Population Structure and Genetic Variation in the Philippine Crocodile (Crocodylus mindorensis)

Report to IUCN-SSC Crocodile Specialist Group on SRAS Project No. 09/11

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Project Background

The endemic Philippine crocodile (Crocodylus mindorensis) is considered to be one of the most highly threatened crocodilians in the world. Historically known to occur throughout the Philippine archipelago, the species is now confined to small and isolated populations on the islands of Luzon and Mindanao. Reintroduction was considered as an important element for the recovery of this species in the wild. Successful captive breeding programs initiated in the 1980s resulted in hundreds of captive Philippine crocodiles, many of which are potential reintroduction candidates to suitable habitats. However, preliminary genetic studies found Crocodylus porosus-C. mindorensis hybrids in the largest captive population, raising concerns on species integrity and suitability of the captive population for reintroduction. In addition, unresolved issues on the extent of genetic differentiation among extant populations hampered recovery plans for years.

To resolve these issues, a Philippine crocodile genetics project was initiated through a collaboration among various universities, zoological institutions, captive facilities, crocodile conservationists and the Philippine Government. This particular study examined population structure and genetic variation in the Philippine crocodile as revealed by microsatellite DNA loci. Initially, the project had three primary goals, to: 1) assess the population structure and genetic diversity in wild and captive populations; 2) identify captive crocodiles with maximum genetic diversity that could serve as founders for the reintroduction program; and, 3) estimate the loss of genetic diversity through time by using preserved C. mindorensis from museums and contemporary samples. This report summarizes the project accomplishments between May 2009 and May 2010.

Research Accomplishments

As of 2009, a total of 618 Philippine crocodile tissue samples from captive institutions and wild populations were collected and sent to the genetics laboratory at the Henry Doorly Zoo (HDZ) in Omaha, Nebraska, USA. I collected 461 of these tissue samples while the rest were collected by various collaborators. Part of the CSG Students Research Assistance Grant (SRAS) was used to purchase materials used during the sample collection in the Philippines. In addition, I was able to obtain 9 Philippine crocodile tissue samples from the Philippine National Museum, the University of the Philippines Museum of Natural History and the Smithsonian Institution, for genetic analyses.
The preserved tissue samples from the museums were brought to Massey University (New Zealand) for DNA extraction. Unfortunately, the poor quality and preservation of the samples prevented the extraction of DNA suitable for Polymerase Chain Reaction (PCR) and DNA sequencing. The study’s third objective depended on the extraction of DNA from these samples; thus, could not be met.

DNA extraction, microsatellite amplification and data analyses for the bulk of the samples was completed at the HDZ genetics laboratory. Laboratory work was conducted from 15 November 2009 to 15 February 2010. The balance the SRAS funding was used to purchase a whole genome amplification kit needed during this phase of the study. After completion of the laboratory work, I returned to New Zealand for further analysis of data and to write my thesis. My manuscript is now in the final stages of revision and is due to be submitted by the first week of June 2010 to my college as a requirement for a degree in Conservation Biology (MSc).

This research found that population structuring exists in *C. mindorensis* populations (Objective No. 1). Baseline genetic diversity estimates for wild and captive populations were also generated and these will be useful for conservation planning and management. In addition, the bulk of the captive population has been screened for genetic integrity and suitable and unsuitable candidates for the reintroduction program have been identified (Objective No. 2). A scientific paper detailing the results of this study is currently being prepared for publication. I plan to present a copy of my thesis to the Philippine Crocodile Recovery Team and the research collaborators once it has been marked and finalised.

Citation: