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American Alligator Population Ecology

The USGS Florida Caribbean Science Center's Restoration Ecology Branch at Everglades National Park conducts research on the American alligator in the Florida Everglades. The Center's scientists, in cooperation with the National Park Service and other State and Federal resource managers, investigate the effects of hydrological patterns on alligator population dynamics, providing information critical to the restoration of the Everglades Ecosystem.

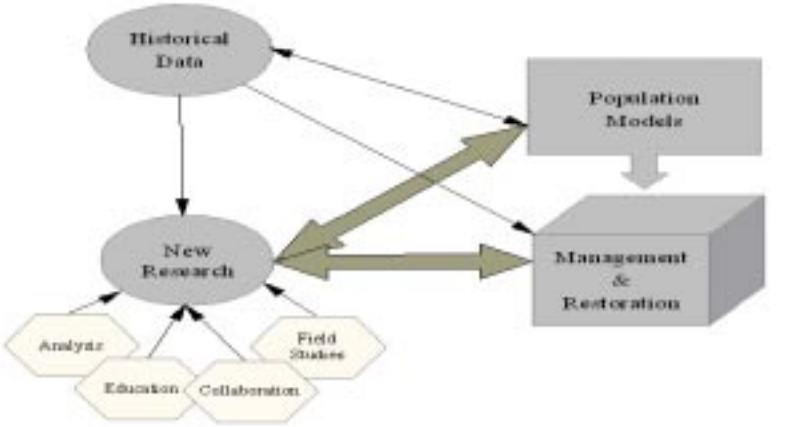
The USGS Florida Caribbean Science Center, Restoration Ecology Branch, located in Miami, Florida, conducts research in cooperation with the National Park Service, Fish and Wildlife Service, Florida Game and Fresh Water Fish Commission, and other management agencies to understand the effects of hydropattern on alligator populations in the Everglades of south Florida.

The greater Everglades of south Florida are characterized by complex patterns of spatial heterogeneity and temporal variability. Spatial and temporal hydrologic patterns [hydropattern], which result from the distribution, volume, and timing of water flow, are major driving forces controlling the trophic dynamics of these systems.

After many decades of intense adverse water management practices, hydrologic restoration alternatives are now being developed and proposed to restore the diverse ecosystems of the greater Everglades. Thus, there is a need to predict and to compare the future effects of alternative hydrologic restoration scenarios on the biotic components of these systems.

The American alligator is not only a top consumer in the Everglades, but also physically influences the system through construction and maintenance of alligator holes. Existence of alligators is important to the faunal and floral character of the Everglades as the system has evolved. However, despite the alligator's visibility and biological importance to the system, many important questions about its basic behavioral and population parameters remain unanswered.

There is no reasonable certainty in estimates of movements or survival of varying size classes of alligators under either stable or fluctuating water levels. The reproductive contribution of individual animals or of different size/age classes in a given year has been a principal stumbling block for attempts at modeling any crocodilian population. Our studies include both field experiments and statistical models to obtain better estimates of movements, survival, and reproduction. Further, broad project goals include end products of ecologically-based ecosystem models (under the model integration framework, Across Trophic Level System Simulation – ATLSS) including predictive population model(s) for alligators to be used in evaluating restoration scenarios for South Florida.



Alligator Population Ecology Program Structure

Department of the Interior
U.S. Geological Survey
Florida Caribbean Science Center
http://www.fcsc.usgs.gov

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Ongoing Research and Collaborations

Alligator Movement, Habitat Use and Preference, Survival, and Breeding Potential

K. G. Rice and T. S. Gross, USGS/BRD/Florida Caribbean Science Center; H. F. Percival, USGS/BRD/Florida Cooperative Fish and Wildlife Research Unit.

This study uses radiotelemetry to monitor the movement patterns of alligators in Everglades National Park (Shark River Slough) and Water Conservation Area IIIA. Over the course of the study, approximately 80 animals (partitioned into area, habitat, sex, and size classes) have been implanted with transmitters and monitored for 1-3 years. Preliminary analyses including estimates of home-range size, habitat preferences, nesting parameters, and movement patterns are available.

Alligator Thermoregulation

K. G. Rice and T. S. Gross, USGS/BRD/Florida Caribbean Science Center; H. F. Percival, USGS/BRD/Florida Cooperative Fish and Wildlife Research Unit.

Of the 80 telemetered animals discussed above, approximately 30 additionally were implanted with temperature data recorders. The recorders logged internal body temperatures every hour for 1 year. After recapture, the loggers were removed and coupled with corresponding environmental temperatures. It is now possible to address questions concerning metabolic costs of surviving in various thermal environments. These data, in conjunction with the telemetry results outlined above and further measurements of alligator holes and canals discussed below, will allow exploration of the relative role of canals and other landscape features and hydrological impacts on alligator populations.

Alligator Holes

K. G. Rice, USGS/BRD/Florida Caribbean Science Center; H. F. Percival, USGS/BRD/Florida Cooperative Fish and Wildlife Research Unit.

During the course of the telemetry study, it became apparent that animals existing in natural slough habitats within marshes used the landscape in very different ways from animals living in canal systems. Marsh animals use 1 to 5 alligator holes for thermoregulation, cover, and, presumably, feeding. To better understand the role of alligator holes and canals in the life-history of the alligator, we have undertaken a task to catalog physical attributes of holes or canals used by each telemetered alligator. This information will be important for simulation population models, and in determining the relative importance of these landscape features.

Breeding Potential Index

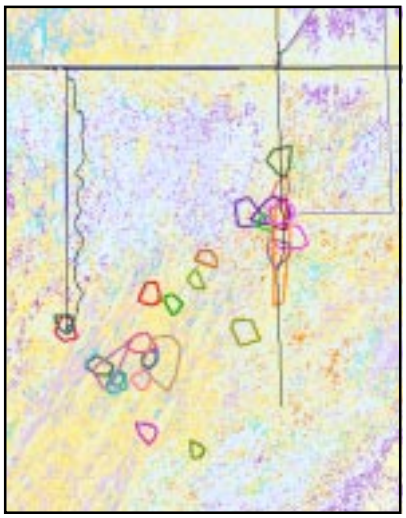
K. G. Rice, USGS/BRD/ Florida Caribbean Science Center.

As a component of ATLSS, the alligator breeding potential index provides an estimate of the relative rate of successful offspring production under varying hydrological conditions in south Florida. The model uses index estimates for nesting potential, habitat conditions, and nest-flooding potential to construct an index value for each 500m cell in the greater Everglades ecosystem. When fully functional, the index will provide comparisons of each proposed restoration alternative and base condition under the Central and Southern Florida Project Restudy.

Population Model

K. G. Rice, USGS/BRD/Florida Caribbean Science Center.

A matrix-based population simulation model for the alligator in south Florida will be constructed during 1999-2000. This model, while having the same underlying goals of the above index (to explore the effects of varying hydrological alternatives on alligator populations), will investigate other life-history parameters. In concert with this model, historical data sets will be located and a database of alligator ecology studies will be produced. When coupled with the outputs from other existing models, the alligator population model will provide estimates of survival, fecundity, and growth (both individual and population) under each Restudy alternative and will be incorporated into the ATLSS program.



Alligator home-range in Everglades National Park

Acknowledgments

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Department of the Interior
U.S. Geological Survey
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