

# Molecular characterization of the spectacled caiman (*Caiman crocodilus*) in the Upper Magdalena River Basin, Colombia: demographic and phylogeographic insights

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**Abstract:** Maintenance of high levels of genetic diversity is crucial for the recovery of overexploited species and acquiring knowledge of genetic diversity of natural populations is crucial to define effective conservation strategies. Spectacled caimans (*Caiman crocodilus*) were unsustainably exploited for decades in Colombia causing drastic population reductions with unknown effects on genetic structure. We molecularly characterized three spectacled caiman populations from the Upper Magdalena River Basin (UMRB), analyzing them within the context of the trans-Andean *C. c. fuscus* sensu stricto lineage, assessing nucleotide and genetic diversity, demographic history, and phylogeography at different scales. Seventeen of the 23 mitochondrial haplotypes currently described for Colombia are present in the UMRB, showing high levels of genetic diversity even when compared with the trans-Andean region (uncorrected genetic distances 0.00-0.87%). Mutational steps between closest haplotypes ranged from one to four while the most differentiated haplotypes were separated by 19 mutational steps across the whole trans-Andean region. Distribution of pairwise nucleotide differences and raggedness tests showed unimodal patterns of mismatch distribution curves fitting the sudden expansion model. Average time since demographic expansion for UMRB, Colombia, and trans-Andean region were inferred as 10,540, 7,591, and 7,071 years before present, respectively, placing the latest expansion close to the Pleistocene-Holocene boundary. Intriguingly, samples from Tolima were overall more related to those collected from Panama and Costa Rica ( $0.34 \pm 0.15\%$ ) than the ones collected across Choco ( $0.45 \pm 0.15\%$ ), Cauca ( $0.70 \pm 0.09\%$ ), and Nariño ( $0.60 \pm 0.14\%$ ) departments. We discuss our genetic findings in the context of the management policies carried out in the country during the last decades (unsustainable and sustainable use, and population restocking), evaluating the implications of these events for the genetic integrity and conservation of the species.

**Keywords:** Conservation genetics, Colombia, Wildlife management, Genetic diversity

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