Gaining Insight From Restoration Scenario Evaluations With Wood Stork Nest Effort Models

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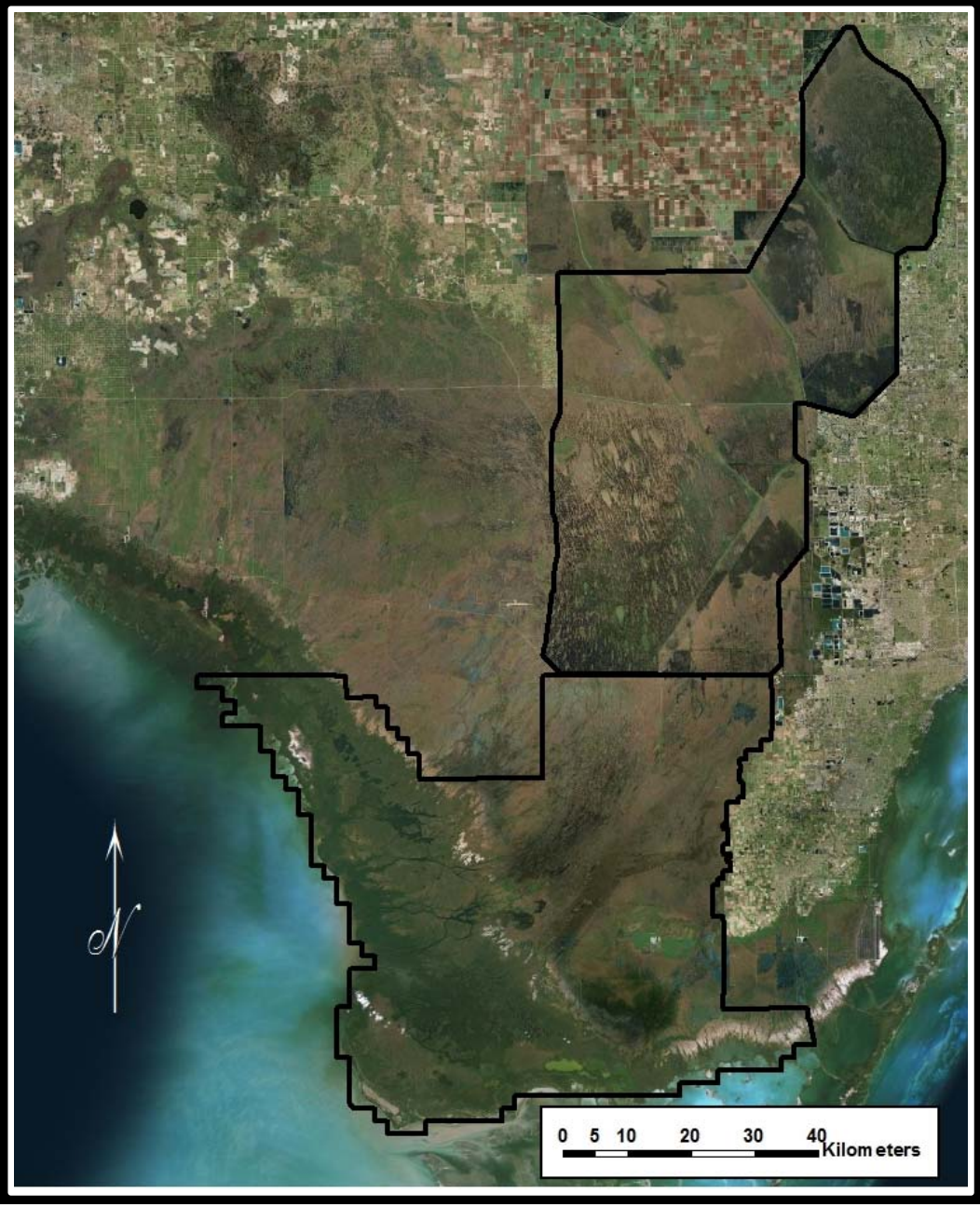
Objectives

- 1. Examine the relationship between large-scale long-term datasets to determine parameters that explain variation in Wood Stork nest effort.

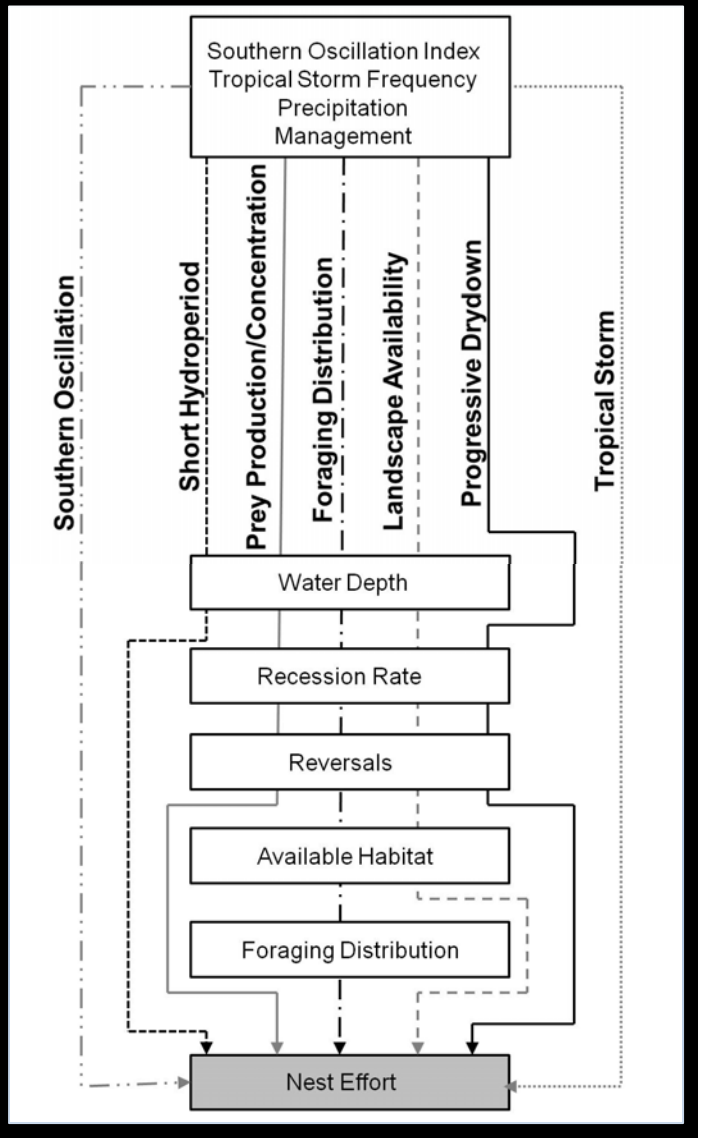
- 2. Use explanatory variables to predict Wood Stork nest effort under natural hydrologic conditions via Natural System Regional Simulation Model (NSRSM).

Model Extent



Nest Effort Model

- Seven *a priori* hypotheses
- Constructed a generalized linearized models (GLM)
  - ***Response Variable***: Nest Effort
    - 1991-2009
    - N=19
  - ***Parameters*** : Water Depth, Recession, Reversals, Foraging Distributions
- (AICc)
  - Restricted maximum likelihood estimator in SAS PROC MIXED
- Jackknife validation



Nest Effort Results

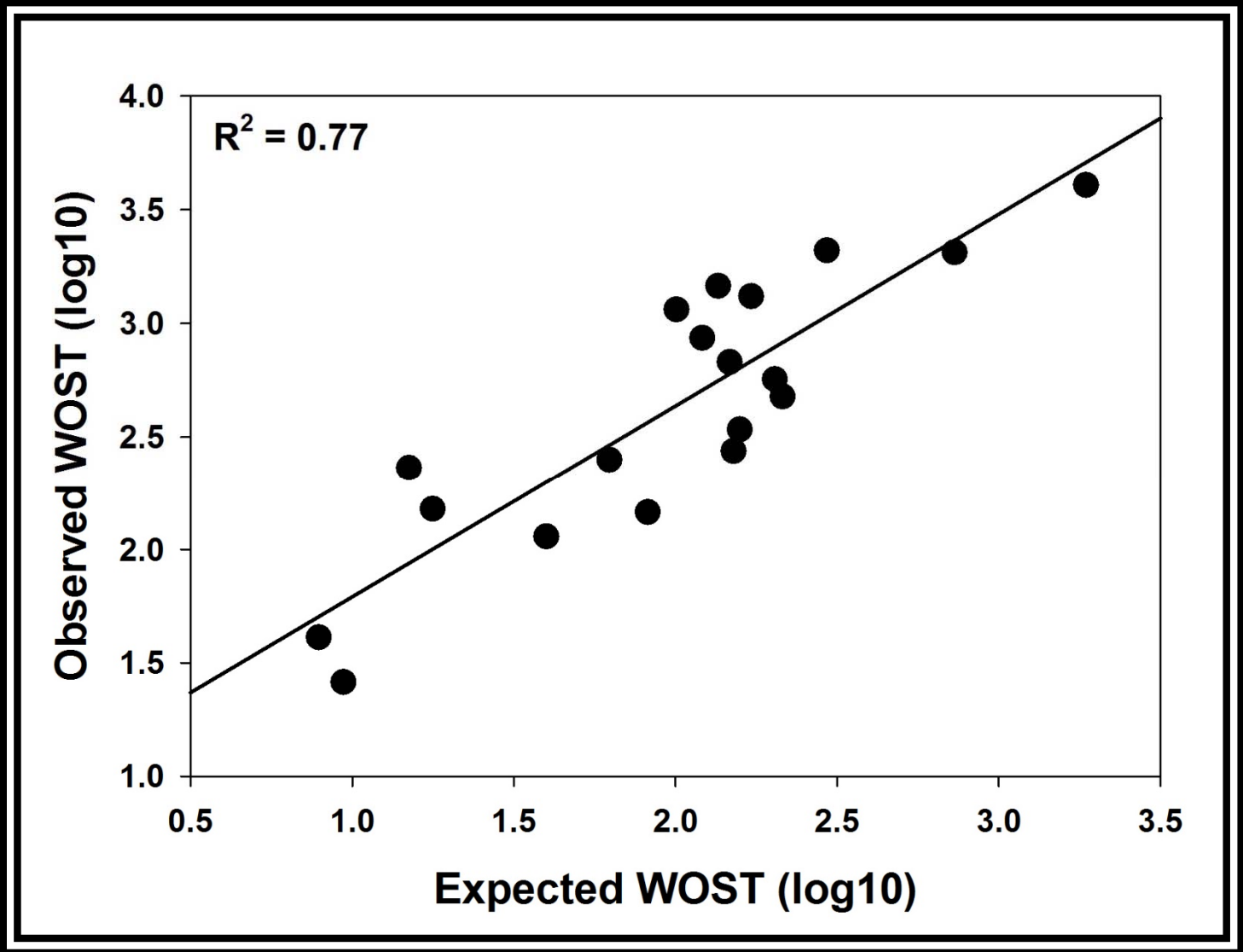
- Best Model
  - ***Prey Concentration Hypothesis*:**

    Initial Water Depth, Pre-breeding Recession, Post-breeding Recession

    (w_i =0.90 , R^2 = 0.94)

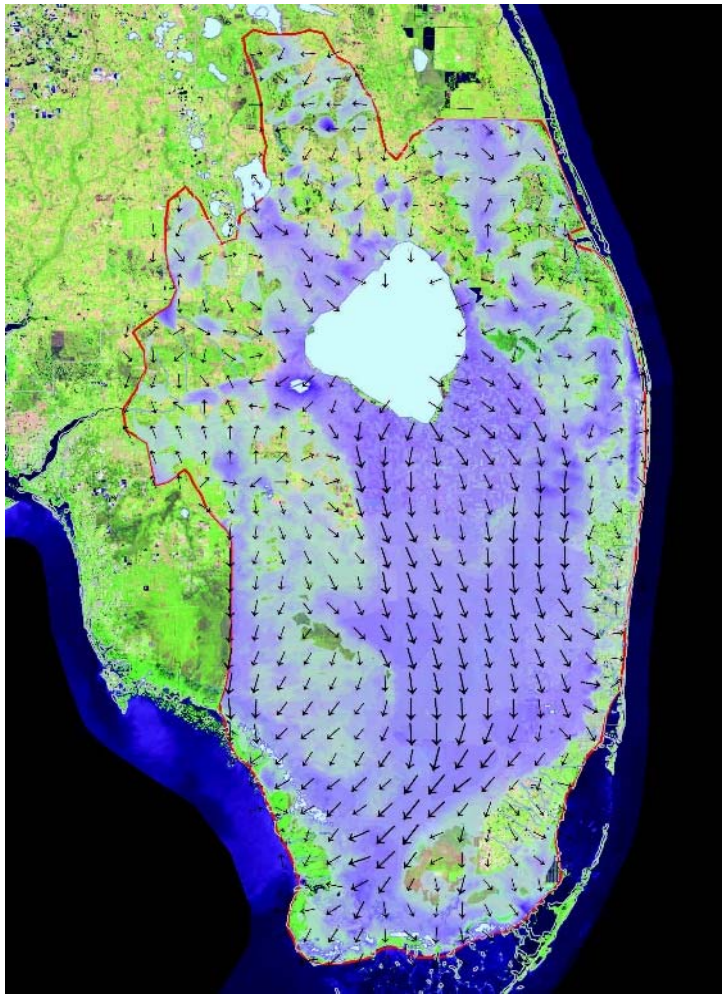
Parameter	β	LCL	UCL
Intercept	2.09	1.78	2.39
Initial Water Depth	-0.02	-0.03	0.01
Pre-breeding Recession	3.26	2.42	4.11
Post-breeding Recession	1.33	0.56	2.10

Nest Effort Validation



NSRSM Application

- Simulates natural hydrology
  - Pre-drainage
  - Daily water depths
    - Jan. 1, 1965 – Dec. 31, 2005
- Incorporates:
  - Climatic data & other refined layers
- Resolution 500 m x 500 m



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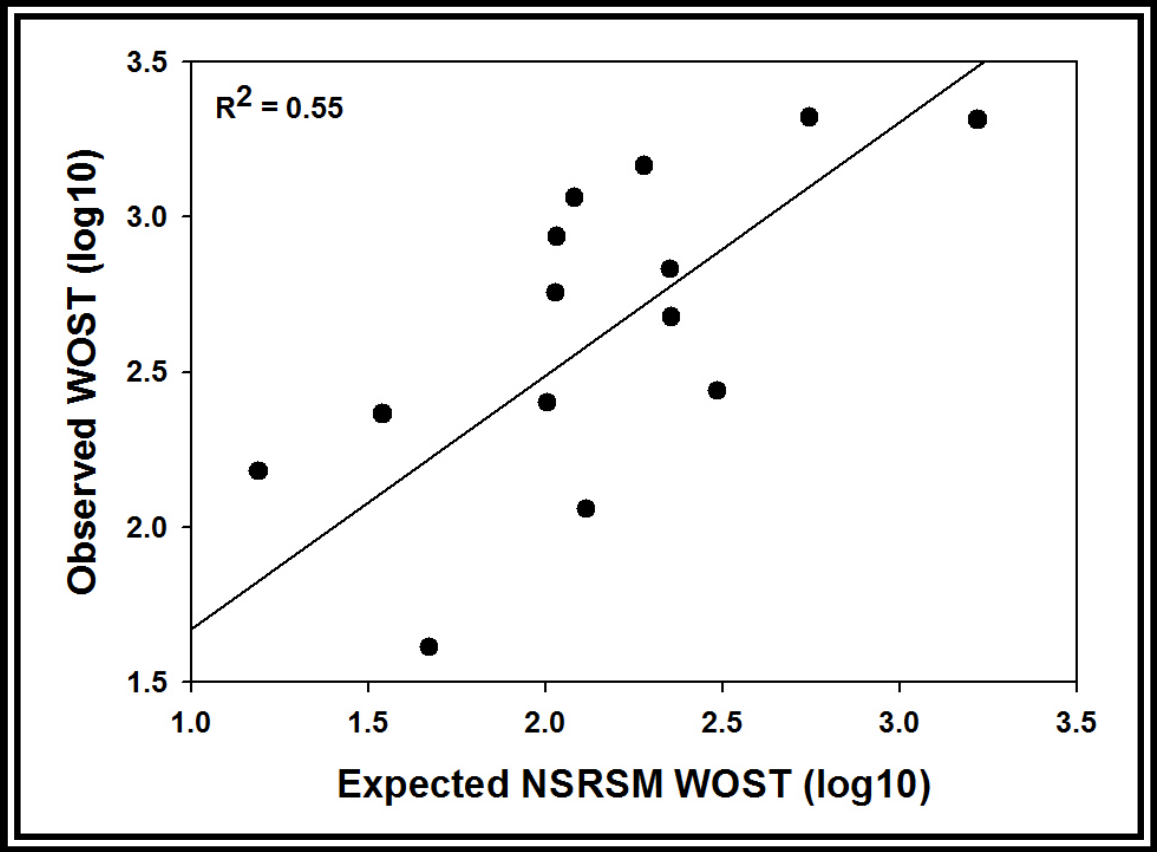
NSRSM Application

- Predict NSRSM Wood Stork Nest Effort
  - 1991 – 2005
  - NSRSM-generated hydrologic variables
    - Initial water depth, Pre-breeding and post-breeding recession rates
  - Par. est. generated from EDEN nest effort models
- Regression analysis
  - NSRSM predicted nest effort vs. observed nest effort

NSRSM Results



- NSRSM-predicted nest effort ↓ observed ($t_{0.5, 14}$ = -4.5, P < 0.001)
- NSRSM pre-breeding and post-breeding recession rates ↓ EDEN ($t_{0.5, 14}$ = -2.3, P < 0.01; $t_{0.5, 14}$ = -10.0, P < 0.001)

Summary

- 1. Under current conditions Wood Storks need:
  - Prey production
  - Continuous drydown
- 2. Appling present day hydrologic conditions to pre-drainage system = ↓ Wood Storks
  - Potential shift in importance of recession rates
  - Suggest that Wood Stork less driven by rapid recession rates in pre-drained Everglades



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