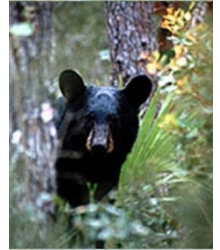




**Greater Everglades
Ecosystem Restoration
Conference
Coral Springs, FL
April 2015**



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

Agnes R. McLean, NPS/EVER

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)

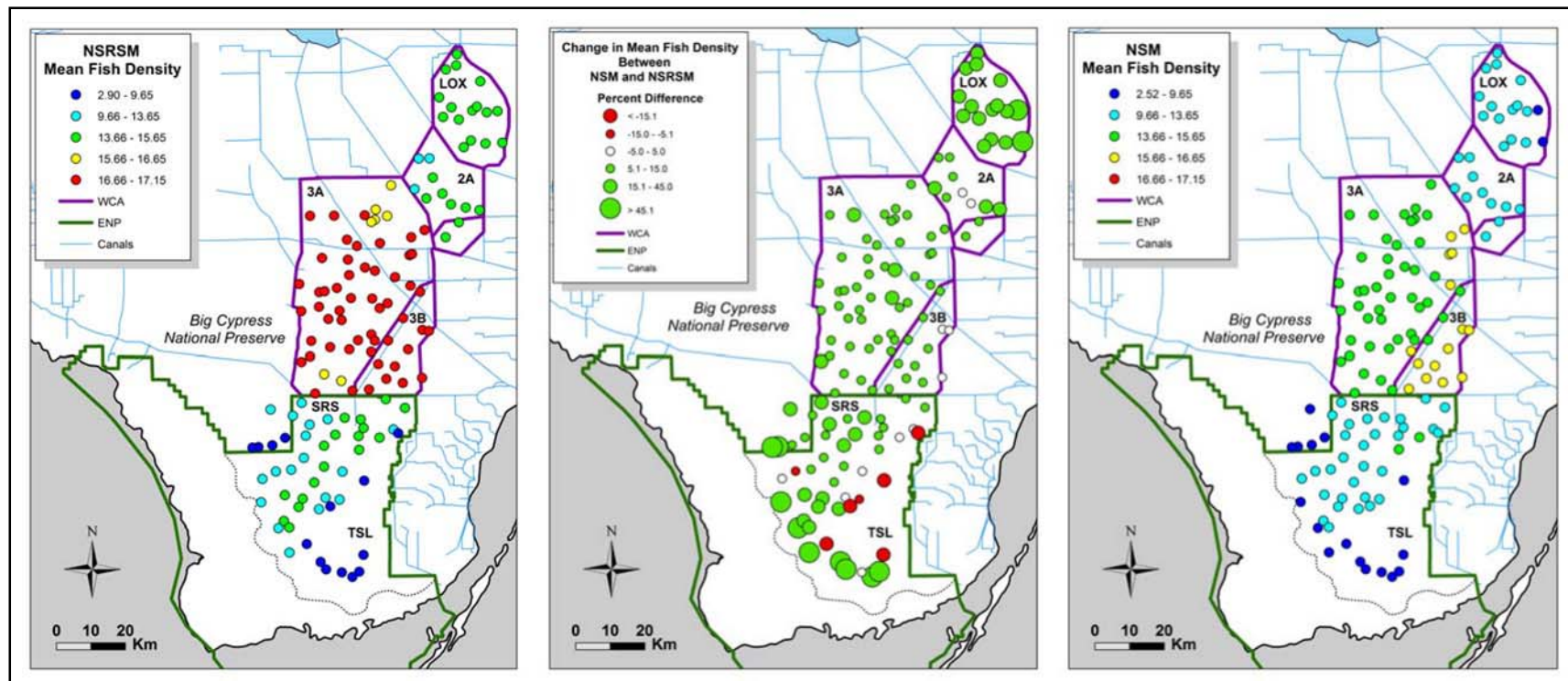




RESULTS AND DISCUSSION

Freshwater Fish Densities

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

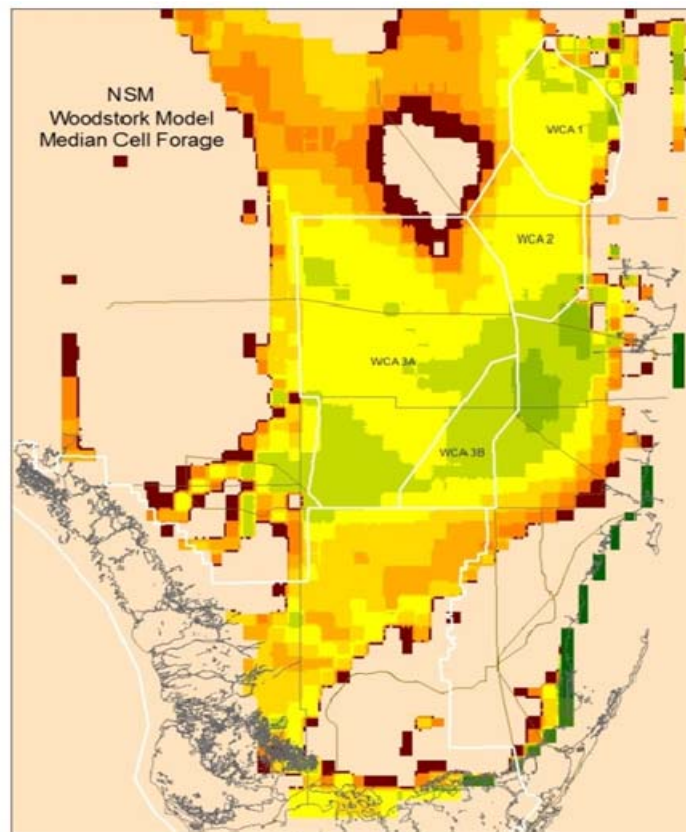
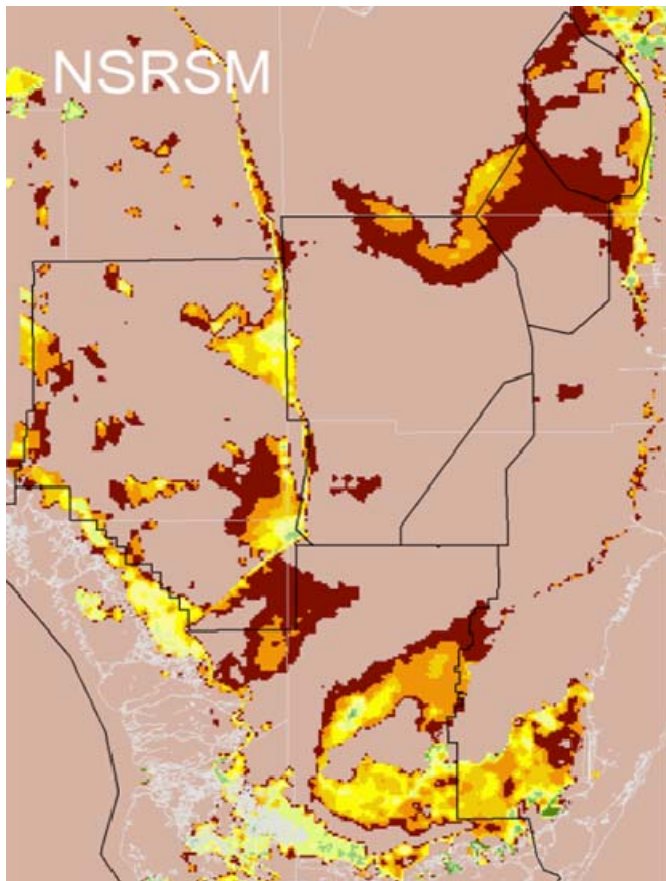


*Note the scale in left and right graphics; red denotes greater density, blue less

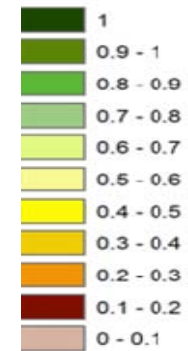


Wood Stork Foraging Potential

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



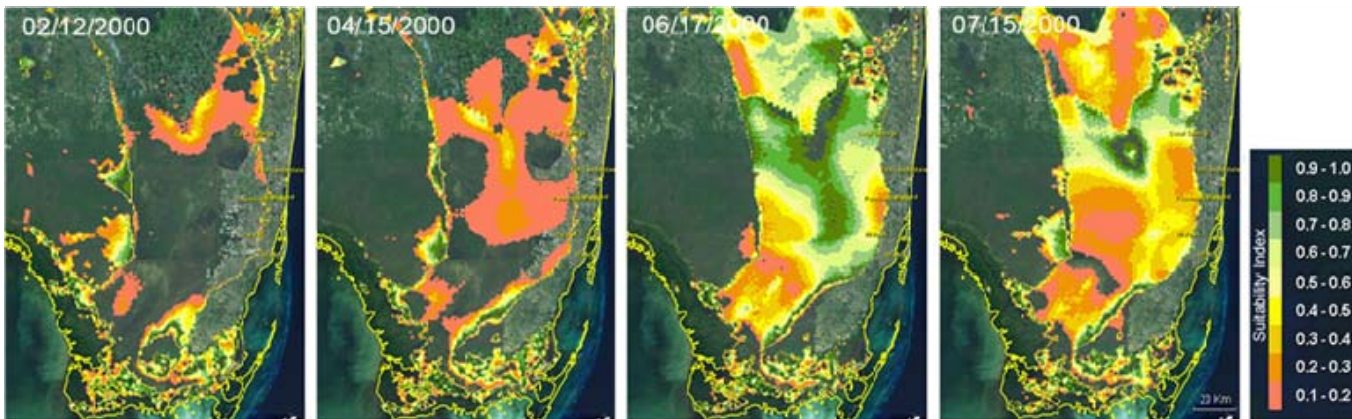
**Forage
Suitability**



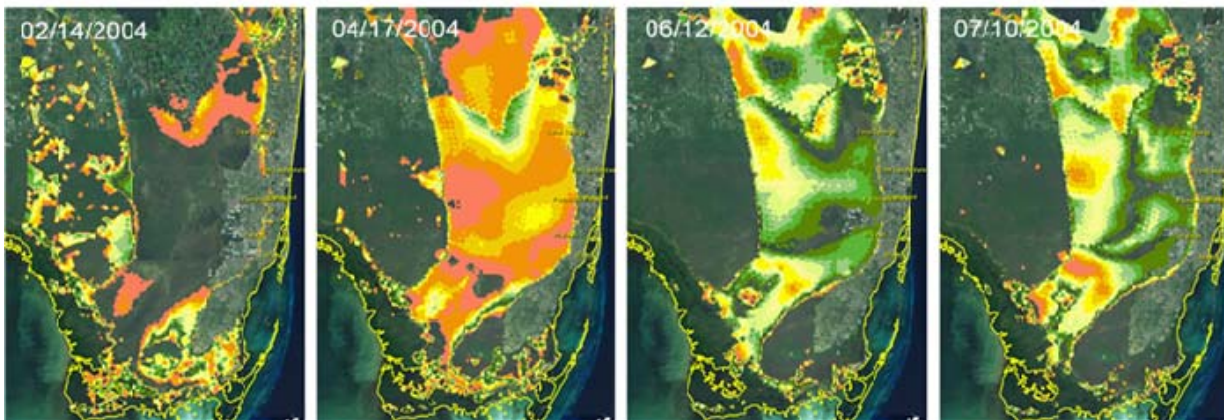
Wood Stork Foraging Potential

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

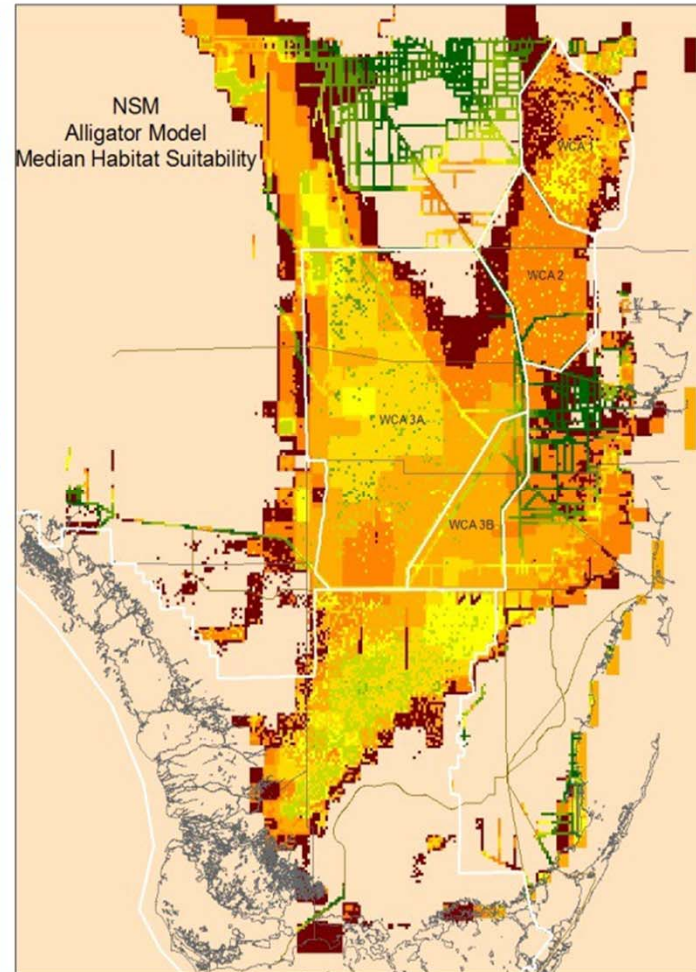
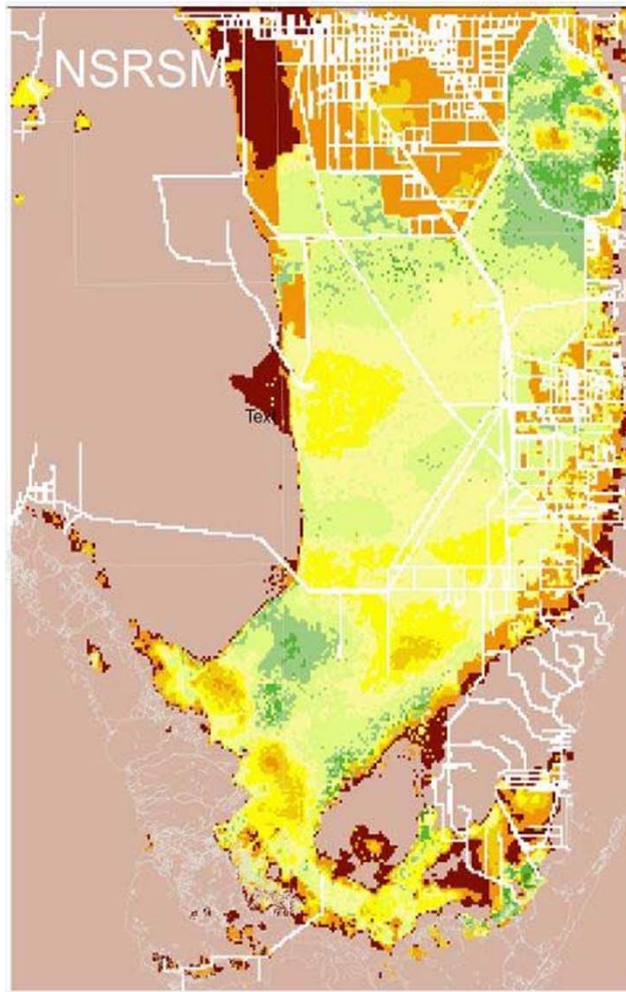


2004

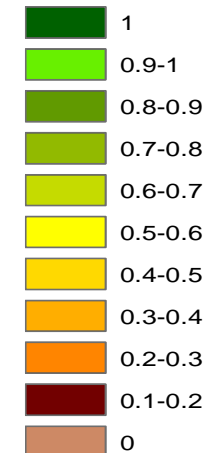


Alligator Habitat Suitability

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

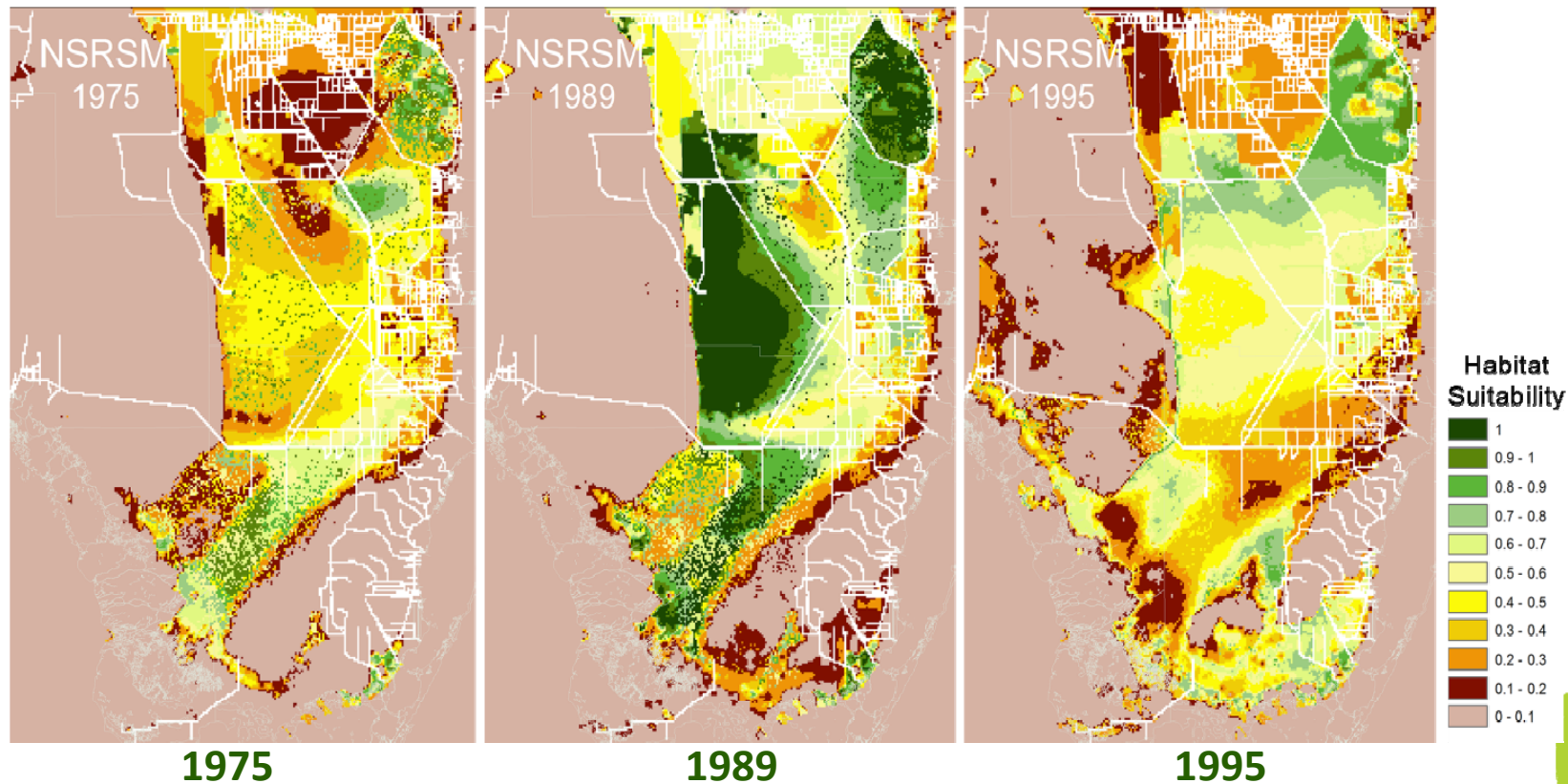


Habitat Suitability Index



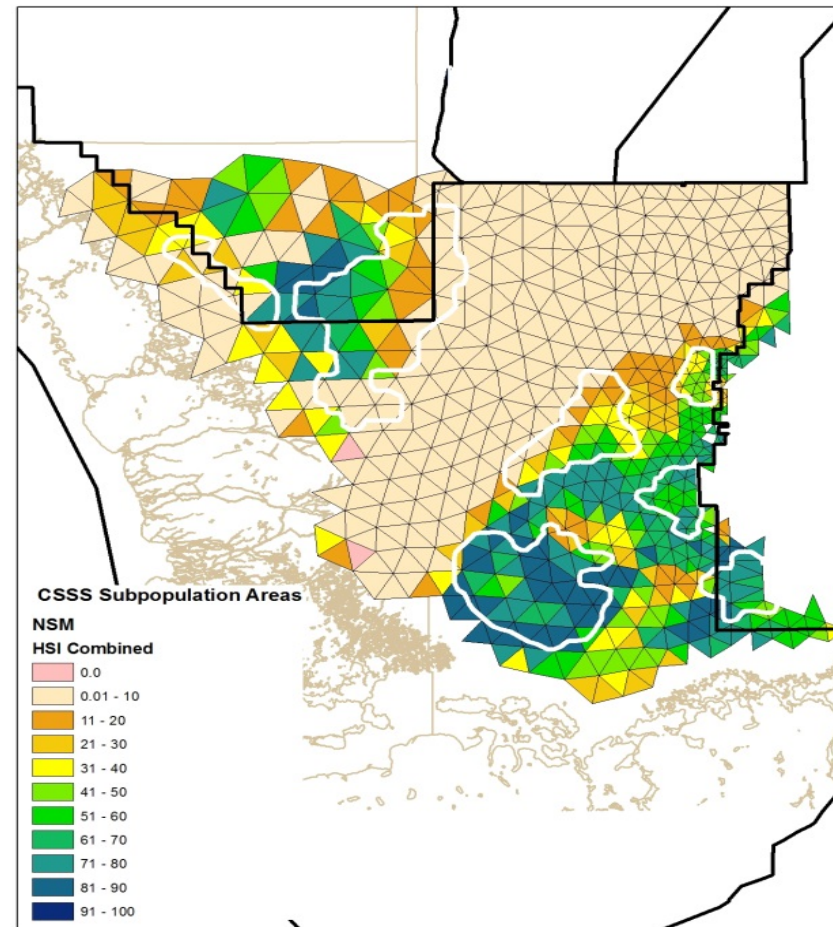
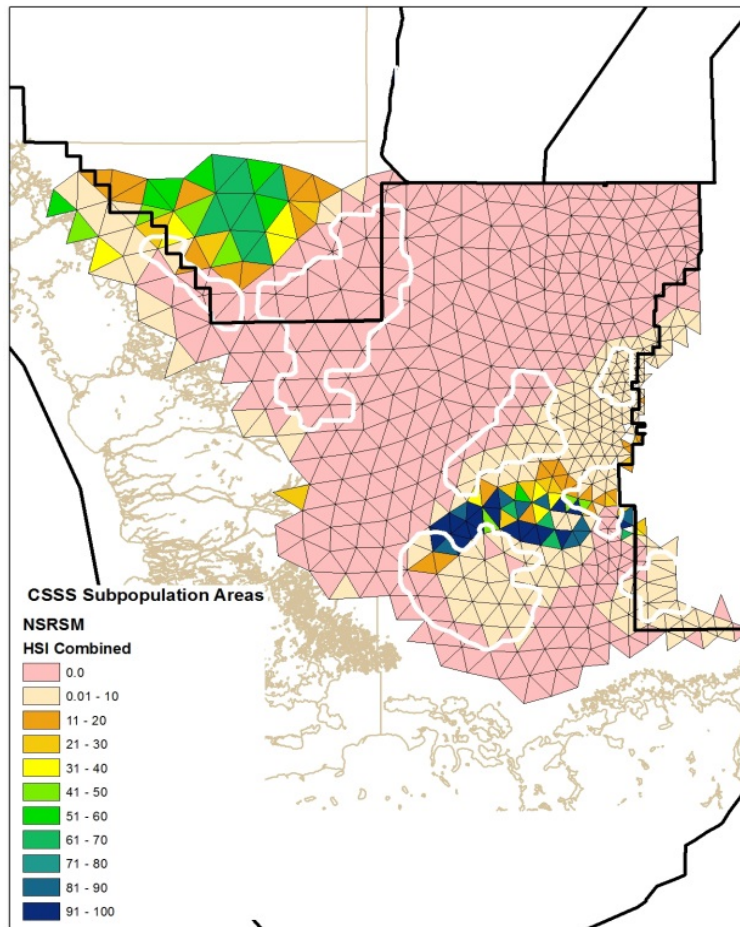
NSRSM – American Alligator by Year

1975 (left, average rainfall year), 1989 (center, dry rainfall year) and 1995 (right, wet rainfall year)



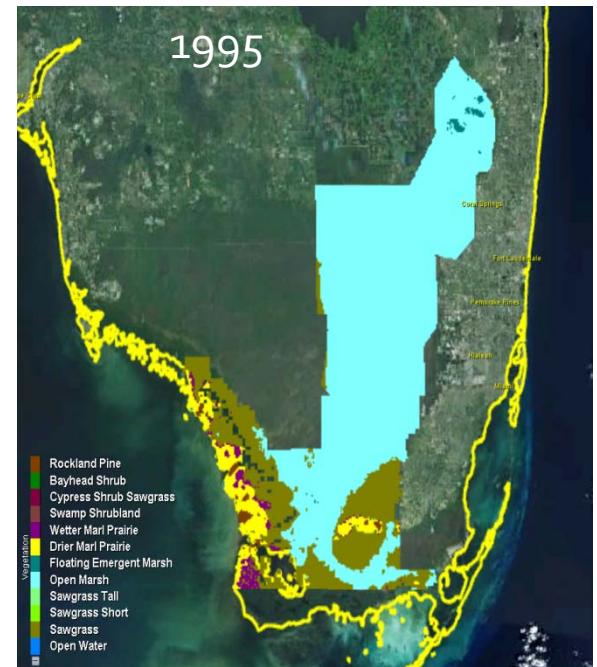
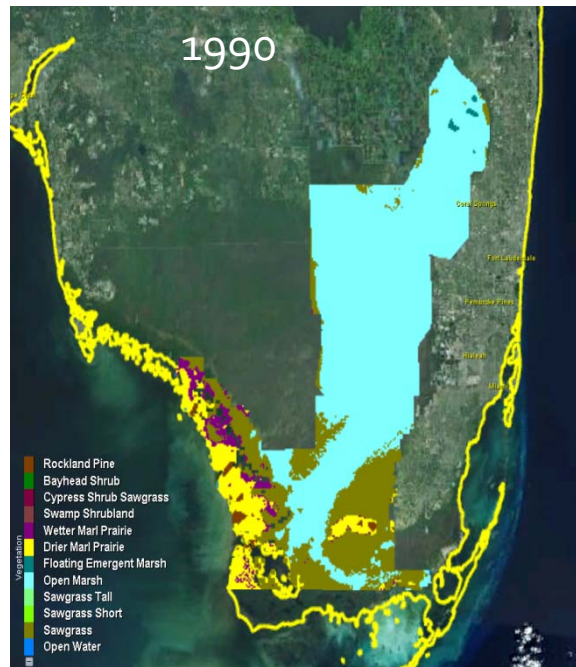
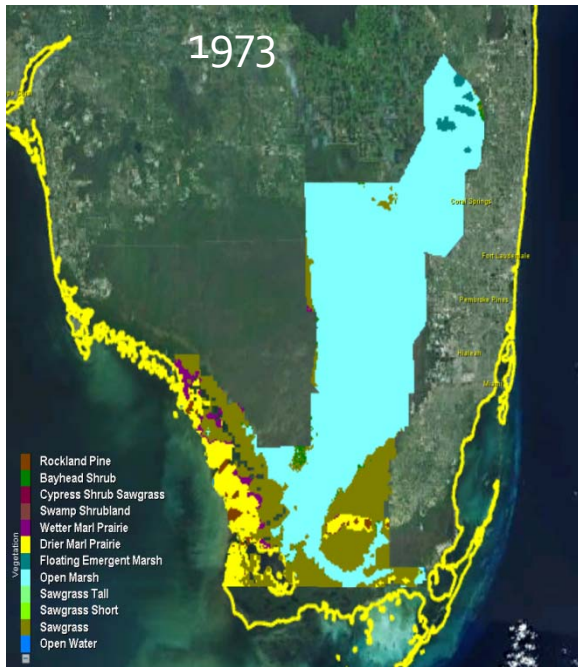
Marl Prairie Habitat Suitability

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



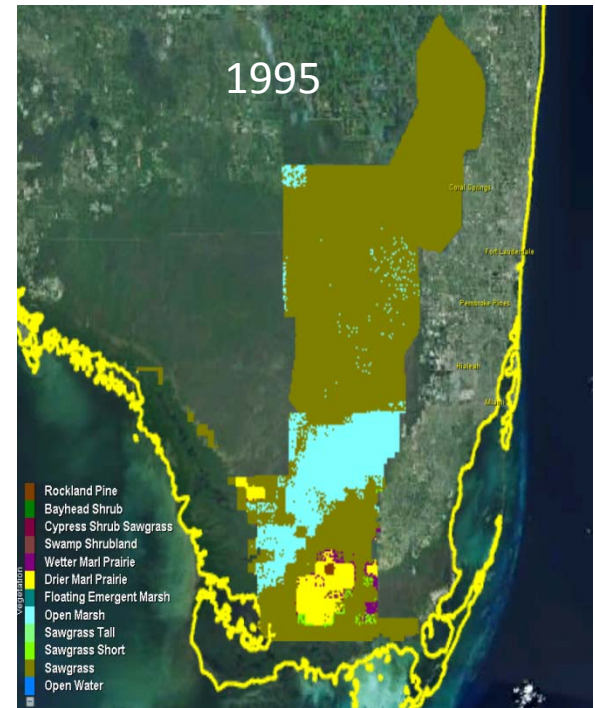
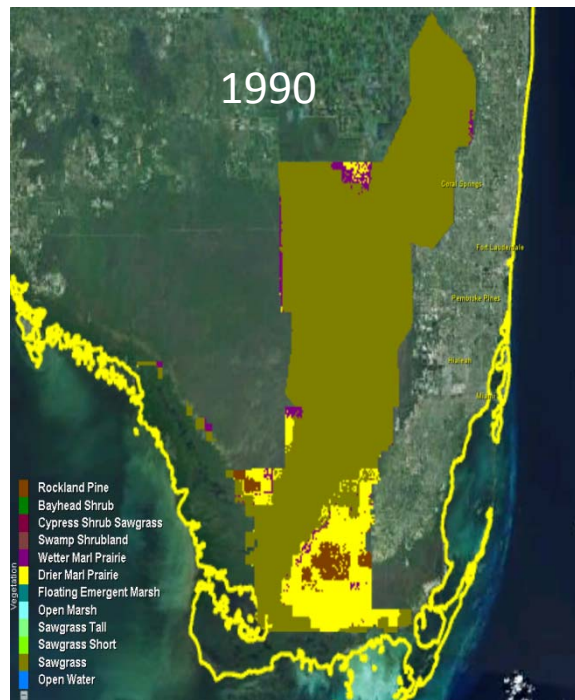
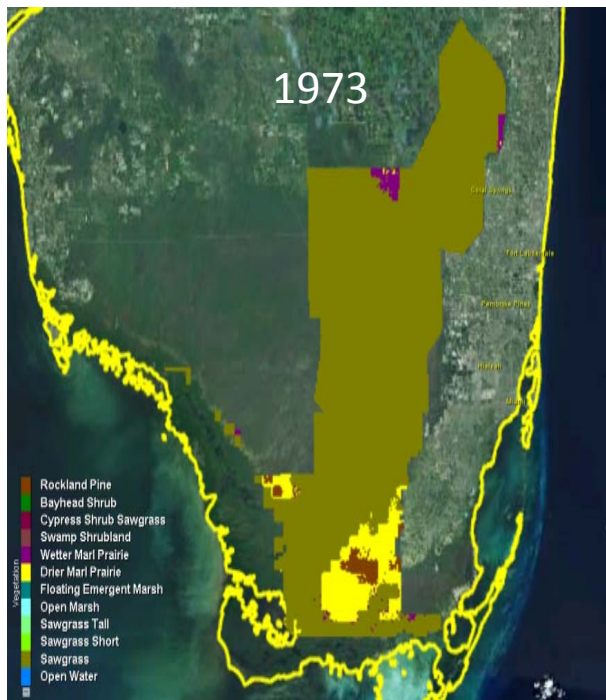
ELVeS

NSRSM – 1973, 1990, 1995



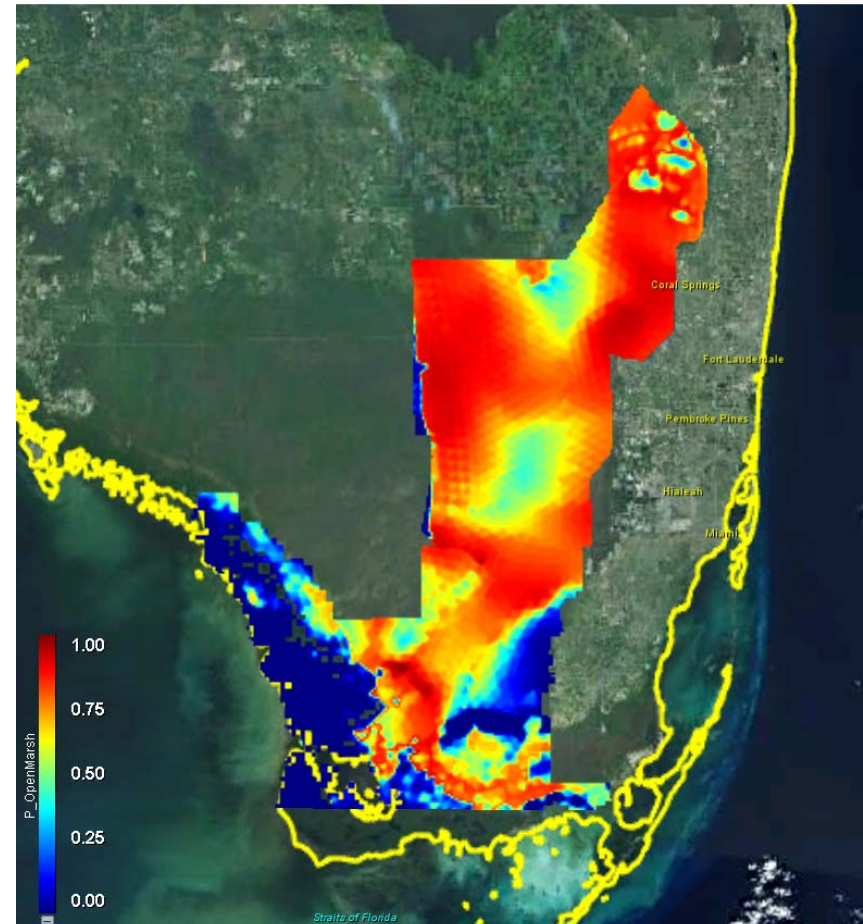
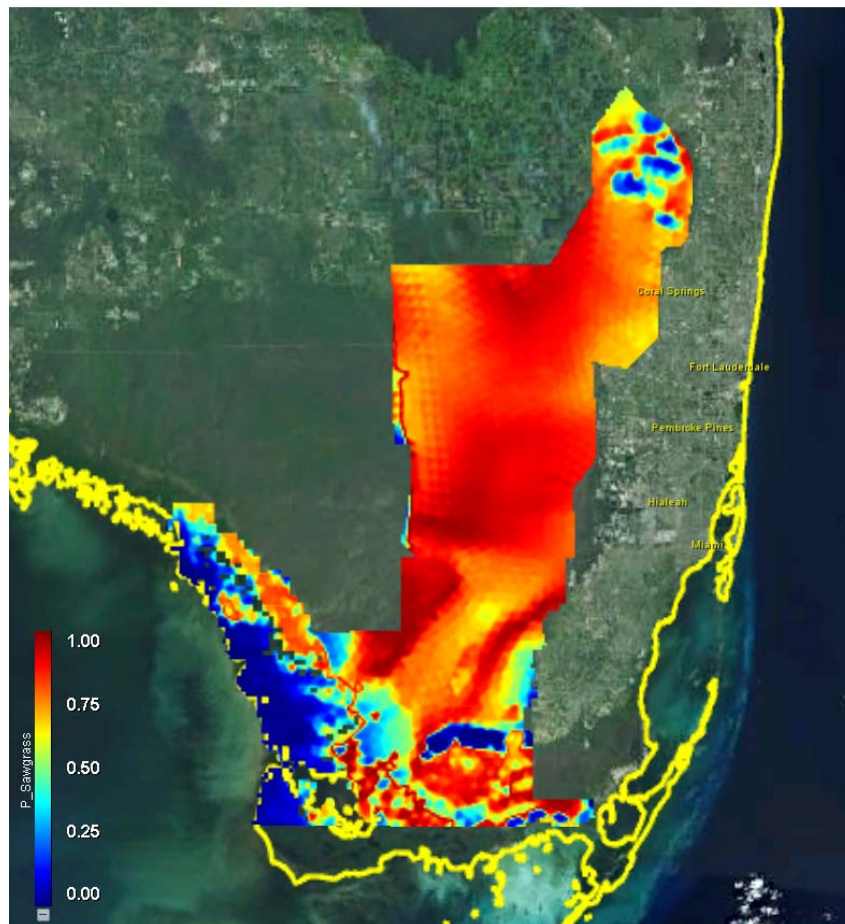
ELVeS

NSM – 1973, 1990, 1995



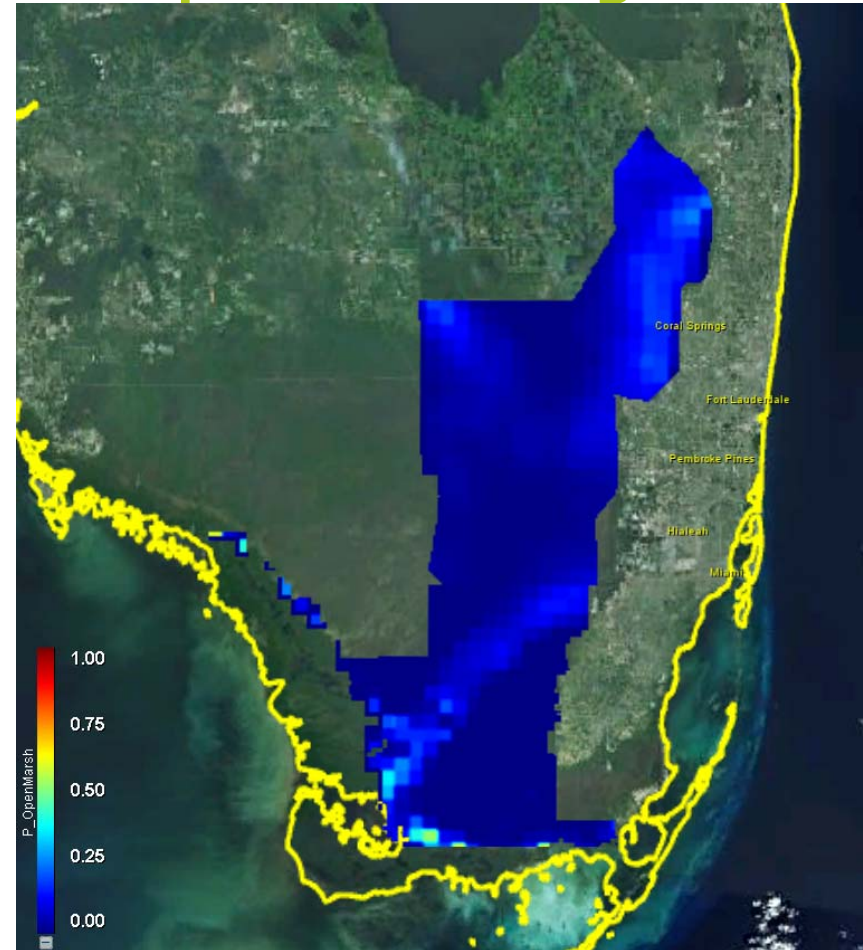
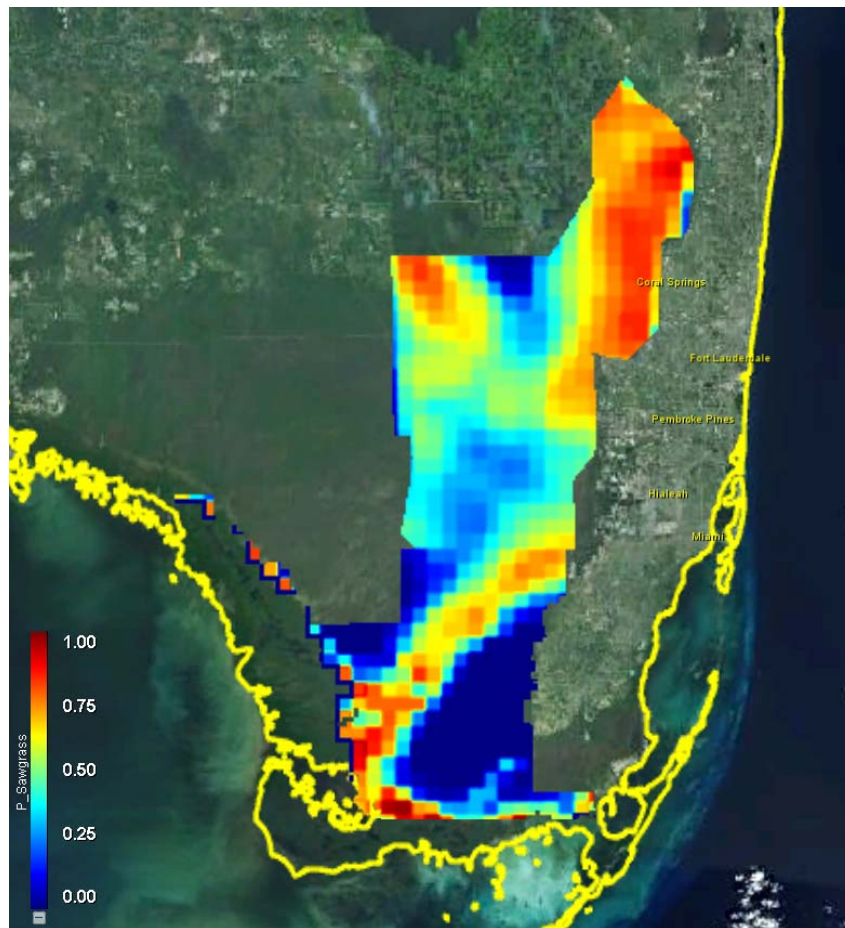
ELVeS Conditional Probabilities

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)



Acknowledgements

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THANK YOU