crocodilian skins and meat plays a crucial role, as it generates the majority of the funding and revenue necessary for governments to sustain successful wildlife management programs for these species. The CSG and its members are central to this dynamic, playing a pivotal role in harmonizing conservation efforts with industry needs. This relationship is unique within the IUCN Species Specialist Groups, as the CSG is distinctive in having industry members as part of its composition. Such an arrangement underscores the symbiotic relationship between conservation and industry, where the collapse of either would adversely affect the other. Maintaining the industry is not just about profits; it's a complex, specialized task integral to the conservation of crocodilians, requiring substantial investment and dedicated research, as recognized by the CSG, SSC and IUCN.

Market Overview:
The market for crocodilian products, including skins, meat, and various byproducts, has experienced dynamic shifts over the years. Driven by a mix of fashion trends, conservation efforts, and changing consumer preferences, this market is as complex as it is fluctuating.

Crocodilian Skins: A Luxury Staple
Crocodilian skins have long been a symbol of luxury and exclusivity in the fashion industry. Used in high-end leather goods like handbags, belts, and shoes, the demand for these skins is primarily driven by luxury brands in Europe and North America. However, recent trends show a growing market in Asia, particularly in China and Singapore. The rarity and unique pattern of branded crocodilian luxury products command high prices, making it a highly profitable segment.

Despite the profit margins, the crocodilian skin industry faces challenges. Ethical concerns and the rise of sustainable and synthetic alternatives could impact future demand. However, industry stakeholders are increasingly adopting sustainable and ethical practices, working closely with conservation groups to ensure a balance between luxury and environmental responsibility.

Crocodilian Meat: An Expanding Market
Traditionally overshadowed by the skin market, crocodilian meat is gaining popularity. Once considered a byproduct, it is now recognized for its lean, high-protein quality, finding a place in exotic meat markets around the world. The USA and some parts of Europe have seen a steady increase in demand for crocodilian meat, often marketed as a gourmet product. This segment faces its own set of challenges, including public perception and stringent food safety regulations. However, with growing interest in exotic meats and a shift towards more adventurous eating habits, the potential for growth in this market is significant.

Byproducts: Untapped Potential
Crocodilian byproducts include oils, bones, and other parts used in various industries. For instance, crocodile oil is known for its medicinal properties and is used in cosmetics and pharmaceuticals. These byproducts represent an untapped market with considerable growth potential. As sustainability becomes more important, utilizing every part of the animal reduces waste and adds value to the industry.

Industry Outlook and Challenges
The future of the crocodilian product market is promising but not without challenges. Key among these is the need for sustainable and ethical practices. Collaboration between industry stakeholders, conservationists, and governments is crucial to ensure the industry's longevity. The CSG plays a vital role in this, promoting sustainable use and conservation of crocodilians.

The market for crocodilian skins, meat, and byproducts is poised for growth, driven by a combination of luxury demand, culinary trends, and the potential of untapped byproducts. However, the industry’s success hinges on its ability to adapt

to ethical and sustainable practices, ensuring that this ancient species continues to thrive both in the wild and in the marketplace.

Strategies to Rejuvenate Declining Market:
Enhance Sustainable Practices: Implement and promote sustainable farming and harvesting methods to ensure long-term species viability.

Boost Conservation Efforts: Collaborate closely with conservation groups, like the IUCN Crocodile Specialist Group, to support wildlife management programs that benefit crocodilian populations.

Promote Ethical Sourcing: Develop and adhere to stringent ethical sourcing guidelines to appeal to environmentally conscious consumers.

Expand Market Reach: Explore new markets and diversify products, particularly in regions where crocodilian products have not been traditionally popular.

Educate Consumers: Increase awareness about the benefits of crocodilian products, focusing on the unique qualities of crocodilian leather and the nutritional value of the meat.

Innovate in Product Development: Create new and innovative products, especially in the fashion industry, to revitalize interest in crocodilian skins.

Leverage Technology: Use technology to improve farming techniques, product tracking, and traceability, ensuring quality and transparency in the supply chain.

Enhance Marketing Strategies: Adopt modern marketing strategies, including digital marketing, to reach a broader and more diverse audience.

Build Partnerships with Luxury Brands: Strengthen relationships with luxury brands to maintain the high-end appeal of crocodilian leather products.

Adopt Regulatory Compliance: Ensure compliance with international regulations and standards to maintain market access and consumer trust.

Research and Development: Invest in R&D to discover new uses for byproducts, improving overall profitability and sustainability.

Respond to Consumer Trends: Stay attuned to changing consumer preferences, such as the increasing demand for sustainable and ethical luxury products.

By implementing these strategies, the crocodilian product industry can address current challenges and position itself for recovery and growth in the global market.

Overview:
The “World Trade in Crocodilian Skins 2019-2021” report provides crucial insights into the global trade dynamics of crocodilian skins. It highlights a significant reduction in the export of all crocodilian skins during the period from 2018 to 2021. Specifically, there has been an overall decrease of 26.5% in the exports of these skins. This decline is indicative of changing market conditions, possibly influenced by external factors like economic shifts and the impact of the COVID-19 pandemic, which severely disrupted global trade and supply chains.

Breaking down this overall trend, the report details a 25.7% reduction in exports of classic crocodilians, which include various species of crocodiles and alligators. Similarly, the trade in caiman skins, which represents a substantial part of the crocodilian skin market, experienced a 26.3% decrease in exports during the same period. These figures demonstrate a consistent downward trend across different categories of crocodilian skins, reflecting a notable shift in the industry. This reduction could be attributed to a range of factors:

Impact of the COVID-19 Pandemic: The pandemic has had a profound impact on global trade, affecting supply chains, consumer demand, and international transportation. The lockdowns and economic slowdown during this period likely contributed significantly to the reduction in the trade of crocodilian skins.

Changing Market Demands: Consumer preferences and fashion trends are dynamic and can shift rapidly, potentially leading to reduced demand for crocodilian skins in the fashion and luxury goods market.

Increased Conservation and Regulatory Efforts: Stricter enforcement of international regulations, such as those imposed by CITES, and heightened awareness of wildlife conservation issues might have led to a decrease in the trade. These efforts often aim to ensure sustainability and prevent over-exploitation of species.

Economic Factors: Global economic conditions, independent of the pandemic, can also influence the trade in luxury goods, including crocodilian skins. Economic downturns in key markets could result in reduced demand.

Alternatives to Crocodilian Skins: The development and increasing popularity of synthetic alternatives or other materials may also play a role in decreasing the demand for genuine crocodilian skins.

Trade Data from International Alligator and Crocodile Trade Studies (IACTS)

Table 2. Direct, commercial global exports of skins from the main taxa, 2012-2021.

Taxon	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Alligator mississippiensis	326,538	481,304	485,884	428,521	553,371	463,466	596,258	507,496	*437,364	*393,055
Crocodylus acutus	2,318	1,905	2,262	3,353	3,233	5,040	5,295	8,182	2,291	1,697
Crocodylus moreletii	679	1,300	2,031	1,291	1,640	3,000	4,338	421	170	0
Crocodylus niloticus	205,489	275,288	282,859	278,094	317,121	250,150	230,312	260,821	155,213	243,174
Crocodylus novaeguineae	23,461	26,046	24,982	39,070	14,022	7,649	8,790	8,023	2,192	2,445
Crocodylus porosus	72,382	57,701	67,979	69,470	102,768	72,173	75,774	67,510	40,724	51,950
Crocodylus siamensis	35,450	55,776	48,557	58,558	33,349	35,407	55,825	19,761	48,607	32,857
Subtotal of 'classic' skins	**666,317**	**899,320**	**914,554**	**878,357**	**1,025,504**	**836,885**	**976,592**	**872,214**	**686,561**	**725,178**
Caiman crocodilus crocodilus	47,130	45,485	35,196	30,594	22,328	41,402	41,071	17,251	6,732	*3,788
Caiman crocodilus fuscus	625,128	857,115	738,401	530,357	368,515	315,338	370,807	365,957	244,569	316,230
Caiman latirostris	5,755	5,602	8,893	8,610	5,525	3,652	2,811	3,909	10,356	2
Caiman yacare	111,078	115,283	94,456	128,203	52,709	65,243	31,953	43,956	13,509	1,167
Melanosuchus niger	275	51	290	584	0	0	1,044	0	0	0
Subtotal of caiman skins	**789,366**	**1,023,536**	**877,236**	**698,348**	**449,077**	**425,635**	**447,686**	**431,073**	**275,166**	**321,187**
Grand total	**1,455,683**	**1,922,856**	**1,791,790**	**1,576,705**	**1,474,581**	**1,262,520**	**1,424,278**	**1,303,287**	**961,727**	**1,046,365**

Source: International Alligator and Crocodile Trade Studies (IACTS) are conducted by the World Conservation Monitoring Centre (WCMC) funded by the Louisiana Department of Wildlife and the Louisiana Alligator Advisory Council

Collaborative Efforts in Crocodilian Conservation: International Crocodilian Farmers Association and the IUCN Crocodile Specialist Group

The International Crocodilian Farmers Association (ICFA) stands as a pivotal organization in the global effort to balance the conservation and sustainable utilization of crocodilian species. Operating in tandem with entities like the CSG, the ICFA plays a crucial role in marrying commercial interests with conservation goals.

The ICFA, comprised of crocodilian farmers, industry experts, and conservationists, focuses on promoting sustainable and ethical practices within the crocodilian industry. Its mission involves ensuring the long-term viability of crocodilian populations through responsible farming and harvesting methods. The ICFA also plays a significant role in public education, debunking myths about crocodilians and highlighting their ecological importance.

The alliance between the ICFA and the CSG is a testament to their shared vision for crocodilian conservation. Their collaboration encompasses several vital initiatives:

Joint Research Initiatives: Pooling resources and expertise, these organizations engage in comprehensive research, crucial for informed conservation strategies.

Knowledge Sharing and Best Practices: This partnership facilitates the exchange of scientific knowledge and insights into market trends, enhancing conservation and industry practices.

Unified Conservation Efforts: Together, they advocate and implement conservation measures, including habitat preservation and anti-poaching campaigns.

Setting Industry Standards: The collaboration aims to establish rigorous standards for ethical and sustainable crocodilian harvesting, ensuring industry regulations align with conservation goals.

Educational Campaigns: Joint efforts in public awareness campaigns educate on the importance of crocodilian conservation and sustainable use.

Policy Advocacy: Their combined influence is stronger in shaping policies at various levels, promoting regulations that support conservation and sustainable industry practices.

The ICFA and the CSG are united in their objectives of conserving crocodilian species and advocating for ethical harvest practices. This collaboration ensures that the commercial utilization of crocodilians does not compromise their survival in the wild. Instead, it contributes to their conservation, exemplifying a model where economic and ecological interests are harmoniously balanced.

The partnership between the ICFA and the CSG represents a forward-thinking approach to wildlife management. It illustrates how conservation and industry can collaborate effectively, ensuring the sustainable coexistence of human activities and crocodilian populations. Through their combined efforts, these organizations set a standard for responsible wildlife management, benefiting both the natural world and human communities.

Crocodilian Bans/ Trade Disruptions:

Government Ban - California (USA)

In a landmark decision by Federal Judge Kimberly Mueller in California's Eastern District Federal Court in Sacramento, the ban on alligator and crocodile products, initially enacted in January 2020, was overturned in July 2023. This reversal marked a significant victory for the alligator and crocodile industry and was a culmination of efforts by key legal and conservation figures.

The case was buoyed by a strong plaintiff group representing nearly all facets of the alligator and crocodile industry's supply chain, including farmers meat processors, product manufacturers, and commercial retailers Bret Sparks, an attorney and a member of the CSG, played a pivotal role in advocating for the sustainable use of these species. His expertise and deep understanding of both the legal and environmental aspects of crocodilian conservation were instrumental in presenting the case.

Adding significant weight to the legal challenge was Jeff Landry, the former Attorney General of Louisiana and now Governor of the State of Louisiana. His involvement underscored the importance of the case not just for California but for states like Louisiana, where alligator farming and harvesting are integral to the economy and conservation efforts.

Highlights of the Ruling:
Conservation and Sustainable Use: The ruling by Judge Mueller brought to light the success stories in conservation achieved through sustainable use. It acknowledged the role of regulated farming and hunting in recovering alligator populations, particularly in states like Louisiana and Florida. This sustainable approach effectively balances ecological conservation with economic viability.

Economic and Social Considerations: The economic impact of the ban, which had been set to take effect in January 2020, was a significant aspect of the case. The industry, represented by Bret Sparks and supported by Governor Jeff Landry, emphasized the livelihoods dependent on this trade and the broader economic ramifications.

Scientific and Regulatory Frameworks: The legal team highlighted the scientific basis for sustainable harvesting practices and the industry's adherence to international standards, notably CITES. The argument was that these practices ensure the trade does not threaten the survival of these species.

Legal and International Compliance: The decision by Judge Mueller also focused on the alignment of state laws with international regulations, underscoring the importance of adhering to established global conservation frameworks.

Moving Forward:
With the overturning of the California ban, there is renewed optimism in the alligator and crocodile industry and among conservationists who advocate for sustainable use. The successful legal challenge, led by skilled attorneys like Bret Sparks and supported by influential figures like Governor Jeff Landry, is seen as a testament to the efficacy of a balanced approach to wildlife management. This approach combines economic development with the preservation of species, setting a precedent for future conservation and industry practices.

CITES Trade Suspension on Mexico: Extended Impacts and Background

In a significant development for international wildlife conservation, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) imposed a trade suspension on Mexico in March 2023. This measure, primarily aimed at addressing non-compliance issues, notably with respect to the Totoaba (*Totoaba macdonaldi*), was lifted swiftly in April 2023 following Mexico's rapid response and collaboration with CITES. This episode is a prime example of how CITES employs trade suspensions effectively to enforce compliance and foster conservation efforts.

The trade suspension imposed by CITES on Mexico, which lasted from March to April 2023, was a significant event with extensive implications, particularly affecting the alligator and crocodile industry and the western cowboy boot sector. This suspension, though brief, served as a critical reminder of the interconnectedness and fragility of international wildlife trade.

The trade suspension, initiated in March 2023, was in effect for approximately one month. During this period, all commercial trade in specimens of CITES-listed species with Mexico was halted. This swift resolution was due to the proactive and cooperative response of the Mexican Government, but even within this short timeframe, the ripple effects were felt strongly across various industries reliant on wildlife products.

The primary reason for the trade suspension was Mexico's non-compliance with CITES regulations, specifically concerning the Totoaba, a critically endangered species. The Totoaba has been a target for illegal fishing due to the high demand for its swim bladder in international markets, especially in Asia for traditional medicine. This illegal trade has not only threatened the survival of the Totoaba but also had collateral impacts on other marine species, including the critically endangered vaquita, a small porpoise.

CITES, recognizing the severity of the situation and Mexico's failure to submit an adequate compliance action plan by the stipulated deadline, opted for a trade suspension. This measure was aimed at compelling Mexico to enhance its regulatory and enforcement mechanisms to protect the Totoaba and comply with international conservation standards.

The response from Mexico was both swift and commendable. Mexican authorities, recognizing the gravity of the situation and the potential impact on both biodiversity and the economy, acted quickly to address the issues raised by CITES. Their actions included strengthening regulatory frameworks, enhancing monitoring and enforcement mechanisms, and improving the management of species under threat.

What stands out in this episode is the exemplary collaboration between CITES and the Mexican Government. CITES worked closely with Mexican officials to identify shortcomings and to develop a roadmap for compliance. This collaborative approach not only expedited the process of lifting the embargo but also strengthened the relationship between the international body and the Mexican Government, setting a precedent for future cooperation.

The trade suspension, although targeted at addressing issues related to a specific species, had broader implications for other wildlife trades, including the alligator and crocodile industry. Particularly impacted was the western cowboy boot industry, which relies on the import of exotic leathers. The suspension halted the import of alligator and crocodile leather products into the USA, leading to shortages and economic strain.

This incident highlighted how non-compliance in one area of CITES regulations can have a domino effect, impacting various industries and livelihoods that are seemingly unrelated. The suspension underscored the need for industries involved in wildlife trade to not only ensure their compliance with CITES regulations but also to be aware of and support broader conservation efforts.

The CITES trade suspension on Mexico, though lasting only a month, had significant and immediate effects on multiple industries, demonstrating the delicate balance that exists in the global wildlife trade. It reinforces the importance of adherence to international conservation agreements and the need for collaborative efforts to ensure sustainable trade practices. For industries like those involved in the production of alligator and crocodile products, this episode served as a crucial reminder of the need for constant vigilance and participation in global conservation efforts.

CITES and United Nations Celebrate Crocodilian Conservation, Spotlighting Louisiana's Pioneering Role

On 3 March 2023, a significant event unfolded in Washington DC at the National Geographic Society's Grosvenor Auditorium - the 50th anniversary of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) coincided with the United Nations World Wildlife Day. Under the theme 'Partnerships for Wildlife Conservation', this event highlighted the global efforts in wildlife conservation, with a special focus on crocodilian conservation and the exemplary role of Louisiana in the American alligator's recovery.

One of the presentations of the day was delivered by Christy Plott. Her speech focused on the remarkable recovery of the American alligator through sustainable use, exemplifying the theme of the CSG meeting: "Crocodile conservation: what works!" Plott emphasized how partnerships between government, science, and brands have woven together a narrative of success in sustainable use and conservation, using the Louisiana alligator program as a prime example.

The role of the CSG was also emphasized, particularly its collaboration with Louisiana in shaping effective conservation strategies. The success of the American alligator is a testament to the impactful work of this group, demonstrating how science-driven policy can lead to tangible conservation achievements.

At the event, both Ivonne Higuero, Secretary-General of CITES, and Martha Williams, Director of the US Fish and Wildlife Service, highlighted the essential role of international partnerships in the field of conservation. They gave special recognition to Louisiana for its innovative strategies in managing alligators and its considerable contributions to the preservation of wildlife. A special thank you should be given to Christine Lippai for her attendance and support on the special day.

The United Nations World Wildlife Day 2023 served as a global acknowledgment of the strides made in crocodilian conservation, with Louisiana's program for the American alligator standing as a beacon of success. The presence of figures like Christine Lippai and Christy Plott underscored the collective dedication to wildlife conservation. The event reaffirmed the critical role of partnerships - be they local, national, or international - in safeguarding our planet's biodiversity for future generations.

Prepared by: Christy Plott
Date prepared: 23 January 2024

Agenda Item: 3.2.

Crocodile Specialist Group Steering Committee Meeting

Double Tree Hilton, Darwin, Australia

(15 April 2024)

Trade Monitoring Report

Data on world trade in crocodilians are obtained from CITES annual reports, the Fishery Statistics Division of FAO and the Crocodile Farmers Association of Zimbabwe. Annual reports to CITES should be submitted by 31 October of the year following that in which the trade occurred and therefore 2021 is the most recent year for which we have reasonably complete data. The deadline for 2021 reports is long past but as usual, some crocodilian producer countries have failed to submit their reports. Although problematic, this is not necessarily disastrous as the data from an exporting country may be recorded in the annual reports of importing countries. The real problem occurs when both ends of the trade route fail to report adequately.

Since the 26th CSG Working Meeting (Mexico, 2020), skin trade data for 2021 and 2022 has been collated for the FAO Yearbook of Fishery Statistics and the IACTS reports for the years up to 2021.

At the time of the global analysis for the most recent IACTS report (April 2023), several CITES annual reports that might have contained important crocodilian data had not been received by the CITES Secretariat. These included Australia (2020 and 2021), Bolivia (2021), Brazil (2019 and 2021), Guyana (2021), Madagascar (2021), Malawi (2021), Mexico (2021), Papua New Guinea (2021), Suriname (2021), USA (2020 and 2021), Venezuela (2021) and Viet Nam (2021).

Of these, Australia (2020), Guyana (2021), Mexico (2021), Papua New Guinea (2021), Suriname (2021), USA (2020) and Venezuela (2021) have now been received.

The current IACTS report can be downloaded here. A further IACTS report is scheduled for completion in June 2024 covering the triennium 2020-2022.

Prepared by: John Caldwell
Date prepared: 28 January 2024

Agenda Item: SC. 3.3.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Veterinary Science

Report on Activities: May 2022-March 2024

1. Veterinary Workshops

Chetumal Veterinary Workshop, 3 July 2022 , Host Jonathan Nacar, information provided by Luis Bassetti via e-mail to Steering Committee 19 July 2022

- One of our missions is to train new generations of veterinarians, so we need to adapt the Veterinary Meeting to the local realities, at the same time we must present new perspectives, discuss trends, show new diagnostic technologies.

- The Veterinary Workshop included 30 participants, with different professional profiles (Zoo, commercial breeding, wildlife veterinarians, biologists, etc.).

- We had an excellent reception by the owner of the commercial breeding site but faced a number of technical challenges including a faulty projector. The following topics were presented:
  - General diagnosis and first signs of disease in crocodilians;
  - Common diseases in crocodilians (signs, control measures and treatment);
  - Anesthesia in crocodilians;
  - Necropsy protocol;
  - Parasitology in crocodilians;
  - Bacterial resistance against antimicrobials.

- Lessons learnt included - coordinating presentations to avoid repetition and follow up after the workshop to assess application/usefulness.

- For the Chetumal meeting in 2022, photographs were prohibited during the performance of necropsies and clinical procedures out of concern that images may be misused by activist or opportunistic groups in a manner that denigrates the work of the CSG.

Darwin CSG Veterinary Workshop, 14 April 2024

- The workshop will be held at Crocodylus Park, following the usual format of presentations in the morning and workshop activities in the afternoon. Participants will be bused in with lunch included in workshop registration.

- An e-mail was sent to the CSG Vet Group e-mail list asking for input into the content of the workshop and soliciting presenters/demonstrators. Only one response was received.

- Presentations currently planned include: Anaesthesia (Annabelle Olsson), Surgery (case presentation, Steve Cutter), Skin Blemishes (Sally Isberg), Diagnostic Imaging (Paolo Martelli) and Necropsy/lesion recognition/sampling (Cathy Shilton).

- For the workshop component, there are 11 carcases of problem crocodiles available for study. The carcasses can be used for necropsy (small groups of participants performing necropsies assisted by roaming instructors), surgical/anaesthesia technique or imaging demonstrations. There will also be a station for skin blemish analysis (light table).

2. Continuation of Fritz Huchzermeyer Veterinary Science Student Research Assistance Scheme

2021: Kyla Beguesse (USA) - New approach for identifying pathologic bone in crocodilian species

2020: Gervais Habarugira (Australia) - Understanding the mechanisms of West Nile virus (WNV) infection and induced lesions in *Crocodylus porosus*

There were no recipients of the FHVS-SRAS between 2021 and the early 2024. We wonder whether the FHVS-SRAS should just be with the SRAS, although we should continue to encourage Vet Science applications.

3. CSG Veterinary Science Group Expertise Register and mailing list

We have received and accepted a number of veterinarians' requests to join the Vet Group mailing list of the CSG. Recent additions to the vet group e-mail list include Kunda Ndashe (Zambia), Kafula Darlington Kangwa (Zambia), Sergio Alberto Viveros Peredo (Mexico).

The Expertise Register (available on the CSG website, Vet Resources page) has not been updated on the website since 2014, although a 2017 update has been made.

The veterinary group mailing list continues to be a resource but we have seen a drop in usage. Unclear at this point if it reflects users shifting to different media (eg Whatsapp? Google drive?) or a loss of relevance. We will bring this up at the Veterinary Science meeting in Darwin, see also the question of increasing interest in Vet Sc thesis raised in point 2 above.

4. Website updates

For the full content see http://www.iucncsg.org/pages/Resources-provided-by-the-CSG-Veterinary-Science-Group.html

As per usual practice we will include this year workshop presentations on the website. Usage of the website resources is not tallied. Feedback from an Iranian colleague in June 2023 was "very great resource for a veterinarian like me who hasn't access to mentor education", suggesting the resources are addressing the intended goals.

Prepared by: Paolo Martelli and Cathy Shilton
Date prepared: 28 February 2024

Agenda Item SC. 3.4.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Zoos Thematic Group

Report on Activities:

1. New CSG co-Vice Chair for Zoos Thematic Group
   Since the last CSG meeting, Colette Adams (Deputy Director, Gladys Porter Zoo, Brownsville, Texas, USA) has been selected to be co-Vice Chair of the CSG Zoos Thematic Group.

2. IUCN SSC
   In November 2023, the IUCN SSC published its "Position Statement on the Role of Botanic Gardens, Aquariums, and Zoos in Species Conservation" formally recognizing the role of these living institutions and endorsing the linking of *in situ* and *ex situ* programs aimed at saving threatened and endangered species.

3. Activities in North American Zoos
   a. Changes in AZA Crocodilian Advisory Group (CAG) Programs
      i. In the past, the CAG had 8 Species Survival Plans (SSP) programs for crocodilians, plus a couple of additional studbooks. These were our (SSPs):
         1. Chinese alligator, *Alligator sinensis*, Yellow SSP
         2. Cuban crocodile, *Crocodylus rhombifer*, Yellow SSP
         3. West African Slender-snouted crocodile, *Mecistops cataphractus*, Yellow SSP
         4. Siamese crocodile, *Crocodylus siamensis*, Red SSP
         5. Gharial, *Gavialis gangeticus*, Red SSP
         6. Tomistoma, *Tomistoma schlegelii*, Red SSP
         7. Orinoco crocodile, *Crocodylus intermedius*, Red SSP
         8. Philippine crocodile, *Crocodylus mindorensis*, Candidate SSP
         9. West African crocodile, *Crocodylus suchus*, Studbook only
         10. African Dwarf crocodiles, *Osteolaemus* spp., Studbook only

      ii. In the past few years, AZA initiated a program of "Reimagining SSPs." Currently, these cooperative management programs among AZA institutions are no longer aimed at conservation, but rather, *ex situ* sustainability. New SSP-designation is granted only to species that are: housed in at least 15 AZA institutions; have sufficient numbers of specimens; and, contain enough genetic diversity (GD) within the population to maintain at least 90% GD for 100 years.

      Only two of our programs survived the reimaging process: Chinese alligators and Tomistoma are now "Provisional SSPs," with our remaining programs now simply managed as studbooks. Provisional SSPs must meet the SSP criteria or these programs will lose their SSP designations as well.

      iii. Our primary concerns with the loss of SSP status for many of our endangered and critically endangered crocodilian species are the possibility that these changes will ultimately result in less spaces for these species, should institutions aim to only support SSPs. The loss of SSP status may make it more difficult for fundraising to support *in situ* projects. The lack of SSP recognition will almost certainly make it more difficult to acquire import permits for endangered crocodilians to supplement our populations. These changes are also heartbreaking for many of us as these changes fail to acknowledge all the hard work over the years of our SSP coordinators for species that no longer carry that designation. Most notably, Bill McMahan, Curator of Herpetology at Louisville Zoo and, now former, SSP Coordinator for the Cuban crocodile, did remarkable work for more than 30 years, guaranteeing the genetic purity of our crocodiles, reproducing Cuban crocodiles to build our population size, working with Cuban crocodile biologists, and facilitating community education programs in Cuba.

iv. New AZA SAFE Program for Cuban crocodiles

1. The Cuban crocodile is no longer an SSP species within the AZA, but it has been selected for the SAFE program. Conservation will now be the work of AZA SAFE Programs. Lauren Augustine (Philadelphia Zoo), Kevin Torregrosa (Wildlife Conservation Society) and Brian Henley (Cameron Park Zoo), along with several others, put great effort into getting the SAFE designation for *C. rhombifer* and have been working closely with Cuban biologists for this. Lauren Augustine will be speaking on the Cuban crocodile SAFE program during our regular presentations and has written a short article regarding this for the CSG Newsletter. This SAFE program will increase focus and collaboration within AZA to support the Zapata Crocodile Farm and Cuban crocodile conservation *in situ*. The Cuban Crocodile SAFE program plan is due to be published soon.

   Palmer, J.L., A. Nieto-Claudín, G.S. Rodriguez, E.P. Fleitas, L. Augustine and S.L. Deem. 2023. Hematology and blood chemistry values in Cuban crocodiles (*Crocodylus rhombifer*) housed at the Zapata Swamp Crocodile Farm, Cuba. Journal of Zoo and Wildlife Medicine 54(2): 301-309.

2. In April 2023, Kelvin Alvarez (Wildlife Conservation Society - Bronx Zoo), was able to go back to Cuba for the first time since before the Pandemic. The team identified new problems that the farm is facing due to fuel and food shortages on the island. They are also working with them to establish incubation temperatures and confirm hatches of more male crocodiles.

3. Knoxville Zoo recently donated $3000 to the Cuban Crocodile SAFE fund for future projects.

v. Kelvin Alvarez (Wildlife Conservation Society - Bronx Zoo) is the new Tomistoma SSP Coordinator and Studbook Keeper.

b. Other Activities

i. The Virginia Aquarium & Marine Science Center hatched a couple of Tomistoma in September 2022 for the first time. The Virginia Aquarium also reported these donations toward crocodilian conservation: CSG - $2500 (March 2022); CrocFest 2023 - $1000 (May 2023); CSG - $2000 (June 2023); and, Winter CrocFest 2023 - $500 (November 2023)

ii. Fort Worth Zoo successfully hatched Gharials (*Gavialis gangeticus*) for the first time (and only the second time in the USA), producing 3 surviving hatchlings. Fort Worth Zoo also donated $750 to CrocFest (May 2023).

iii. Ellen Trout Zoo is the process of constructing 8 new off-exhibit enclosures for those species we have that are not currently on exhibit. This will include a breeding enclosure for Cuban crocodiles. Ellen Trout Zoo also donated $1000 to CrocFest (May 2023).

iv. Since June 2022, Bronx Zoo has contributed around $14,000 toward croc projects. They provided $10,000 for Jeff Lang's work with Gharial, $1500 to CrocFest, and around $2500 toward our work with *C. rhombifer* in Cuba.

c. "Croc school"

In May 2023, the 20th iteration of Crocodilian Biology and Captive Management, known fondly to instructors and past students as "Croc School", was held at the St. Augustine Alligator Farm Zoological Park after a 4-year hiatus due to COVID-19 and scheduling issues. This course was created by the Crocodilian Advisory Group and many of its instructors are important members of the CAG. It has always been administered by AZA Professional Development. Following last year's course, St. Augustine and AZA Professional Development initiated discussions regarding St. Augustine taking over the course completely, freeing time and resources for AZA to develop a new course. So, beginning in May 2024, this course, now called Crocodilian Biology and Management will be hosted and managed by the Alligator Farm.

d. CrocFest

The following submitted by Colette Adams, one of the primary administrators of CrocFest (along with Curt Harbsmeier and Flavio Morrissiey):

Since its humble beginning 15 years ago, CrocFest has hosted 25 events and raised over $US900,000 to support crocodilian research and conservation programs in 20 countries.

Funds raised through CrocFest are sourced from corporations catering to the reptile industry, academics, CSG members, zoos and individual zoo employees, and a unique private audience of reptile enthusiasts who enjoy getting together to tour animal exhibits, eat and drink together, and do something good for crocodilians.

After the volunteers who donate their time and energies towards these biannual events, credit for CrocFest's success goes largely to zoos. Since 2017, every event has been hosted by a zoological facility - all within the state of Florida. In addition to surrendering a significant portion of sales at the front gate to CrocFest admissions, these zoos have dedicated staff time for planning, carrying out the event, and keeping their parks staffed past 10 pm for cleanup. They have sponsored t-shirts, in some cases covered the costs of an event-wide feast and paid for the requisite advertising and beer.

In 2023 alone, zoos provided $36,000 in cash donations - over one third of the funds raised for projects - in support of CrocFest initiatives.

St. Augustine Alligator Farm Zoological Park has hosted nearly half of the events since 2017. Wild Florida Gator and Safari Park, Gatorama, Busch Wildlife Sanctuary, Gatorland, ZooTampa, Everglades Alligator Farm, and Zoo Miami have all hosted as well - in some cases more than once. In the early days, very successful events were hosted by private facilities, including Shawn Heflick's Crocodile Manor, but as the popularity of CrocFest grew, so did the expectation of eventgoers that their cost of admission would include the ability to tour facilities with established animal collections and exhibits geared toward public engagement.

Finally, the non-profit Gladys Porter Zoo in Brownsville, Texas, collects, donates accounting services for, and administers CrocFest funding free-of-charge, lending legitimacy to the fiscal management of the program. Tax-exempt documentation is also provided to donors by this zoo.

Since our report from the 26th CSG Working Meeting in Mexico in 2022, CrocFest reports the following:

- Summer CrocFest 2022, hosted by Everglades Alligator Farm, $50,000 for *Crocodylus intermedius*. Venezuela and Colombia
- Winter CrocFest 2022, hosted by St. Augustine Alligator Farm Zoological Park, $51,000 for *Melanosuchus niger*. Guyana, French Guiana and Suriname
- Croc School CrocFest 2023, hosted by St. Augustine Alligator Farm Zoological Park, $68,000 for *Gavialis gangeticus*. India.
- Winter CrocFest 2023, hosted by Wild Florida Gator and Safari Park, $40,000 for *Crocodylus acutus*. Guatemala.

4. Activities in Europe
   a. I have minimal information from European Zoos. I'm sure Fabian Schmidt's Regional Europe Report will include numerous zoo-related items.

   b. We have been in contact with Shaun Foggett (Crocodiles of the World, UK). He has 6 juvenile Chinese alligators hatched over the last few years, and he is open to sending them to the USA. This would facilitate building the genetic diversity of our North American population. Kevin Torregrosa (Chinese alligator SSP Coordinator) would send him some of the animals hatched at US Zoos.

   c. Thomas Ziegler reported that Cologne Zoo has again repatriated three *Crocodylus mindorensis* hatched at the zoo in 2021 to the Philippines, in summer 2023, received by Crocodylus Porosus Philippines, Inc. (CPPI). This is the second such repatriation of captively born Philippine crocodiles by Cologne Zoo; the first in 2020 when two crocodiles were transported to the Philippines. These two crocodiles are still doing well there.

   Cologne Zoo's Crocodile related papers published in 2023:

   Mobaraki, A., Erfani, M., Abtin, E., Brito, J. C., Tan, W. C., Ziegler, T. & D. Rödder (2023). Last chance to see? Iran and India as strongholds for the Mugger Crocodile (*Crocodylus palustris*). Salamandra 59(4): 327-335.

   Ziegler, T. (2023). The IUCN/SSC CPSG's One Plan Approach and the role of progressive zoos in conservation: case studies from herpetology. Pp. 195-222 *in* Proceedings of the 14th National Congress of the Italian Society for Herpetology, Torino.

Prepared by: Kent Vliet and Colette Adams
Date prepared: 4 March 2024

Agenda Item: SC. 3.5.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Taxonomy and Identification Working Group

---

1. Living Crocodylians of the World list

    a. We have produced a list of the living crocodylians of the world. This is a living document that can be readily modified as new information becomes available. For the purposes of the Taxonomy and Identification working group, the list is a Google document available online to all members of the working group, so that notes, comments, or modifications can be made at any time by any member for our consideration. Once the list is reviewed by the CSG Chairs or Executive Committee, our suggestion to the Chairs is to post the list on the CSG website so that CSG members and the general public can see what the CSG considers to be the most up to date understanding of the taxonomy of living crocodylians. As an alternative, or in addition to, we have discussed the possibility of publishing the most current version once a year in the CSG Newsletter.

    b. The list currently includes 26 species, a slight increase from King and Burke 1989 (Crocodilians, Tuatara, and Turtle species of the World: A Taxonomic and Geographic Reference. Washington, D.C., Assoc. Systematic Collections) given the 35 years since that publication. This may surprise many who might have expected at least a couple more species to be listed, but this is representative of the mindful, conservative approach the working group has adopted in this process. A small number of additional taxa have been discussed but the group is waiting for more information to be formally published. Subspecies may be mentioned in the list but are not formally adopted or rejected by the group at this time.

    c. We do not consider any modifications to the list that have not already appeared in peer-reviewed literature. Publication is absolutely not the only criterion for inclusion.

    d. I thank those members of the working group who have very kindly and unselfishly shared their latest research, as yet unpublished, to help us have a more defined understanding of extant crocodylian diversity so that we may better foresee the work ahead of us as well as identify additional areas of research to be undertaken.

2. A significant amount of work in numerous laboratories over many years has been devoted to trying to understand the complicated genetics and phylogeography of *Crocodylus acutus* throughout the Americas and the Greater Antilles. This work continues resulting in continued refinement of hypotheses related to speciation, both ancient and recent hybridization, and population structure in these crocodiles.

3. There has been a remarkable expansion of research into genomics and phylogeography within the Caimaninae, with previously unrecognized population structure throughout the range of every recognized species of caiman.

4. As I commented in my last report following the meetings in Chetumal, progress has been slow and laborious in developing means of identification by external morphology and meristics within many crocodylian species groups.

Prepared by: Kent Vliet
Date prepared: 8 March 2024

Agenda Item SC.3.6

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia

(15 April 2024)

Legal Affairs

I am pleased to once again report that the CSG has not been a party to any litigation nor has the CSG been called as an expert in any formal legal proceedings since our prior report in Chetumal, Mexico on 4 July 2022. However, our members continue to provide evidence for governmental agencies associated with regulation of crocodilians. For example:

1. In Australia, the Department of Climate Change, Energy, Environment and Water (DCCEEW) has initiated a process to review the Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles in conjunction with the State/Territory Governments of Queensland, Western Australia and the Northern Territory. The Code set forth standards for the humane capture, restraining and housing of both wild and farmed crocodiles in Australia. In July 2023, an independent review of the Code began, to ensure the Australian crocodile farming industry continues to be managed to world class standards. Stakeholder input will be received and the review is anticipated to be finalized later this year.

2. The Northern Territory Crocodile Management Program for *C. porosus* is currently under review (2024).

3. The saltwater crocodile population and the frequency of fatal attacks on people are both increasing in Timor-Leste. Community-based monitoring has been encouraged by the Government to collect data on crocodile habitat and attacks. Crocodiles are culturally very important to locals in Timor Leste and so a new management program could integrate stakeholders with traditional elders and community members.

4. The South African National Biodiversity Institute (SANBI) is currently working on a national Non-Detriment Finding (NDF) for Nile crocodiles to address CITES issues. CSG members have collaborated with SANBI and provided guidance and recommendations regarding same. The NDF will be presented to the Scientific Authority of South Africa later this year.

5. There have been increased instances of human-crocodile interactions in southern Guatemala in recent years involving *C. acutus*. Collaborators (including CSG members) worked with the Protected Areas Council of Guatemala (CONAP) to create a new conservation management plan in 2023. This plan will be implemented in parts of Guatemala later this year.

<u>Industry finally prevails against the State of California (USA)</u>

Recall that Plaintiffs, various businesses and industry members engaged in the distribution and sale of products made from alligator and crocodile parts, mounted their legal challenge against the Attorney General of California and the Director of the California Department of Fish and Wildlife, in December 2019. They sued to enjoin the enforcement of provisions of California Penal Code

sections 653o and 653p, which were scheduled to take effect 1 January 2020. Those provisions criminalized the sale and possession for sale of alligator and crocodile parts in California. Plaintiffs claimed, inter alia, that the California law was preempted by federal law (the ESA and CITES), which regulated and permitted those activities. Moreover, on the issue of consumptive utilization of crocodilians, California totally ignored the very real conservation issues (sustained utilization) in favor of creating moral outrage.

Chief United States District Judge Kimberly Mueller ruled on 13 October 2020, that Defendants were enjoined from enforcing California Penal Code Section 653o and 653r in connection with the importation, possession, or sale of American alligator bodies, parts, or products thereof, and of the bodies, parts, or products of CITES Appendix II-listed Saltwater and Nile crocodiles, until the final disposition of the case. The opinion was lauded by attorneys for the plaintiffs as being a "victory for… jobs and conservation efforts that would not have been possible without the great partnership by state officials, landowners, farmers and retailers."

In March 2023, the California Court issued its final opinion, holding that Under the Supremacy Clause of the United State Constitution, California Penal Code Sections 653o and 653r were unenforceable and unconstitutional as applied to the importation, possession or sale of American alligator bodies, parts, or products thereof, and of the bodies, parts or products of Saltwater crocodiles and Nile crocodiles subject to 50 C.F.R. s. 17.42. The State of California did not appeal. Accordingly, it remains generally legal to sell and trade alligator, Saltwater crocodile and Nile crocodile products in the state of California.

Christy Plott and Brett Sparks deserve significant accolades for their work, strategy and management of the litigation on behalf of industry.

New Alligator Hunting Rules approved in Florida (USA)

At its February 2024 meeting, the Florida Fish and Wildlife Conservation Commission (FWC) approved rule changes to establish a special-use alligator harvest opportunity, which will take effect for the 2024 alligator harvest season. The new opportunity will complement the existing statewide alligator hunt and create a flexible alternative that allows permittees to hunt at multiple alligator management units during a longer season than the statewide hunt. The 2024 application period will run from 3 May to 3 June.

The number of permittees will be established annually by FWC and will be selected through a random drawing process. Up to two alligators may be harvested per permit and selected permittees will be allowed to hunt at any legally accessible alligator management unit from August 15 to December 31. This is an 8-week extension of the Florida alligator hunt. This will give license holders a new opportunity to hunt at multiple alligator management units throughout the state.

CITES and the impact of AR NGOs

I offer this for discussion purposes. It is a theme that is only increasing and will continue to present challenges for those who seek legal, ethical and responsible sustained utilization of wildlife. There is little argument that the world is in the midst of a global biodiversity crisis. Many argue that AR NGOs have become too powerful within CITES, disallowing trade in favor of protectionism. Why? The answer lies in ideology rather than evidence.

It's about hunting

For example, a significant part of the southern African recipe for wildlife conservation success involves granting landowners and communities that live outside formally protected areas the right to sell regulated numbers of animals to hunters. This provides incentives for people living on the land to tolerate wildlife that can be dangerous or difficult to live with. Wildlife thus becomes a valuable and, if managed well, renewable resource that is protected by those people.

It is this facet of conservation - scientifically managed, fee-paid hunting - that runs counter to animal-protectionist ideology. Never mind what a century of research and results have proven all over the globe. Sustainable wildlife use has contributed significantly to rural incomes through direct payments, meat distribution and employment. It also motivates local people to become wildlife custodians and to invest in their own anti-poaching efforts, thus sharing the burden of conservation with their governments.

NGOs @ CITES

Consider the ideological position of several large, well-funded international non-governmental organisations such as the Humane Society International, the International Fund for Animal Welfare and Born Free. Their stance is made clear by their consistent and forceful lobbying against the legal international trade in wildlife that is regulated by CITES. Increasingly, this stance reflects Western sentiments towards the sustainable use of wildlife.

CITES has been in force since 1975 and now includes 184 member nations, or "Parties." Its original purpose was not to prohibit the international wildlife trade, but to ensure that it is sustainable. A two-thirds-majority vote at a CITES Conference of the Parties, is required to change the trading status of any given species. In theory, these decisions should be based on clear CITES criteria and guided by the latest scientific evidence of whether a particular species is threatened by international trade. In practice, however, anti-sustainable use animal-rights NGOs - despite their status as "observers" with no voting rights - increasingly base their considerable influence at CITES CoPs on their protectionist dogma. This puts them in direct conflict with countries that use hunting tourism as part of their proven strategy to conserve wildlife while supporting rural livelihoods. Hunting by international clients involves exporting and importing animal parts, which falls under CITES jurisdiction. In recent years, some Western countries have been pressured by animal-protectionist NGOs to ban the import of African hunting trophies, which would in effect stop hunting.

Ideology vs. science

AR NGOs do not win votes for their side by presenting scientific evidence that meet CITES criteria, but rather by using their financial, social and political muscle.

As Parties to CITES, the European Union, the UK and the US - from whence nearly all international hunters come - face sustained and increasingly effective lobbying and media pressure by animal-protectionist groups to oppose any sustainable-use (hunting) proposals brought by countries around the globe. These NGOs also wield significant financial influence in countries of the AEC, the African Elephant Coalition, by bankrolling their conservation ministries (especially Kenya) and the expenses of AEC representatives travelling to CITES conferences.

The European Union, with its huge CITES voting power as a bloc of now 27 countries, has seen significant declines in many of its native species and struggles to accept the return of predators such as wolves and bears. Yet this large collection of states with mostly poor conservation records continues to impose its ill-informed wildlife strategies on states by easily outvoting them at CITES conferences.

The USA and Canada now have perhaps the world's best record of maintaining their wildlife, thanks largely to the century-old North American Model of Wildlife Conservation, which is based on hunting. However, as in Europe and the UK, their CITES delegations are under great pressure from legislators, celebrities and citizens who are against hunting.

Frustration & alienation

At the CoP in Switzerland in 2019, all of the proposals put forward by SADC members were rejected. The animal-rights NGOs won the day by wielding their influence over the African Elephant Coalition and successfully lobbying Western nations to support their positions.

An anti-use, anti-trade platform contradicts the UN's Declaration on the Rights of Indigenous Peoples, the Convention on Biological Diversity and the official position of the IUCN, which all recognize the rights of Indigenous peoples to the sustainable use of their natural resources.

In response, some Parties are seriously questioning the benefits of remaining in CITES.

(This is an edited version of an article by Max Abensperg-Traun, who coordinated national and international CITES issues for the Austrian Ministry of Sustainability and Tourism from 2003 until 2019. He is now an independent consultant. He worked as a game ranger and safari guide in Zimbabwe in the 1970s and from 1981-97 he studied and worked as a conservation biologist in Australia. His original paper appeared in INDABA *Vol. 106/20, the magazine of the Southern Africa Documentation and Cooperation Centre, based in Vienna.)*

Prepared by: Curt Harbsmeier
Date prepared: 7 April 2024

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

IUCN Red List Authority

The CSG Red Listing (RL) process continues to be very successful with 3 more updated RL assessments submitted for 3 species (*Crocodylus rhombifer* (CR A2cde); *Crocodylus moreletti* (LC); and, *Tomistoma schlegelii* (EN C2a(i)). We are grateful for the efforts of all the assessor/authors (S. Platt, L. Sigler, T. Rainwater, J. Cedeño-Vázquez, A. Villegas, W. McMahan, R. Targarona, R. Soberon, M. Alonso Tabet, K. Shaney, B. Shwedick, B. Simpson, A. Pine, B. Sideleau, C. Stevenson) and the numerous other CSG members who contributed to, or reviewed, these publications.

Current priorities for assessment remain with African species *C. suchus*, *O. tetraspis, M. cataphractus* and *M. leptorhynchus*. Drafts for the two *Mecistops* species are advancing, and an assessment team has been assigned for *C. suchus*. Since the last SC meeting, *Osteolaemus* has been recognised by the taxonomic group as comprising three species, but as the paper proposing this is still in progress, these other species have not yet been added to the Red List species list. Matt Shirley was successful in obtaining a SSC Internal EDGE grant to host a workshop in West Africa to develop Red List assessments and Action Plans for the three *Osteolaemus* species - we await participation in, and the outcomes from, this workshop.

The CSG taxonomy group has not yet formally recognised *C. halli,* although it acknowledges that genetic data will likely support the species. Until such time, the current *C. novaeguineae* assessment is current although lacks much of the detail expected in our normal assessment process.

Following from the above, all species have been assessed under the current Red List criteria (version 3.1; see table below) and updates are now required on a 10-20-year cycle which is the recommended reassessment schedule for crocodylians based on their life history and intensity of threats.

Accordingly, the first re-assessment drafts of the text and map have been developed for *Melanosuchus niger*. An assessment team for *C. palustris* has been identified, with *C. siamensis* and *C. mindorensis* the next priorities.

We continue to improve our capacity and systems for conducting RL assessments. One significant advancement has been our refinement of distribution maps to distinguish between extant, possibly extant and extinct areas. Some of our previous distribution maps will need to be updated upon reassessment to incorporate these refinements but are not perceived as a disadvantage at this stage from those published (eg *C. porosus*). The other advancements have been the development of Word and Excel templates as well as a review of the RL assessment process summary, as applicable to crocodylians, that is distributed to our assessment teams.

The team now consists of Sally Isberg, Sergio Balaguera-Reina, Brandon Sideleau and Colin Stevenson. Perran Ross continues to be of great assistance and guidance when required. Identifying others to become involved in the RL team, particularly trained RL assessors, is still required.

It has been suggested that when Red List assessments are published, that we do a short video release to be promoted on our social media channels. This will be trialled on the two released assessments from 2023, *C. moreletti* and *T. schlegelii*, and engagement will be reported to determine the level of interest against effort to develop.

Prepared by: Sally Isberg, Perran Ross, Sergio Balaguera-Reina, Brandon Sideleau and Colin Stevenson
Date prepared: 13 February 2024

Species	Assessed as	Assessd	Published	Actions
Alligator mississippiensis	LC	2018	2019	Current
Alligator sinensis	CR A1b, B1ab(11.v)+2ab (ii.v), C1 +2a(i)	2017	2018	Current
Caiman crocodilus	LC	2016	2019	Current
Caiman latirostris	LC	2019	2020	Current
Caiman yacare	LC	2019	2020	Current
Crocodylus acutus	VU A2cd	2020	2022	Current
Crocodylus intermedius	CR A2bcd, C2a(i)	2017	2018	Current
Crocodylus johnstoni	LC	2016	2017	Current
Crocodylus mindorensis	CR A2cd	2012	2016	Due
Crocodylus moreletii	LC	2020	2023	Current
Crocodylus niloticus	LC	2017	2019	Current
Crocodylus novaeguineae	LC	2018	2019	Current
Crocodylus palustris	VU A2cd	2009	2013	Due
Crocodylus porosus	LC	2019	2021	Current
Crocodylus rhombifer	CR A2cde	2022	2022	Current
Crocodylus siamensis	CR A2cd	2012	2012	Due
Crocodylus suchus	Not yet been assessed			Assessment team assigned
Gavialis gangeticus	CR A2bce	2017	2019	Current
Mecistops cataphractus	CR A2acde+3cde+4acde	2013	2014	Underway
Mecistops leptorhynchus	Not yet been assessed			Underway
Melanosuchus niger	LR; not yet assessed under version 3.1	2000	2000	Nearing completion
Osteolaemus tetraspis	VU A2cd; not yet assessed under version 3.1	1996	1996	Plan enacted; along with species split
Paleosuchus palpebrosus	LC	2018	2019	Current
Paleosuchus trigonatus	LC	2018	2019	Current
Tomistoma schlegelii	EN C2a(i)	2022	2023	Current

Agenda Item: SC. 4.1.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Future Leaders Program

A group of FLP members was selected to attend CITES CoP19 held in Panama City, Panama, on 14-25 November 2022, which also included the 75th and 76th meetings of the CITES Standing Committee (SC75 and SC76). Some attended as part of national delegations, and others were on the IUCN delegation. Prior to the event, FLP members and other CSG members actively participated in reviewing the three proposals at CoP19, seeking transfer from Appendix I to Appendix II: 1) Brazil: *Caiman latirostris*; 2) Philippines: Palawan population of *Crocodylus porosus*; and, 3) Thailand: *Crocodylus siamensis*. During the plenary session, FLP members had the opportunity to witness different discussions around the proposals. They actively participated in various ancillary events focusing on conservation, sustainable utilization, livelihoods, and illegal trafficking, particularly those related to crocodilians.

Some FLP members identified the need for greater efforts and dedication to detect priorities in the conservation of crocodilian species and to find alternatives to assist in the conservation, research, and management of Critically Endangered or Endangered Species. The list of conservation priorities is still under development.

CSG was asked for a review of the report "Modelling Population Dynamics of Estuarine Crocodiles on Queensland's Northern Populated East Coast". Some FLP members were invited to provide recommendations and assisted in revising this work.

While the FLP has been able to coordinate some activities, it has been very difficult to achieve others for various reasons, including financial considerations. In reality, key activities such as attendance at CITES meetings, IUCN WCC, etc., could still be undertaken without a formal working group structure. For this reason, it has been decided to disband the FLP, but to achieve FLP goals as opportunities arise, through the CSG Executive Committee and a proposed advisory group.

Prepared by: Pablo Siroski
Date prepared: 20 February 2024

Agenda Item: SC. 4.2.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Drone Working Group

I am excited to be a part of the next drone or unmanned aerial vehicle (UAV) workshop to be held in Darwin at this year's CSG Working Meeting! The Drone Working Group hopes that this will be an ongoing part of the CSG Working Meetings in the future as technology rapidly grows! This will be a fantastic opportunity to hear about the latest developments in crocodile conservation using drones, recent technology, and networking for future collaborations. I look forward to seeing everyone there!

Since 2020 the working group has held virtual meetings to discuss and engage members of the CSG in projects, and recent technologies and to encourage networking among our members. Please see the CSG Website for a full history of the working group and activities.

On 6-9 October 2023, working group members Carlos Piña, Lonnie McCaskill and Ray Carthy were part of the organising team of the "Wildlife Conservation Drone and Technology Summit" held in Burnet, Texas, USA. Although this Summit was focused on global wildlife conservation, hands-on training, and demonstrations of drones and related technologies, there was a good representation of CSG members in attendance. We held a 2-hour Technology in Crocodile Conservation Workshop. There were presentations and a round table discussion that followed. It was a terrific opportunity to hear about current projects, network and share best practices. A full list of abstracts is found on the Summit website https://www.wcdws.com/.

Drones are going to be a valuable tool not just in conservation but in crocodile conservation. I know the working group leaders would like to get members' feedback to see if there is a need or interest in continuing with this working group. We are open to feedback and volunteers to join us.

Prepared by: Lonnie McCaskill
Date prepared: 8 March 2024

Agenda Item: SC. 5.2.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

Convention on Migratory Species

---

1. CoP14 of the Convention on Migratory Species (Bonn Convention) took place on 12-17 February 2024 (https://www.cms.int/en/parties-range-states).

2. At 1 March 2022, CMS on had 133 Parties.

3. For the purpose of this Convention: "Migratory species" means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.

4. Two crocodilian species are currently listed on CMS - *Crocodylus porosus* (CMS App II; 1979) and *Gavialis gangeticus* (CMS App I; 1979).

5. At CMS CoP14, the Parties:

    - adopted the "Action Plan to Address Aquatic Wild Meat Harvests in West Africa" with the goal of making tangible progress towards the sustainable management of aquatic wild meat harvesting across West Africa and securing the conservation status of all impacted CMS-listed species (UNEP/CMS/COP14/Doc.30.1.2/Rev.3).

    - directed the Scientific Council, through its Aquatic Wild Meat Working Group, to collaborate with the relevant IUCN Specialist Groups to present a case to the Scientific Council for the assessment of the migratory nature of crocodylians (Genera: *Gavialis*, *Crocodylus*, *Mecistops*, *Caiman*, *Melanosuchus*) and freshwater chelonians, and the relevance of CMS to their conservation and management, including whether or not they may fit the criteria for inclusion in the CMS Appendices.

Prepared by: Charlie Manolis and Alejandro Larriera
Date prepared: 15 March 2024

Agenda Item SC. 6.

Crocodile Specialist Group Steering Committee Meeting
Double Tree Hilton, Darwin, Australia
(15 April 2024)

28th CSG Working Meeting

The CSG Executive Committee has received one formal bid to host the 28th CSG Working Meeting (2026), from CROCOPARC, in Agadir, Morocco. SC members may recall that in 2018, CROCOPARC had submitted a bid to host the 26th Working Meeting.

A brochure submitted by CROCOPARC is attached.

Prepared by: Charlie Manolis
Date prepared: 5 April 2024

CSG MEETING
AGADIR
2026

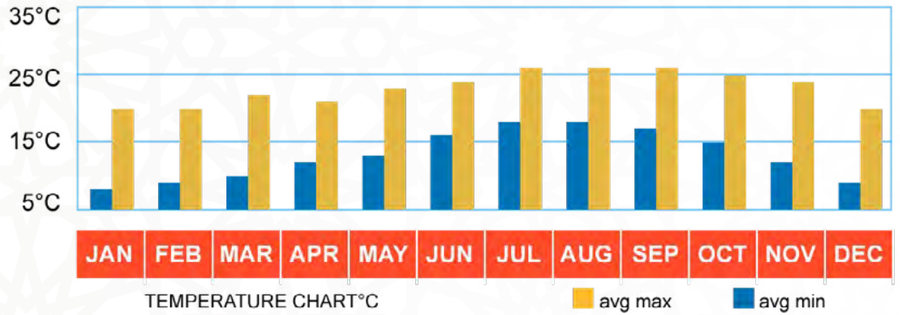
Contents

01 AGADIR, A city with 1001 assets

Agadir is an important seaside town in south-western Morocco, with a population of nearly 1 million inhabitants. Located on the Atlantic coast, at the foot of the Atlas Mountains, at the mouth of the Oued Souss river, it attracts many European tourists.
Agadir is located 600 km south of Rabat, the Kingdom's capital, about 500 km south of Casablanca and 235 km west of Marrakech. Agadir is the capital of the administrative region of Souss-Massa and the prefecture of Agadir Ida-Outanane.
The city's main economic activities are agriculture, tourism and fishing industries.

02 AGADIR, a dream weather forecast

Agadir is characterized by a semi-arid subtropical climate with warm summers and mild winters. Located on the Atlantic Ocean, Agadir enjoys a temperate climate. And very pleasant Daytime temperatures average around 25°C (77°F) all year round, with winter temperatures averaging over 20°C -8°F) in December and January.



03 AGADIR, a well-served city

By plane

Agadir Al Massira International Airport is located 30 minutes from the city centre of Agadir. This airport is served by about 30 airlines departing from all major capitals in the world. From the airport, there is a fleet of large taxis to reach the city centre.

Visitor information: entry to Morocco requires a valid passport even for French nationals. The vast majority of countries do not require a visa, it is preferable to obtain information from the Moroccan Embassy .

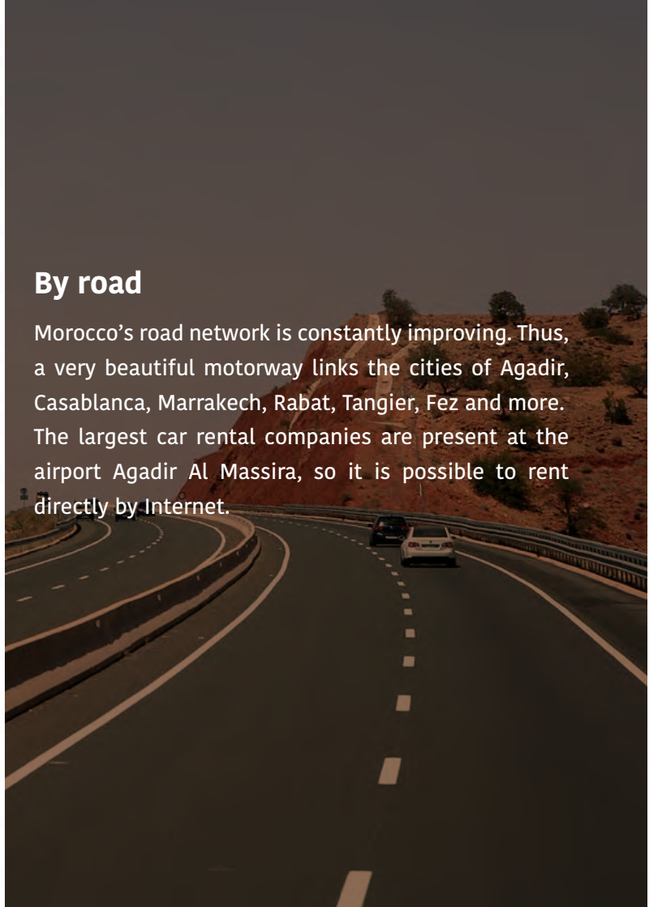
03 AGADIR, a well-served city

By taxi

There are two categories of taxis: small taxis that only travel in urban areas, and large taxis that connect conurbations.

By coach

Several companies (Supratours, CTM,...) offer a wide national coverage, allowing you to reach Agadir from Marrackech, Casablanca, etc., but also to visit the hinterland of Agadir at a lower cost. For those two companies, the buses are very comfortable, air-conditioned and well heated.



By road

Morocco's road network is constantly improving. Thus, a very beautiful motorway links the cities of Agadir, Casablanca, Marrakech, Rabat, Tangier, Fez and more. The largest car rental companies are present at the airport Agadir Al Massira, so it is possible to rent directly by Internet.

04 AGADIR, a quality hotel capacity

Selection of hotels (5 to 3 stars)

Hotel	Category	Distance to				Feature
		Room	Downtown	Sea	CROCOPARC	
Sofitel Royal Bay	★★★★★	1 km	1,5 km	0	10 km	Nightclub
Sofitel Thalassa	★★★★★	1 km	1,5 km	0	10 km	Thalasso Center
Tikida beach	★★★★★	1 km	1,5 km	0	10 km	Nightclub
Tikida Palace	★★★★★	1 km	1,5 km	0	10 km	Thalasso Center
The View	★★★★	1 km	1,5 km	0	10 km	Thalasso Center
Anezi Tower	★★★★	0 km	0,5 km	0, 5km	08 km	
Beach Club	★★★★	1 km	0,5 km	0	08 km	
Hotel Kamal	★★★	0,5 km	0	1 km	08 km	

04 AGADIR, a quality hotel capacity

Some pictures of hotels

05 AGADIR, a conference city

Agadir can offer several meeting and conference room, the largest of which can accommodate up to 1000 people.

For the “Congress 2026”, two meeting rooms have been selected downtown: Iberostar and The View. Technical equipment includes sound equipment, a slide projector, a large screen, microphones, flip charts, etc.

Agadir hosted several international conferences in 2023/2024 as:

- 23rd Annual SSIG Meeting for Sahara conservation
- 9 ème Ecole Internationale de Recherche
- Halieutis, The International meeting of the fish sector

06 AGADIR, an attractive tourist city

Agadir's tourism industry offers many advantages:

Its gastronomy alocal cuisine (tajines, couscous, méchoui, fish specialities)

Numerous restaurants on the seaside and the marina, tea rooms, traditional pastry shops.

Its famous souk, an unmissable place, is located in the centre of the city: it covers an area of 9 hectares and includes nearly 6000 shops, arranged by product families. It is accessed through eleven doors.

3 casinos in front of the sea, thalassotherapy centres, hammams, traditional health centres.

A marina in the heart of the city, located on the beachfront promenade and surrounded by beautiful residences, luxury shops and welcoming terraces for refreshments.

Water sports: Agadir has a worldwide reputation for surfing and jet skiing: it attracts many surfers from all over the world.

Golf: The region of Agadir offers golf enthusiasts the opportunity to practice this sport all year round, especially in winter thanks to a mild and sunny climate.

07 AGADIR, a rich flora and fauna in the hinterland

The Souss-Massa National Park, a stopover for migrants

Located at the mouth of the Oued Massa river, the Souss-Massa National Park, which covers an area of 33,800 hectares, is home to more than 230 species of birds, including 90 nesting birds. This wetland is also a stopover for many migratory species, and an important wintering place for over 2000 bird species. More than 70 species of waterfowl (herons, white spatulas, flamingos, storks) frequent the site, but the bald Ibis remains the most remarkable of this poultry fauna.

The south of Agadir, a region of interest for its herpetological fauna

The region offers interesting excursions to search for species such as the Helmeted Gecko, which can be found in its coastal plain biotope near Inezgane. An excursion to the Tiznit Souss-Massa area is interesting in various ways, as the terrain is quite sandy and contains a lot of stones. Many species of reptiles can be found here.

08 CROCOPARC, a major asset for an international Congress in Agadir

Designer of CROCOPARC

Luc Fougeirol, Designer of the CROCOPARC, is a member of the “Herpetological Society” of France, the “Species Survival Commission”, the “Crocodile Specialist Group” and the IUCN (International Union for Conservation of Nature).

In July 2006, he organised the first congress of the Crocodile Specialist Group in Europe and the first congress of the Crocodile Specialist Group of West Africa in Niger in November 2007. He is the author of the book “CROCODILES” published by Martinière.

Website: www.luc-fougeirol.com

Opportunities and working facilities

This congress project offers specialists the opportunity to discover Morocco’s unique crocodile park and to discover the species of the Agadir hinterland and southern Morocco.

The programme of this congress is currently being prepared: one of the avenues of work could be to study with local authorities the reintroduction of crocodiles into their natural environment. Organizing this congress in Agadir would be a real opportunity for the urban Community and its region.

09 CROCOPARC, place of exchange and sharing knowledge

CROCOPARC, the only crocodile park in Morocco, is located on the outskirts of Agadir, along the National Highway 8 (Agadir-Marrakech highway); it opened its doors to the public on June 1st, 2015. This 4 hectare park, set in the heart of the argan trees and at the foot of the Atlas Mountains, is home to 325 crocodiles of the Nile (*Crocodylus niloticus*).

CROCOPARC is also an exotic garden and aquatic - rich in many plant species of the region of Souss-Massa-Draâ and tropical plants.
The laboratory, the first of its kind in Morocco, is a real door open to students, researchers and teachers of all levels.

Corcoparc is also a place to share knowledge: it has hosted numerous conferences and exhibitions of all kinds.

Website: www.crocoparc.com

10 CROCOPARC, Partner for the rehabilitation of biodiversity in Morocco.

As part of its nature conservation mission, Crocoparc is committed to projects to conserve Morocco's biodiversity. It supports a project to reintroduce the West African crocodile in southern Morocco, as part of a partnership with the National Agency for Water and Forests.

A tank of Suchus Crocodiles has been set up at Crocoparc, with the aim of exhibiting specimens of the West African Crocodile (*Succhus Crocodiles*), and to hold a founding nucleus, from which individuals will be taken for the project to reintroduce this species of Crocodile in the South of Morocco, initiated in collaboration with the National Agency for Water and Forests.

CROCOPARC - CONTACTS

Ariane Marinetti,
ariane.marinetti@gmail.com
Tel : + 212 6 62 03 23 93

Leila SDIGUI-BRUNET,
leila.crocoparc@gmail.com
Tel. : + 212 6 61 31 62 99

Luc FOUGEIROL,
Designer of the CROCOPARC and International
Consultant for reptilian luc.fougeirol@orange.fr
Tél. : +33 6 20 46 23 38

Facebook: CrocoParc Agadir
Website: www.crocoparc.com