

2020 STATE NMJAS SENIOR DIVISION RESEARCH PAPER COMPETITION WINNER

CLIMATE CHANGE ON CROCODILIANS: MODELING THE EFFECTS OF VARIATIONS IN RAINFALL ON CROCODILIANS AND THEIR ECOSYSTEM

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ABSTRACT

Climate change is projected to cause significant changes to global precipitation patterns. To explore how crocodilians and their ecosystems are impacted by variations in rainfall, a model of was created using a novel adaptation of the Lotka-Volterra equations. The model uses a time step of months, and includes a crocodilian, three plant species, and eight other animal species. Each year, populations are impacted by predator-prey interactions and reproduction. Rainfall only impacts the ecosystem through the plant populations. This model was validated by running it with Louisiana rainfall data from 1970-2018 and comparing the outputs to measured alligator nest count data. The populations in the model followed a similar pattern to the nest count data, showing that the model accurately describes how rainfall affects the ecosystem. Changes in the amount of rainfall caused the populations to increase or decrease in proportion to the rainfall. Changes in the timing of rainfall affected the seasonal variation of plant populations, which caused animal populations to increase or decrease depending on whether the plant populations were above or below average when they reproduce. Crocodilians and their ecosystems are likely to be harmed by climate change and developing management programs will be important to protect them.