

Body condition, growth, and survival of the American crocodile (*Crocodylus acutus*) in the Florida Everglades

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Abstract: The American crocodile (*Crocodylus acutus*) is a flagship, federally threatened species and ecosystem indicator that directly links responses of crocodiles to hydrologic restoration in the Florida Everglades. Here, a long-term mark-recapture study of American crocodiles was conducted in south Florida from 1978 to 2015. Over the study period, 10,040 crocodiles were captured, with more than 90% of captures being hatchlings. We estimated hatchling survival at 25%, which steadily increased with age to near 90% survival from age six onward. Survival rates decreased with hypersalinity and differed between nesting areas. Body condition and growth of crocodiles were strongly age-structured with younger crocodiles found in lowest body condition but growing fastest and larger crocodiles continuing to grow. Crocodile body condition decreased with more days of hypersaline conditions and low annual salinity had positive effects on body condition. High average salinity conditions during the dry season strongly reduced growth rate. After the first year under high salinity conditions, there was a 13% decrease in crocodile growth, a 24% decrease at 5 years old, and a 29% decrease in growth at 10 years of age. Crocodiles captured in Northeastern Florida Bay where hydrologic conditions have been most altered were in lowest body condition, had reduced growth rates, and had the lowest survival rates relative to other nesting areas of South Florida. These findings support the hypothesis that restoring freshwater flow will reduce hypersaline conditions and will result in crocodiles in better condition, with faster growth rates, and greater survival in the Florida Everglades. American crocodiles are an effective bioindicator and illustrate the need for continued restoration efforts in NE Florida Bay to ensure health of the Florida Everglades.

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