

1.0 Performance Measure Title

Wetland Trophic Relationships - American Alligator Distribution, Size, Nesting and Condition

Last Date Revised: December 2006

2.0 Justification

American alligator distribution, abundance, reproduction, and body condition in the Everglades are controlled by hydroperiod and water table in the Rocky Glades, salinity in the mangrove estuaries, and water depth patterns in the ridge and slough system, all of which were driven by direct rainfall and sheet flow prior to drainage.

Compartmentalization, disrupted sheet flow, and regulatory water releases restrict alligator populations in the ridge and slough landscape by causing nest flooding, unsuitable over-drained and pooled habitats in the Water Conservation Areas, and low hatchling and juvenile survival in canals during low water periods.

3.0 Relationship to CEMs and Adaptive Assessment Hypotheses

Everglades Ridge and Slough, Southern Marl Prairies, Everglades Mangrove Estuaries, and Big Cypress Regional Ecosystem Conceptual Ecological Models attribute (RECOVER 2004b)

Ecological Premise: The distribution and reproduction of American alligator populations have been reduced as a result of altered hydrologic conditions and the reduced abundance and accessibility of prey organisms that accompany the hydrologic alterations.

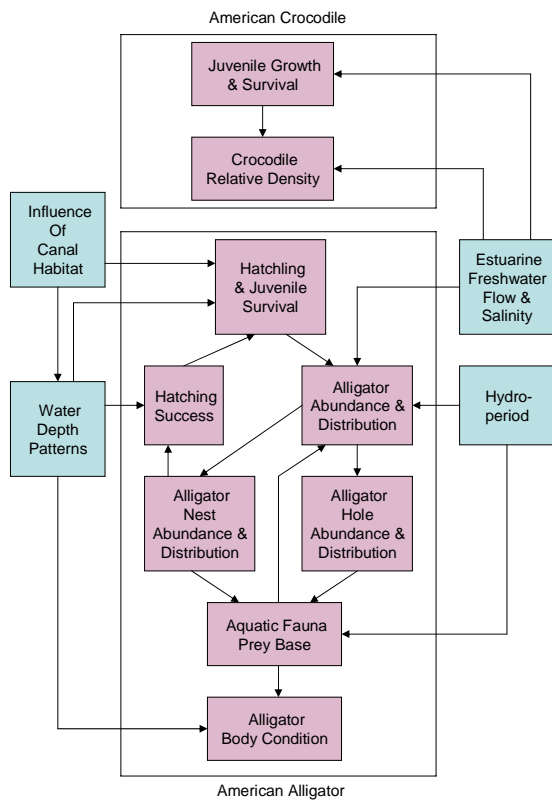
Greater Everglades Wetlands Module Everglades Crocodylian Population Hypothesis:

Hypothesis 1:

American alligator populations in relation to hydroperiod, water table, water depth, and salinity in the Everglades.

Rationale: Shortened hydroperiod and lowered water table in the rocky glades have reduced alligator abundance and reproduction because of loss of aquatic habitat required for survival and reduced aquatic prey base. A positive feedback loop of increased alligator populations and alligator holes (aquatic refugia) leading to increased aquatic fauna density (alligator prey) has been disrupted. That feedback loop is assumed to have been functional under pre-drainage conditions in the rocky glades where alligators were formerly abundant, although it is clearly not functional in the drained marshes today.

Everglades Alligator Populations Conceptual Ecological Model



4.0 Restoration Expectation

With the resumption of natural patterns of volume, timing, and distribution of flow to the Everglades, the American alligator is expected to repopulate and resume nesting in the rocky glades and the freshwater reaches of tidal rivers in the mangrove estuaries and will increase in population size and body condition throughout most of the Greater Everglades wetlands.

4.1 Predictive Metric and Target

For the total CERP project, the evaluation target is to improve total alligator production scores relative to the 2050 base. For implementation runs, the evaluation target is to exceed 2000 base production scores. Efforts to refine and update a predictive model are in development with an expected completion date beyond 2008.

4.2 Assessment Parameter and Target

Restoration targets for spatial distribution and relative abundance of alligators in the Greater Everglades Wetlands include the following:

- Maintain present spatial distribution and relative abundance of alligators in the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR)
- Increase spatial distribution and relative abundance in west coast (e.g., Lostman's, Broad, North, Roberts, East and Shark Rivers) and C-111/Taylor Slough estuaries, Water Conservation Areas 2 and 3, Everglades National Park and the rocky glades, especially in peripheral wetlands. (
- Increase relative abundance in appropriate indicator habitats in impacted areas of Big Cypress based on regions with 100% hydropattern match to Natural System Model (NSM) Size classes targets are as follows:
- Maintain present size/sex classes in the LNWR
- Shift size classes in estuarine rivers from one dominated by males greater than 1.8 meters to a more even distribution with juvenile size classes represented
- Increase juvenile size classes in Water Conservation Area 3, Everglades National Park and rocky glades Draft CERP System-Wide Performance Measures June 18, 2004

Nesting effort and success targets are as follows:

- Maintain present values for nest success in the LNWR
- Decrease unnatural nest failure due to regulatory releases and ponding in Water Conservation Areas 2, and 3 and Everglades National Park
- Maintain nesting effort and success in central sloughs of Everglades National Park, and increase nests in peripheral wetlands, rocky glades and restored freshwater mangrove areas.
- Reduce management related fluctuations in annual nesting effort in Everglades National Park
- Increase the spatial extent and density for alligator nesting in the mangrove ecotone
- Increase number of nests and clutch sizes for alligators in appropriate habitats in impacted areas of Big Cypress based on indicator regions with 100% hydropattern match to NSM

Alligator hole distribution and occupancy targets are as follows:

- Maintain present values for occupancy of holes in LNWR
- Increase occupancy of holes in Water Conservation Areas 2 and 3, and Everglades National Park
- Maintain distribution of holes in central sloughs of Everglades National Park and increase active holes in peripheral wetlands and marl prairie.

5.0 Evaluation Application

5.1 Evaluation Protocol

Predictive models to evaluate this performance measure are still under development and refinement. At this time, this performance measure should not be used to conduct evaluations.

5.2 Normalized Performance Output

5.3 Model Output (example attached)
5.4 Uncertainty
Recognition of model uncertainty is needed when interpreting the ecological significance of model output. The Model Uncertainty Workshop Report provides guidance on the potential implications of uncertainty on model output interpretation (RECOVER 2002).
6.0 Monitoring and Assessment Approach
See CERP Monitoring and Assessment Plan: Part 1 Monitoring and Supporting Research - Greater Everglades Wetlands Module section 3.1.3.15 (RECOVER 2004a)
See <i>The RECOVER Team's Recommendations for Interim Goals and Interim Targets for the Comprehensive Everglades Restoration Plan</i> – Interim Goal 3.10 American Alligator (RECOVER 2005)
See RECOVER Team's 2006 Assessment Strategy for the Monitoring and Assessment Plan. Final Draft (RECOVER 2006)
7.0 Future Tool Development Needed to Support Performance Measure
7.1 Evaluation Tools Needed
An ATLSS model based on sound science has been developed for this performance measure and has been judged by the USGS as appropriate for use in some model-to-model comparisons. However, it is in need of further calibration, validation and peer review.
7.2 Assessment Tools Needed
Accessibility to the various data sources through an integrated database is needed for the complete evaluation of these hypotheses and for parameter refinement.
8.0 Notes
This Performance Measure supersedes and addresses GE-23 Wetland Trophic Relationships - American Alligator Distribution, Size, Nesting and Condition (Last Date Revised: November 03, 2005).
9.0 Working Group Members
Jana Newman, SFWMD; Patty Goodman, SFWMD; Andy Gottlieb, EPJV
10.0 Acceptance Status
GE Working Group November 3, 2005
ET
AT
Public Review
Final Acceptance Date
11.0 References
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- RECOVER 2002. Model Uncertainty Workshop Report: Quantifying and Communicating Model Uncertainty for Decision Making in the Everglades, Restoration Coordination and Verification Program (RECOVER), United States Army Corps of Engineers, Jacksonville District, Jacksonville, Florida, and South Florida Water Management District, West Palm Beach, Florida.
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