Modeling American Alligator Population Dynamics

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The American alligator, Alligator mississippiensis, was hunted extensively until a management program was started in 1967. This management program, which is still used today, consists of hunting, egg collection, and farm release. The purpose of this experiment was to better understand the effects of human interaction and hurricanes on alligator population dynamics. The hypothesis was that human interaction can help the alligator population recover from hurricanes. A model was made using python code to test this. The model includes exponential growth, carrying capacity, aging, predator-prey interaction, hurricanes and human interaction in the form of farm release, egg collection and hunting. Without human interaction, the populations took three years to recover from a hurricane. Different variations of human interaction did not affect the recovery time. The hurricanes that occurred in Louisiana from 1950-2000 were modeled to determine if subsequent hurricanes affect recovery. The recovery was longer when hurricanes came in quick succession. Modeling a historical hunting level (50% & 20% on alligator adults and young) caused the alligator adult population to be very low. Managing the historical hunting level with farm release and egg collection was attempted. No levels of farm release and egg collection manage this level of hunting, as increased farm release caused the alligator population to exceed the carrying capacity, which made it drop because there were not enough resources. The hypothesis was not supported because hurricane recovery was only minimally affected by human interaction. Successful management plans must balance alligator and human needs.

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