TESTING A NATURAL SYSTEM MODEL FOR USE IN SOUTH FLORIDA ECOSYSTEM RESTORATION

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Introduction and Background

• For two decades, restoration practitioners involved in ecosystem restoration activities in South Florida used the Natural System Model (NSM), a hydrologic model that simulates natural system response to relatively recent climatic conditions.

• A next generation of natural system modeling, developed by the South Florida Water Management District, is the Natural System Regional Simulation Model (NSRSM).
Introduction and Background

• Model developers from the District requested that RECOVER test the application of this model to assess its potential for use in the broad arena of restoration planning, analyses and implementation.

• RECOVER chose to use ecological models to evaluate the NSRSM.

• The ecological models were run using NSRSM hydrology, and were compared back to the NSM.

• Models were also compared to CEPP; these results are not shown here.
Ecological Models Being Applied

*Models completed:*
1. Freshwater fish densities (prey fish < 8 cm) (Trexler lab, FIU)
2. Wood Stork foraging index (SFNRC)
3. Alligator production suitability index (SFNRC)
4. Marl prairie habitat index (SFNRC)
5. Everglades Landscape Vegetation Succession (ELVeS) (SFNRC)

*Models in prep:*
1. Wading bird nesting effort (Gawlik lab, FAU)
2. Florida Bay multi-linear regressions (Cetacean Logic)
3. Crocodile habitat suitability index (Brandt, FWS)
4. Juvenile spotted seatrout (Kelble, NOAA)
RESULTS AND DISCUSSION
Freshwater Fish Densities

Freshwater fish density – NSRSM (left) v NSM (right): Percent change (center) in average fish density*

*Note the scale in left and right graphics; red denotes greater density, blue less
Wood Stork Foraging Potential

NSRSM (left) v NSM (right): all years
Wood Stork Foraging Potential

Wood storks shift foraging locations based on water depths across the landscape; depicted here are NSRSM wood stork foraging potential scores for February, April, June and July 2000 and 2004.
Alligator Habitat Suitability

NSRSM (left) v NSM (right): all years
NSRSM - American Alligator by Year

1975 (left, average rainfall year), 1989 (center, dry rainfall year) and 1995 (right, wet rainfall year)
Marl Prairie Habitat Suitability

NSRSM (left) v NSM (right): all years
ELVeS

ELVeS

ELVeS Conditional Probabilities

NSRSM – Sawgrass (left) and Open Marsh (right)
ELVeS Conditional Probabilities

NSM – Sawgrass (left) and Open Marsh (right)
Discussion

• Overall, the NSRSM suggests that historical conditions were wetter than previously predicted under NSM
• The finer mesh of NSRSM (~1.6 sq mi) than the NSM (4 sq mi), better captures landscape features such as Shark River and Taylor sloughs
Discussion

• There is agreement with the peer review panel (Bales, et al, 2007) that the model should not be used to set performance measure targets.
• NSRSM can be used as a guide, along with expert knowledge, to inform target setting.
• If results (of any model) seem counterintuitive, dig deeper into the data (ex. wood stork, alligator).
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