

Crocodile Specialist Group Steering Committee Meeting
Universidad Nacional del Litoral, Santa Fe, Argentina
(6 May 2018)

East and Southeast Asia

Cambodia

Cambodia Crocodile Conservation Program (Dr. Jackson Frechette, Fauna and Flora International)

- Seven crocodiles (4 adult females, 3 juveniles, 2.5 years old, bred at our facility) were released in to remote sanctuary of Cardamom Mountains in January 2018. The four adults were attached with radio-transmitters for monitoring. They are monitored every month while access is possible in the dry season.
- Siem Reap crocodile farmers donated 28 2-year-old crocodiles to our facility for wild release.
- As of March 2018, we are caring for 57 Siamese crocodiles at our breeding facility - 32 (4 from our 2016 clutch, 28 from SR farm) are set to be released in December 2018 or January 2019; plus an additional 12 crocodiles we are raising for WCS to be released later this year. 8 (3 males 5 females) are currently part of the breeding stock; with two crocodiles in our care that we may use for breeding later. We have one remaining crocodile from last year's clutch. The rest of the crocodiles are unfit for release (mostly birth deformities in the farmed crocodiles).
- We conducted annual monitoring of the key four crocodile sanctuaries. The population still appears to be stable.
- We have on-going educational programs with school groups that come to the Phnom Tamao Zoo.
- On 13 March the first nest of the season was made and 22 fertile eggs were discovered.

Wildlife Conservation Society (Lonnie McCaskill Prospect Park Zoo)

- On 15 June 2018 the first Siamese crocodile nest discovered on the Sre Amble River in Koh Kong Province by WCS Community Crocodile Patrol and reported to WCS Field program staff. Due to concerns on poaching and predation the nest was relocated to the Reptile Conservation Center in Koh Kong.
- 10 out of 19 eggs hatched and are now being head-started at the Center. Release is planned on the Sre Ambel River in proximity of where the original nest was found
- March 28 WCS partnering with FFI moved 12 3-year-old Siamese crocodiles to the Phnom Tamao Zoo crocodile breeding center for pre-release conditioning. These possibly will be among the group of crocodiles that FFI will be releasing in November-December in the Cardamom Mountains.
- WCS and FFI are continuing to partner on different aspects and strategies for Siamese crocodiles in Cambodia.

Indonesia

Wildlife Conservation Society

Conservation of Siamese crocodile in Indonesia: (Maslim As-singkily, Steve Platt, Lonnie McCaskill)

- May 2017 - WCS-Indonesia program start an initial project to help conservation of the last population of Siamese crocodile
- July 2017 - the first drone survey was conducted in Mesangat. Nine drone overflights covered 1789 ha along a 286.6 km flight course, and produced 12,385 individual photographs. Of these, 9042 images were successfully stitched, while 3343 images were discarded owing to poor resolution, often the result of reflection from the water surface or instability of the aerial platform. The final dataset covered 1549.5 ha with a 10 cm pixel resolution and encompassed about 30% of Lake Mesangat. From individual photographs, 35 mounds of vegetation similar in size and appearance to crocodile nests were identified. These mounds were scattered widely throughout the study area with the majority in open marsh (n= 20) and others beneath a forest canopy (n = 15). Five mounds were in close proximity to locations of Siamese crocodile nests identified while the other blong to false gharial during a study in 2010-2011 (A. Staniewicz and N. Behler, unpubl. data).
- On 12 October 2017, in Sangatta, capital of Kutai Timur, Lonnie McCaskill gave a presentation on the global conservation efforts for *C. siamensis*.

- 14 October 2017 - the WCS team with Lonnie, Bowo from BKSDA (Natural Resource Conservation Agency) Kalimantan Timur and Madan with Widi from Kutai Timur Environmental Department arrived at the evening in Kelinjau Ulu Village
- 15 October 2017- team moved to the floating house inside the Lake Mesangat area. It is a one-hour boat trip from the Kelinjau Ulu Village. Our activity inside Lake Mesangat began at 1.30 pm. Daylight orientation was conducted, and if possible identifying nests. At 8 pm we started night survey to the Loa Toh, which is the known hotspot of the crocodiles, and an open area that is suitable as the preferred habitat for Siamese crocodile. In this area our team saw 3 eyeshines that confirm crocodiles. Survey finished at around 11 pm.
- 23-25 October 2017 in Lake Mesangat, Steven Platt delivered training on Survey Techniques for Crocodiles.
- 23-27 October 2017 - Ground-truthing to verify crocodile nests at these sites was carried out. One old nest was found. The nest was located in an ecotone between closed-canopy swamp forest and open marsh (Loa Atoh), and characterized by pools of open water surrounded by widely scattered trees with a thick understory of floating grass and water hyacinth. Spotlight survey also conducted to investigate the population of the Siamese crocodile. Seventeen (17) crocodiles were observed along 89.0 km of survey route (encounter rate= 0.20 crocodiles/km) during spotlight counts conducted in the Abang, Klan Limbot, Loa Balung, and Loa Toh areas of Lake Mesangat. An additional crocodile (most likely *C. siamensis*) was observed during a spotlight count along 72.0 km of the Kelinjau River (encounter rate= 0.01 crocodiles/km) on 27 October 2017.
- January 2018 - a meeting was held by Forum of Mesangat and Kenohan Suwi to formulate an action plan for management of Mesangat and Kenohan Suwi.

Laos (Wildlife Conservation Society, Steve Platt, Lonnie McCaskill)

WCS is re-engaging in Siamese crocodile conservation initiatives.

- In late 2017, WCS received funding to conduct a rapid assessment of former CCAs, evaluate past conservation actions, and determine if renewed efforts are warranted.
- Herein report the results of this rapid assessment, describe a potential long-term conservation strategy, and provide specific conservation recommendations.
- Visited Crocodile Conservation Areas (n= 7) from 4-11 January 2018 and conducted interviews of former VCCT members and other knowledgeable persons. We questioned participants about recent crocodile sightings (location and approximate date), estimated total length (TL) of any crocodiles observed, perceptions of abundance, and potential threats. Of particular interest was evidence of recent crocodile nesting activity, descriptions of nest sites and habitat, and observations of hatchlings and small juveniles. We also accompanied informants to locations where nest mounds were reported and examined nesting habitat.
- Our ultimate long-term conservation objective should be the restoration of a viable metapopulation of Siamese crocodiles within the Xe Champhone Ramsar Site that functions in the manner of a source-sink system.

Goals for this initiative

1. WCS developed a community-based conservation program that proved highly successful in beginning the recovery of Siamese crocodile populations within the area now designated as the Xe Champhone Ramsar Site. Given the initial success of this project coupled with the results of the recent reconnaissance mission, renewed crocodile conservation efforts seem warranted. To this end, I recommend re-engaging at those CCAs most likely to support relatively robust crocodile populations. Without a doubt Kout Mark Peo (Tansoum Village) is the most important CCA in the Ramsar Site. Other high priority sites include Kout Kaen, Kout Kouang and Kout Koke, and Kout Xelat Kadan. Non Maehang and Kout Tapong are used seasonally by crocodiles and therefore considered less important (but not unimportant) for conservation efforts. Beung Bua and Beung Hor should be removed from consideration as a CCA.
2. Regular population monitoring should be undertaken at each designated CCA. Evidence of crocodile reproduction (eg active nests, old nests, hatchlings, eggshells, etc.) is the most effective metric to evaluate population trends.
3. Conservation efforts at priority sites should focus on recruiting VCCTs to monitor local crocodile populations, search for nests, and assist with egg collection and incubation.
4. Head-starting young crocodiles for eventual release will be the cornerstone of conservation efforts at priority sites for the foreseeable future. Head-starting should be conducted in Tansoum and Ban Dongyanong villages. Rearing facilities are already available in Tansoum (minor repairs will be required). Additional facility should be constructed in Ban Dongyanong and villagers trained in basic crocodile husbandry. Head-starting is a demonstrated means to quickly boost recovery trajectories of crocodile populations.
5. Post-release monitoring of future reintroductions with radio telemetry is strongly recommended. Monitoring is necessary to determine post-release dispersal and survival of reintroduced crocodiles, and provide the

scientific rigor necessary to quantify conservation success, evaluate reintroduction protocols, and make changes if necessary (ie adaptive management).

6. A GIS-based inventory of potential crocodile habitat for the Xe Champhone Ramsar Site is urgently needed. Additionally, a classification system ranking the suitability of wetlands as crocodile habitat should be developed. These measures are crucial for conservation decision-making and developing management guidelines. Inventory results will also help identify potentially valuable crocodile habitat not currently designated as a CCA (see below).
7. Surveys of other wetlands in the Xe Champhone Ramsar Site likely to harbor crocodiles are warranted. If heretofore unknown populations are identified, the existing community-based conservation program should be expanded to include villages adjacent to wetlands inhabited by crocodiles. Particular effort should be made to identify villages that afford protection to crocodiles on the basis of spiritual-religious beliefs.
8. A conservation-breeding program should be developed at the Lao Zoo to provide offspring for head-starting and release in suitable wetlands within the Xe Champhone Ramsar Site. Crocodiles selected for the breeding program should be screened to insure the genetic integrity of the breeding population. Additionally, the importation of offspring from an on-going captive-breeding program in the United States warrants serious consideration. Releasing captive-reared crocodiles will genetically diversify the existing wild population.

Discussions between WCS, the Lao Zoo and Thomas Zigler from Cologne Zoo have been occurring to evaluate the Siamese crocodile collection at the zoo and developing a focused breeding program for reintroductions for Laos. There are over 100 crocodiles on sight with many already determined to be pure bred but have subsequently been mixed with known hybrids. As mentioned a number of crocodiles have been tested and scutes-clipped and could possibly be easily identified and separated out. The others would need to be DNA tested, marked and chipped and could be paired up at a later date.

Summary of site assessments

We visited the 7 previously established Crocodile Conservation Areas in Savannakhet Province during January 2018 and interviewed former VCCT members, local farmers, and rank-and-file villagers to determine the current status of Siamese crocodile populations. According to information provided during these interviews, at least some crocodiles are present in every CCA, although population estimates vary widely and some sites are inhabited only seasonally. Most importantly, our informants reported evidence of crocodile reproduction (eggshells, nests with eggs, and observations of small juveniles often in company of much larger adults) at four of the seven (57%) wetlands (Kout Kaen, Kout Kouang - Koke, Kout Mark Peo, and Kout Xelat Kadan). Two other CCAs (Kout Tapong and Non Maehang) where nesting was not reported appear to serve as wet season foraging habitat for crocodiles. Furthermore, the release of 65 head-started crocodiles in 2013-14 appears to have successfully augmented the small existing population in Kout Mark Peo. Most likely, the reintroduced crocodiles (now subadults measuring approximately 150 cm TL) will disperse into neighboring wetlands using the Champhone River as an immigration corridor. A single large adult crocodile remains at Beung Hor. Because males are absent, reproduction can no longer occur at Beung Hor. Given the reluctance of villagers to permit the release of a male crocodile at Beung Hor owing to entrenched animist beliefs, the site is of minimal conservation significance.

Threat assessment

For the most part, crocodiles in the CCAs are relatively safe and face few direct threats. However, some seemingly innocuous practices (eg water extraction for irrigation) could pose a threat to the long-term survival of crocodiles in the Xe Champhone Ramsar Site. Below we provide a prioritized list potential threats, assess the risk posed by each threat, and suggest measures to mitigate any danger to crocodiles.

Long-term crocodile conservation strategy

Crocodiles inhabiting wetlands in Xe Champhone Ramsar Site were historically part of a larger metapopulation linked by riverine corridors. However, the remaining demes are now much reduced and somewhat isolated, and as such, each is subject to the extinction risks inherent in any small population (Gilpin and Soule 1986). Our ultimate conservation objective should therefore be not simply to restore multiple small populations, each of tenuous viability, but to restore a viable metapopulation of Siamese crocodiles in the Xe Champhone Ramsar Site that functions in the manner of a source-sink system (Hanski and Simberloff 1986). To achieve this objective, individual populations must first be recovered to the point of viability. To this end, our future efforts should be focused on those populations with the greatest likelihood of eventually functioning as source populations (eg Kout Mark Peo). Once recovery is achieved, dispersing offspring from these populations can be expected to colonize other wetlands in the Ramsar Site (the expanding inkblot analogy of counterinsurgency warfare theorists). Connectivity among wetlands in the Ramsar Site already exists in the form of 1) Champhone and Xangxoy river corridors, and 2) widespread annual wet season flooding that inundates the landscape. In anticipation of future population recovery, increasing emphasis in the near-term should be placed on identifying suitable habitat amenable to protection, and expanding the network of designated CCAs. Particular effort should be made to identify villages that afford protection to crocodiles on the basis of spiritual-religious beliefs. Conservation measures grounded in local belief systems often have a greater likelihood of success than legalistic or economic approaches to resource management (eg Platt *et al.* 2003).

Conservation Recommendations

The following recommendations are designed to achieve the objectives of the long-term conservation strategy as out-lined above:

- WCS developed a community-based conservation program that proved highly successful in beginning the recovery of Siamese crocodile populations within the area now designated as the Xe Champhone Ramsar Site. Given the initial success of this project coupled with the results of the recent reconnaissance mission, renewed crocodile conservation efforts seem warranted. To this end, I recommend re-engaging at those CCAs most likely to support relatively robust crocodile populations. Without a doubt Kout Mark Peo (Tansoum Village) is the most important CCA in the Ramsar Site. Other high priority sites include Kout Kaen, Kout Kouang and Kout Koke, and Kout Xelat Kadan. Non Maehang and Kout Tapong are used seasonally by crocodiles and therefore considered less important (but not unimportant) for conservation efforts. Beung Bua and Beung Hor should be removed from consideration as a CCA because 1) these wetlands are not encompassed by the boundaries of the Ramsar Site and 2) the “population” consists of a single female crocodile and village custodians of the wetland rejected proposals to release one or more males.
- Regular population monitoring should be undertaken at each designated CCA. Evidence of crocodile reproduction (eg active nests, old nests, hatchlings, eggshells, etc.) is the most effective metric to evaluate population trends (Platt *et al.* 2014a).
- As in the past, conservation efforts at priority sites should focus on recruiting VCCTs to monitor local crocodile populations, search for nests, and assist with egg collection and incubation.
- Head-starting young crocodiles for eventual release will be the cornerstone of conservation efforts at priority sites for the foreseeable future. Head-starting is a demonstrated means to quickly boost recovery trajectories of crocodile populations. Head-starting should be conducted in Tansoum and Ban Dongyanong villages. Rearing facilities are available in Tansoum (minor repairs will be required). An additional facility should be constructed in Ban Dongyanong and villagers trained in basic crocodile husbandry. Our past experience indicates that incubating eggs and rearing hatchlings in villages imparts a sense of community ownership in the project (Platt *et al.* 2014b).
- Post-release monitoring of future reintroductions with radio-telemetry is strongly recommended. Monitoring will determine post-release dispersal and survival of reintroduced crocodiles and provide the scientific rigor necessary to quantify conservation success, evaluate reintroduction protocols, and make changes if necessary (ie adaptive management).
- A GIS-based inventory of potential crocodile habitat for the Xe Champhone Ramsar Site is urgently needed. Additionally, a classification system ranking the suitability of wetlands as crocodile habitat should be developed. These measures are crucial for conservation decision-making and developing management guidelines. Inventory results will also help identify potentially valuable crocodile habitat not currently designated as a CCA (see below).
- Surveys of other wetlands in the Xe Champhone Ramsar Site likely to harbor crocodiles are warranted. If heretofore unknown populations are identified, the existing community-based conservation program should be expanded to include villages adjacent to wetlands inhabited by crocodiles. Particular effort should be made to identify villages that afford protection to crocodiles on the basis of spiritual-religious beliefs.
- A conservation-breeding program should be developed at the Lao Zoo to provide offspring for head-starting and release in suitable wetlands within the Xe Champhone Ramsar Site. Crocodiles selected for the breeding program should be screened to insure the genetic integrity of the breeding population. Additionally, the importation of captive-reared offspring from an on-going captive-breeding program in the USA warrants serious consideration. Releasing these animals will genetically diversify the existing wild population.

Philippines (Crocodylus Porosus Philippines Inc.; Rainier I. Manalo)

- The proposed Department of Environment and Natural Resources (DENR) Administrative Order adopting the *Conservation and Management Plan for Crocodiles in the Philippines 2018-2028* has been reviewed and finalized by the DENR Policy and Planning Office.
- The Department of Environment and Natural Resources – Biodiversity Management Bureau (DENR-BMB) have approved the final draft of the DENR Technical Bulletin on the *Protocol for Managing Human-Crocodile Conflict in the Philippines*.
- With the clearance from the DENR Secretary, the CPPI in partnership with the Biodiversity Management Bureau (BMB) and the local government units have initiated the released of 29 captive-bred Philippine crocodiles *Crocodylus mindorensis* composed of 8 yearlings and 21 juvenile (21M, 8F) in Paghungawan Marsh, Siargao Islands Protected Landscapes and Seascape on 17 June 2017. This supplemental release was requested by the local Government of Pilar in their Mun. Resolution No. 070 series of 2015 for the enhancement of community-based sustainable tourism.
- CPPI received \$US9160 in research funds from the Assn. of Zoos and Aquaria - Crocodile Advisory Group (AZA-CAG) together with the \$US10,020 from CrocFest (through Colette Adams/Shawn Heflick) both for Philippine crocodile conservation research in Siargao Islands Protected Landscapes and Seascape.

- As of August 2017, CPPI have recorded an estimated of 387 individuals (all size classes present) *C. porosus* wild population only in southern Palawan, Philippines. It is about 10.60% higher than the recorded estimate in January 2016.
- About 1948 hectares of coastal mangrove habitat in southwestern Palawan was endorsed for protection as *Crocodylus porosus* Critical Habitat under the Philippines Wildlife Act of 2001. The local Government of the municipalities of Quezon and Rizal, Palawan has been aware in conserving *C. porosus* for future and cultural benefit of their indigenous communities.
- The CPPI's *Charles Andy Ross Fund for Crocodile Research and Conservation* (CAREsFund) have awarded \$US7500 in student research funds to undergraduate research of the University of Santo Tomas (UST), and a PhD student of the Western Philippines University (WPU) for crocodiles biological and ecological studies respectively. A total of about \$US4000 was provided as sponsorship for other crocodile and wildlife related conference, symposium, fora and the like.
- CPPI in partnership with the DENR Provincial Environment & Natural Resources Office – Palawan and the Palawan Wildlife Rescue and Conservation Center (PWRCC formerly Crocodile Farming Institute CFI) hosted the first *Palawan Youth Forum on Crocodile Conservation* in celebration of the World Wildlife Day in March 2017. Youth leaders of Palawan were gathered together to craft resolutions in addressing the on-going major threats to crocodiles including habitat conversion, over-exploitation or illicit wildlife trafficking.
- Series of community and public schools awareness outreach activities in the island of Balabac, Palawan was jointly conducted by the DENR Palawan Wildlife Rescue and Conservation Center, Palawan Council for Sustainable Development Staff and the CPPI.

Prepared by: Lonnie McCaskill, Regional Chair East and Southeast Asia

Date prepared: 4 April 2018