ALLIGATORS, HYDROLOGY, AND AQUTIC FAUNA, OH MY! INTEGRATING ECOSYSTEM RESPONSES

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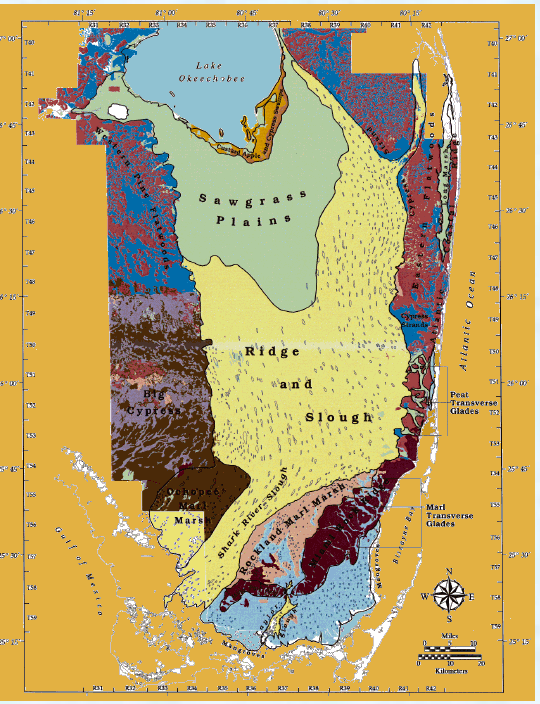
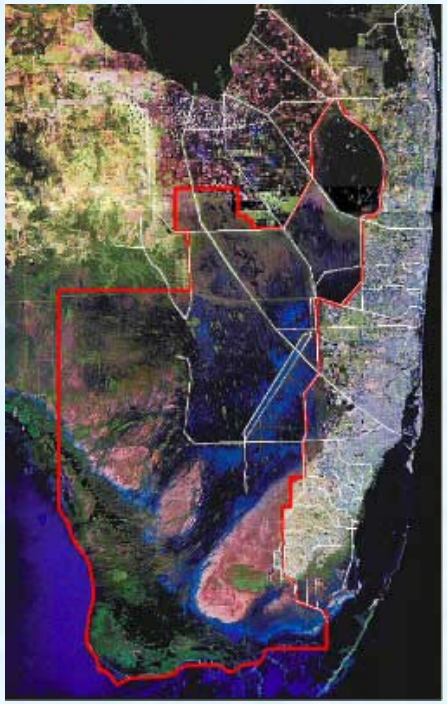
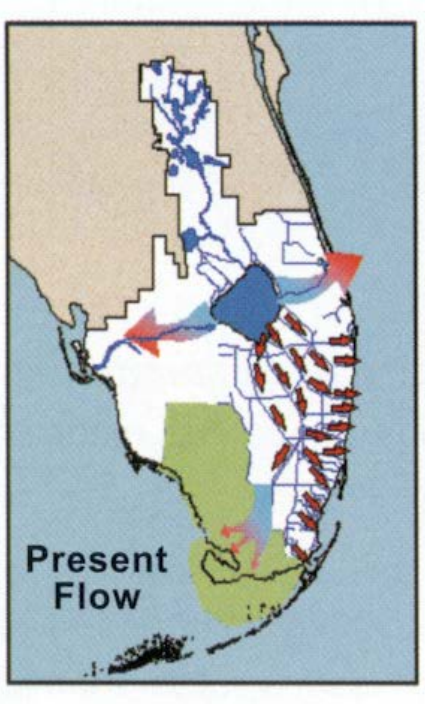
RECOVER
assessment
science
integration
evaluation

- Background- Everglades restoration
- Alligators as indicators
- Conceptual ecological model
- What we have learned
- Next steps

Everglades Background







Everglades Restoration Goals

(South Florida Ecosystem Restoration Task Force)

- Get the Water Right

Comprehensive **E**verglades **R**estoration **P**lan (CERP)

- Foster Compatibility of the Built and Natural Systems

RECOVER

- **Re**storation **Co**ordination and **Ve**rification
  - Multi-agency team to organize and apply scientific and technical information
  - Evaluation, assessment and planning
  - Development and implementation of a monitoring plan

CERP MONITORING AND ASSESSMENT PLAN

Restoration Coordination and VERification

(RECOVER)

the journey to restore America's Everglades

Comprehensive Everglades Restoration Plan

Central and Southern Florida Project

Revised

December 2009

Indicators

- Crocodilians
  - **Alligators**
  - Crocodiles
- Aquatic fauna
  - Small fish
  - Large fish

The alligator, like the buffalo of the plains, dominated the ecology of the Everglades Swamps – Craighead (1968)

Crocodilian Performance Measures

Metric	**Restoration Goal**
• Alligators	
– Relative Abundance	>1.7 alligators/km
– Body Condition	>2.27 (Fulton's K)
– Alligator Hole Occupancy	>70%

Alligators and Everglades Restoration

- American alligator populations have been reduced as a result of altered
  - hydrologic conditions
  - reduced abundance and accessibility of prey
- Hydrologic restoration will result widespread increase in
  - alligator relative abundance
  - alligator body condition

Why Alligators?

Productivity

Hydrology

Aquatic fauna

- Hydroperiod
- Frequency of dry events
- Intensity of dry events
- Water depth
- Range in water depth
- Timing of water depth

Hydrobiologia (2009) 635:329–338
DOI 10.1007/s10750-009-9925-3

PRIMARY RESEARCH PAPER

Wetlands
DOI 10.1007/s13157-015-0677-8

ORIGINAL RESEARCH

Dry Years Decrease Abundance of American Alligators in the Florida Everglades

J. Hardin Waddle[1] · Laura A. Brandt[2] · Brian M. Jeffery[3] · Frank J. Mazzotti[3]

...ip between body condition of American alligators ...th in the Everglades, Florida

PLOS ONE

Wetlands (2011) 31:147–155
DOI 10.1007/s13157-010-0120-0

ARTICLE

Estimating Trends in Alligator Populations from Nightlight Survey Data

Ikuko Fujisaki · Frank J. Mazzotti · Robert M. Dorazio · Kenneth G. Rice · Michael Cherkiss · Brian Jeffery

RESEARCH ARTICLE

Presence of Breeding Birds Improves Body Cond...ian Nest Protector

Lucas A. ...Mazzotti[2], Kent A. Vliet[3], Laura A. Brandt[4]

1 Departm... of America... Center, Un... Florida, Ga... Florida, Un... ...versity of Florida, Gainesville, Florida, United States of America, ...rvation, Fort Lauderdale Research and Education Center, ...s of America, 3 Department of Biology, University of Florida, ... United States Fish and Wildlife Service, Davie, Florida, ...

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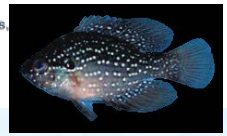
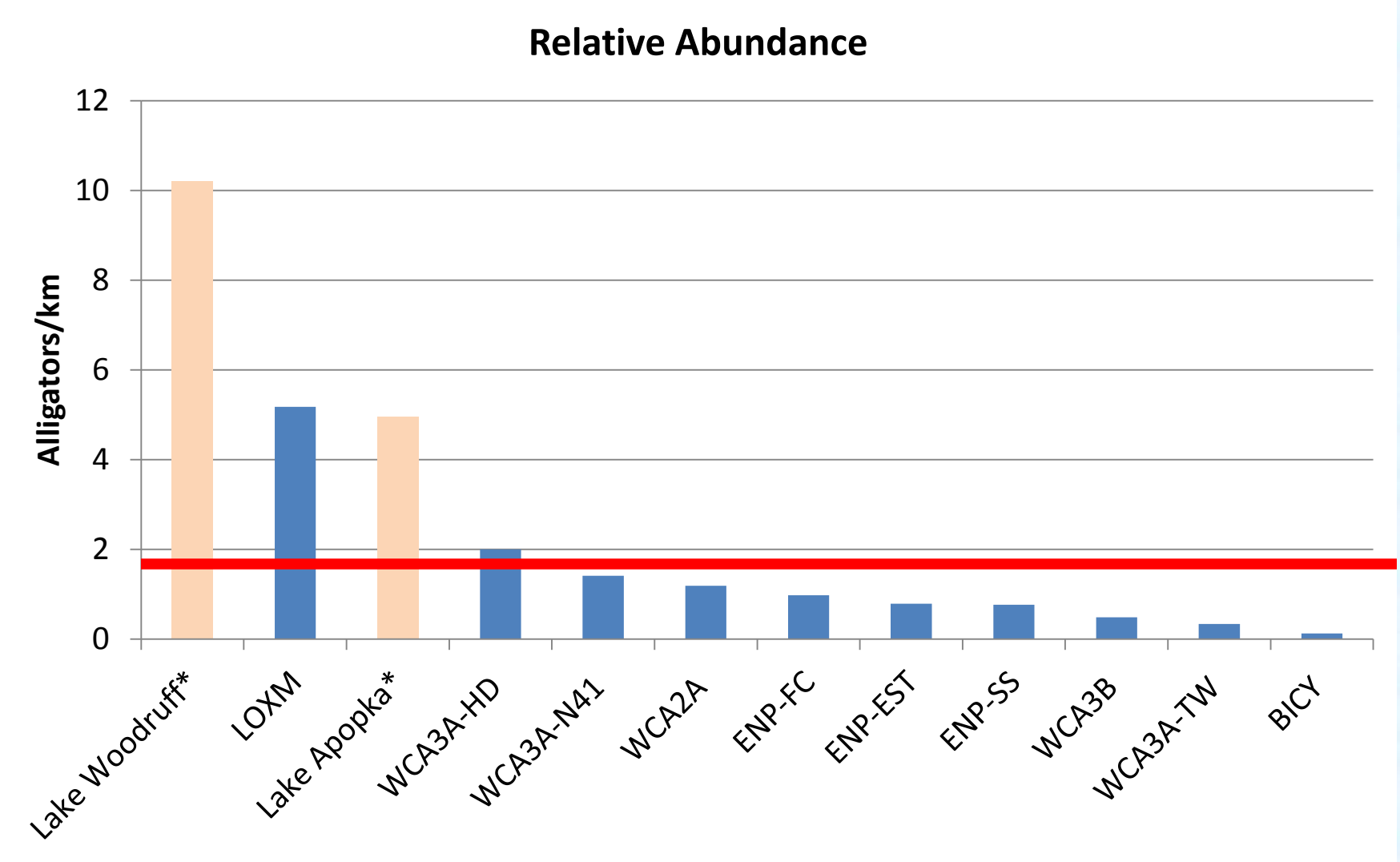


- nests
- alligator holes
- shallow depressions
  - trails
  - pockets

Landscape patterns

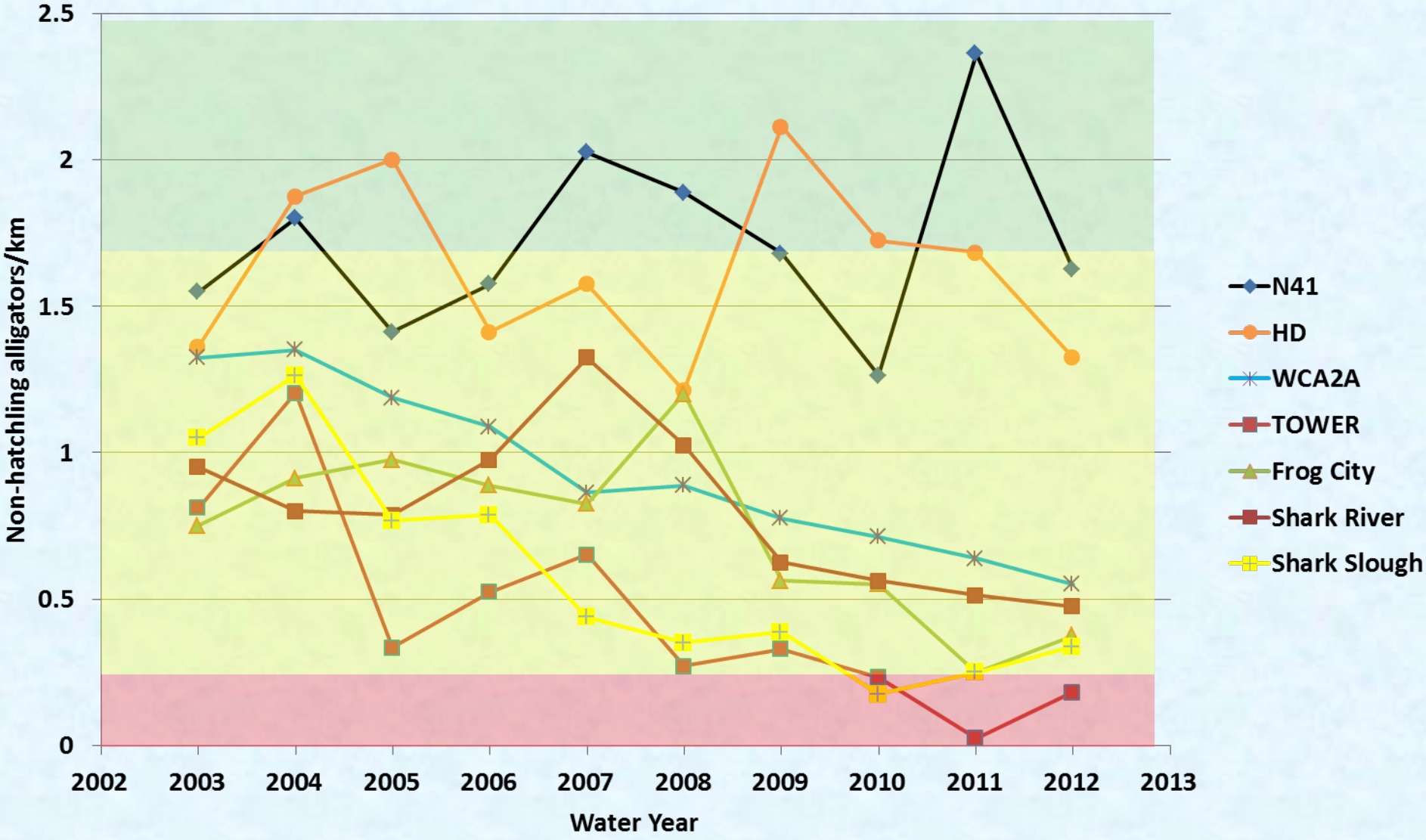
Wading birds

What Have We Learned?

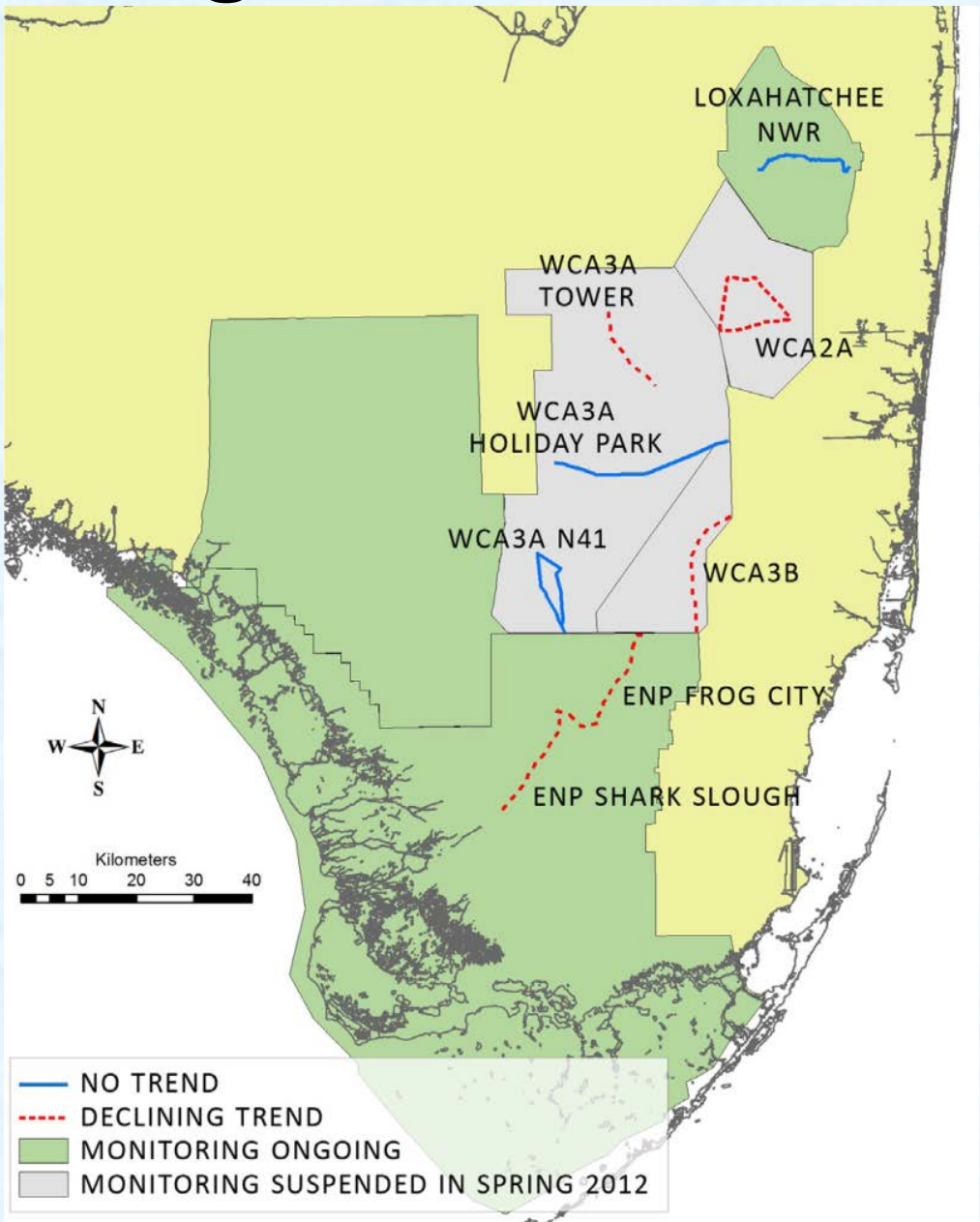


Everglades data from Spring 2005. North central Florida data from Woodward and Moore 1990

Alligator Relative Abundance



Trends in Alligator Relative Abundance

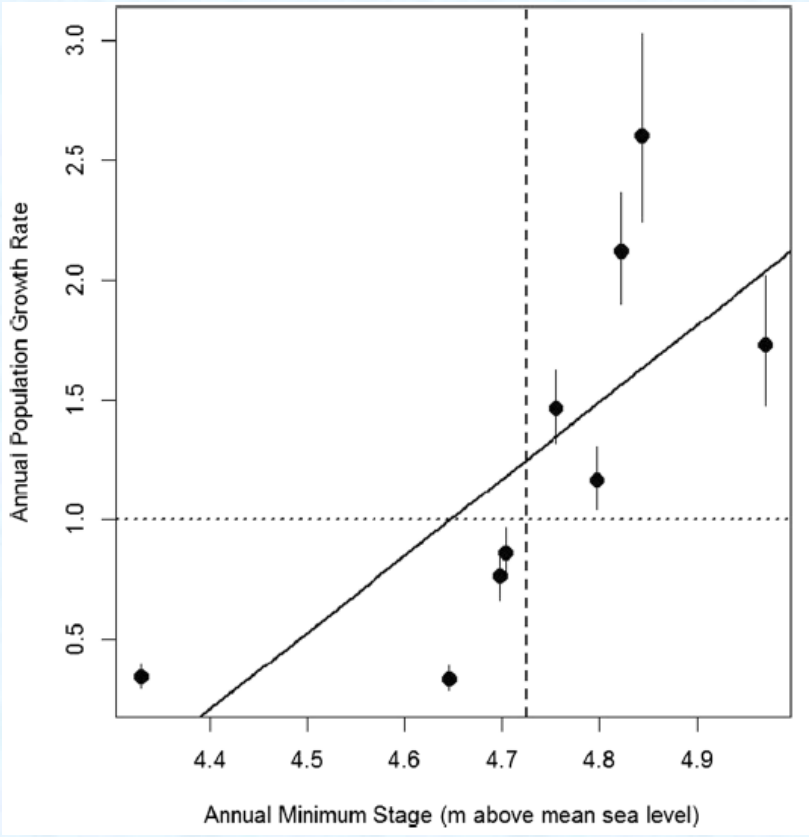


Alligator abundance has declined in drier areas but has not changed in wetter areas

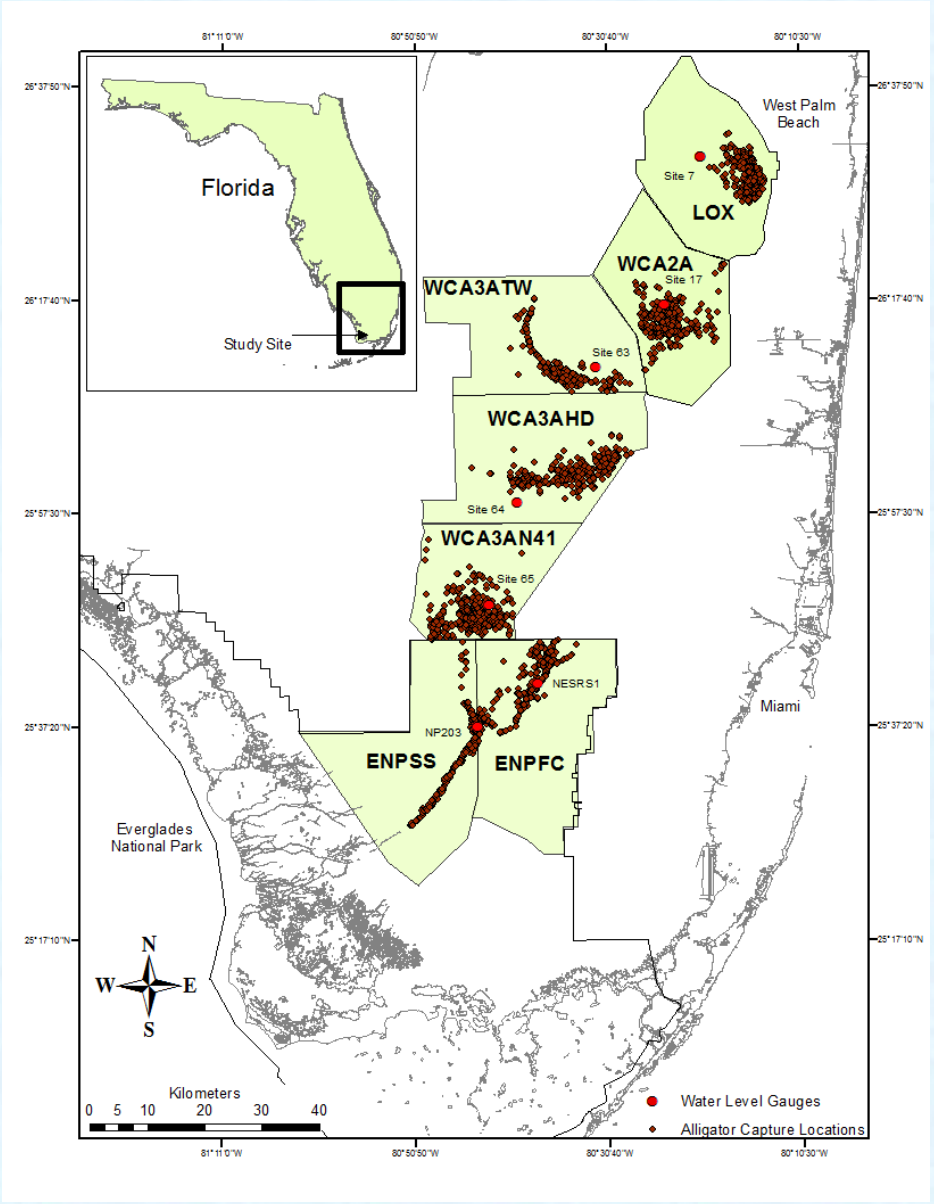
- Hydroperiods longer than 11 months per year
- Drydowns no longer than about 40 days (1 ¼ months)
- At least two years between drydowns

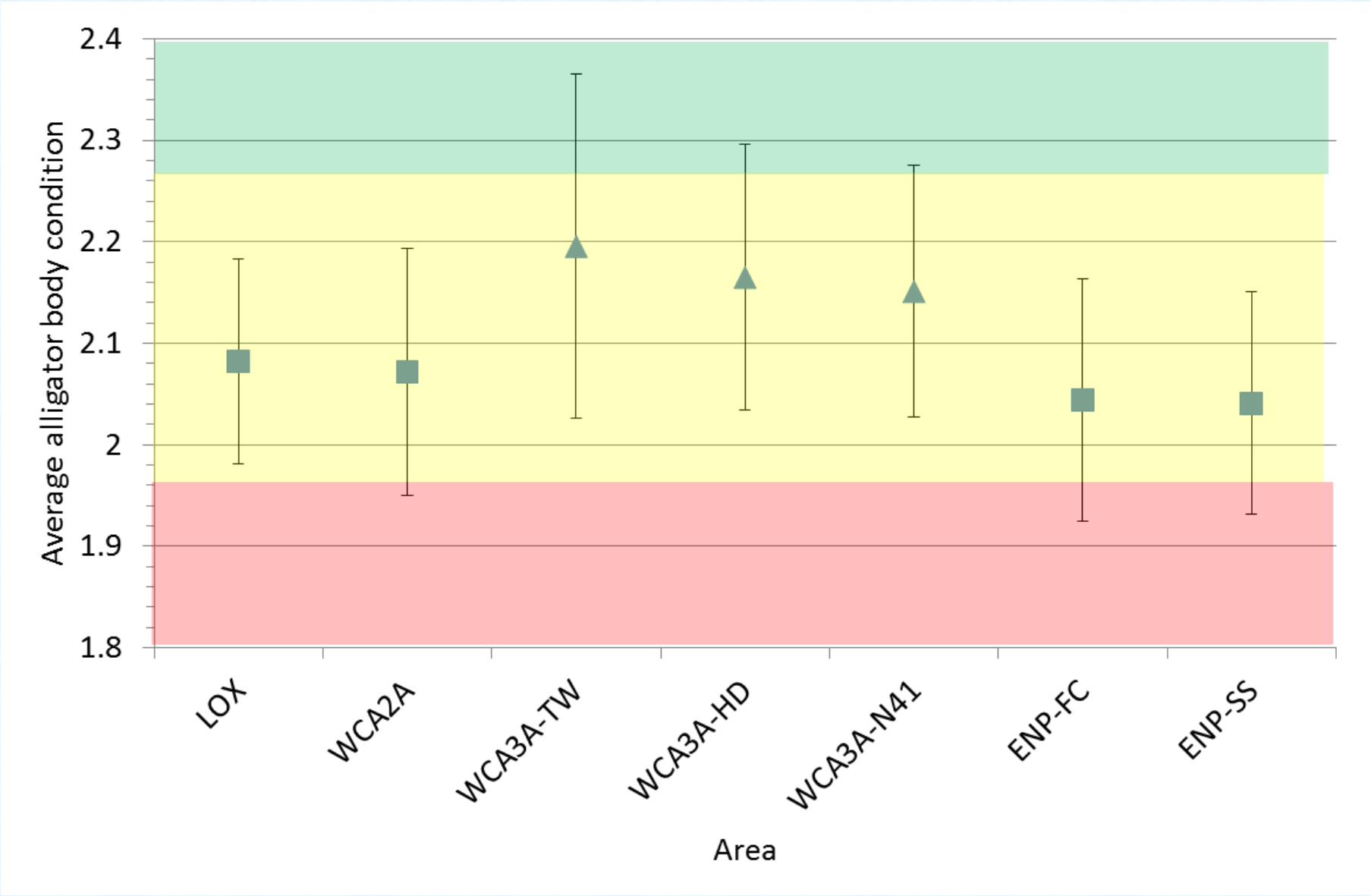
Dry Conditions

- Declining trends (2001-2008) in abundance of small and medium sized animals (Fujisaki et al. 2011).
- Annual population growth rate in A.R.M. Loxahatchee NWR lower in drier years (Waddle et al. 2015).

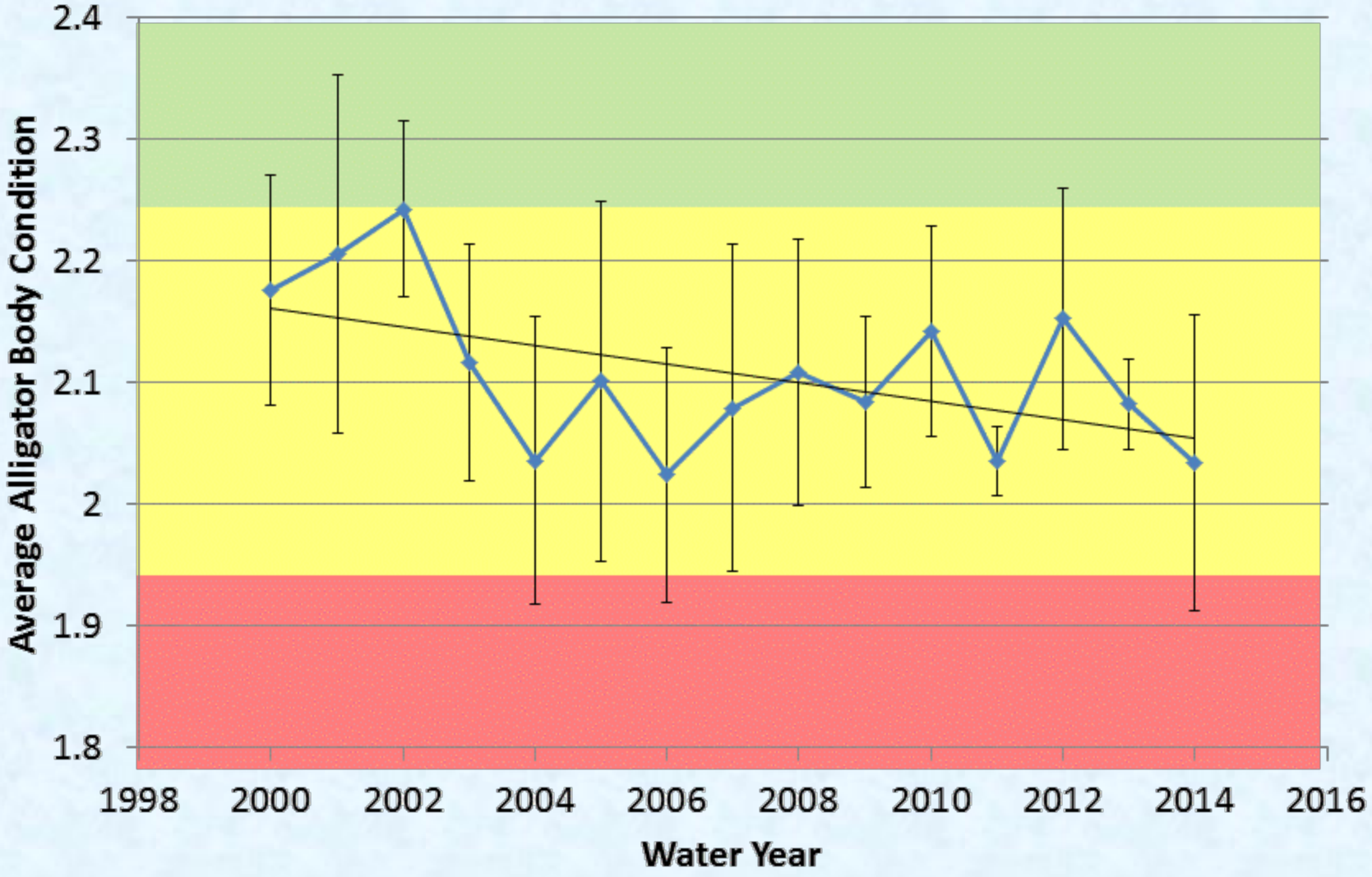


Body Condition

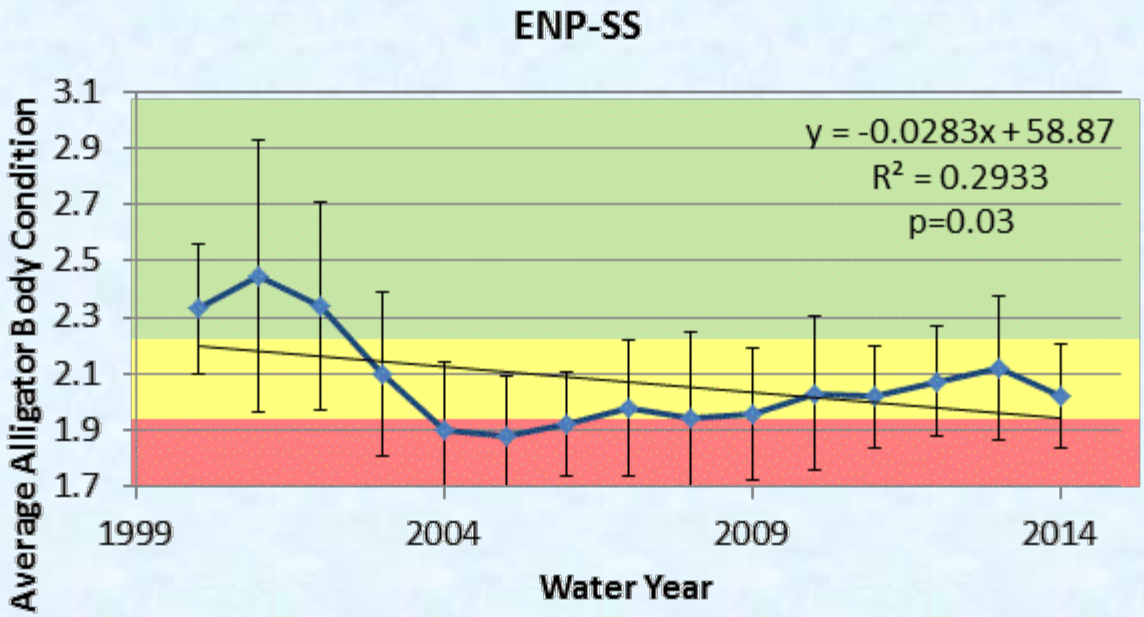


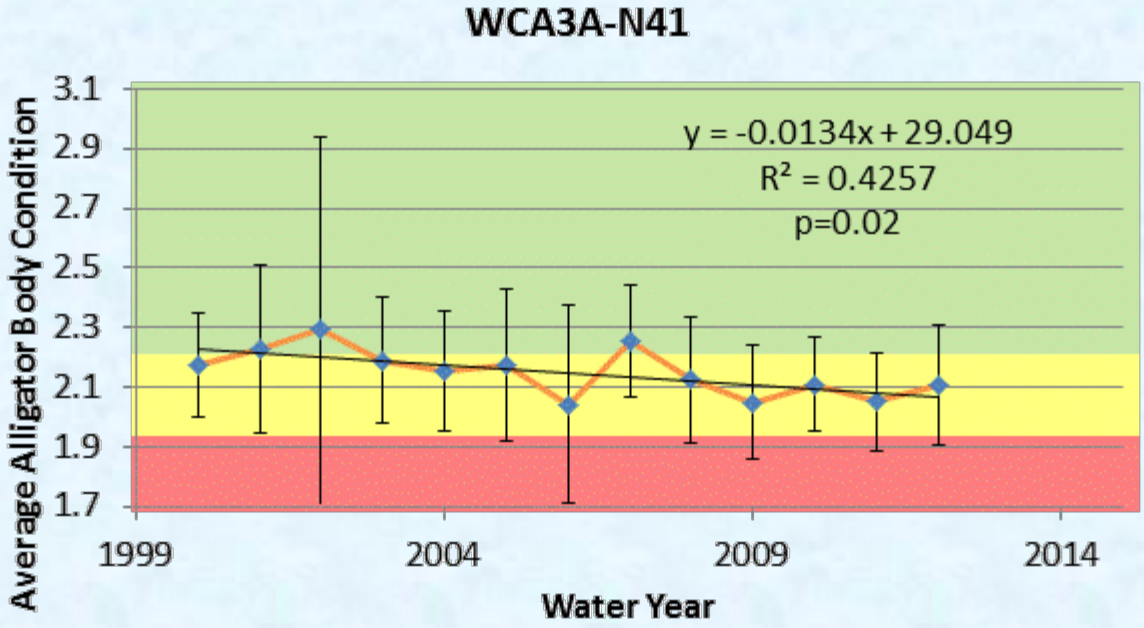

Average alligator body condition
2.4
2.3
2.2
2.1
2
1.9
1.8
LOX
WCA2A
WCA3A-TW
WCA3A-HD
WCA3A-N41
ENP-FC
ENP-SS
Area

Alligator Body Condition All Areas



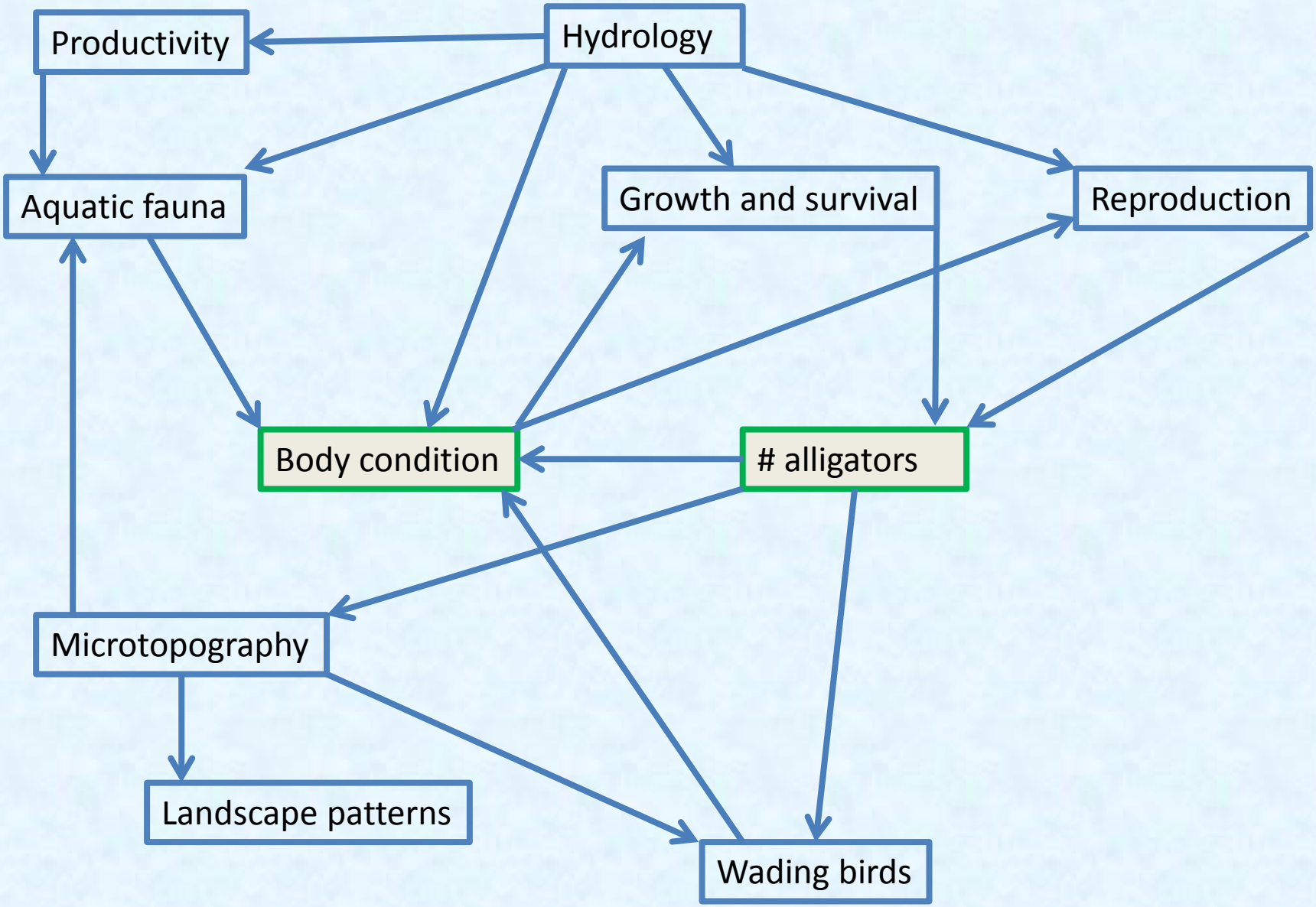
Alligator Body Condition

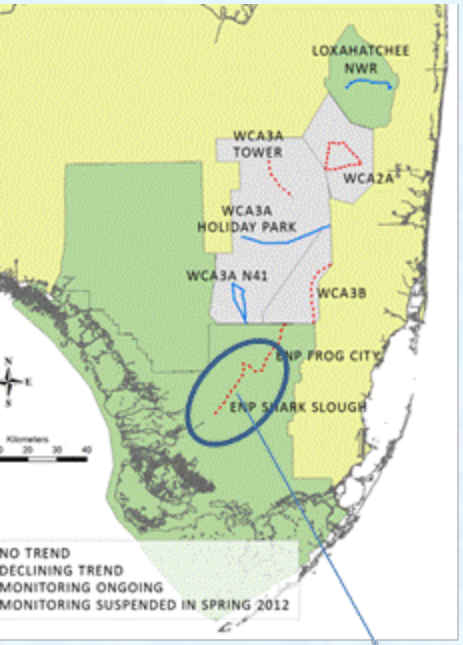




Water Depths

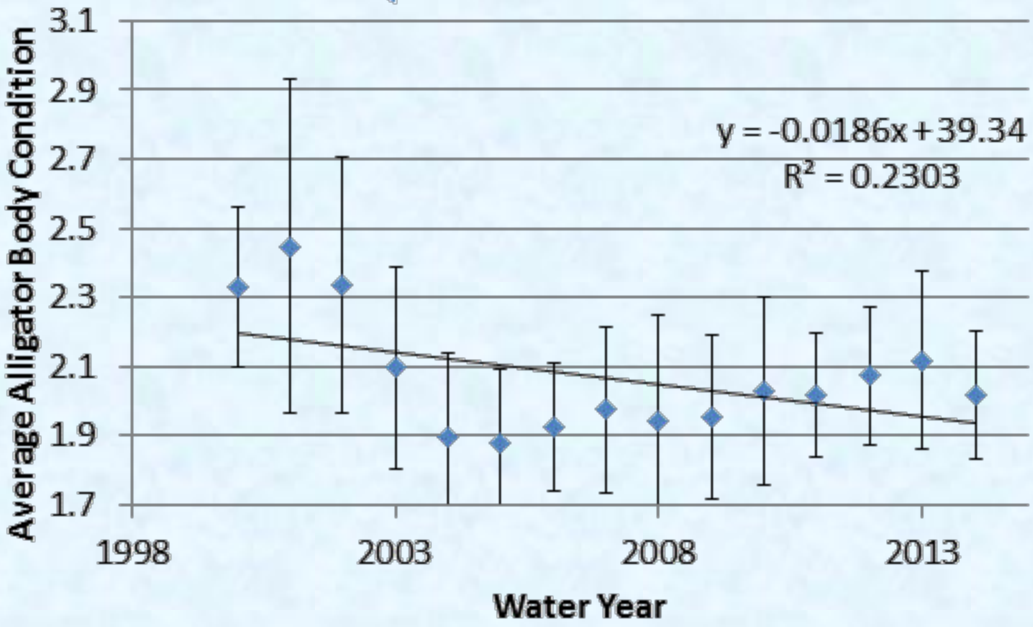
- Alligator body condition depends on water depth 10-49 days prior to capture (Fujisaki et al. 2009)
- Alligator body condition is correlated with annual range in water depth and fall water depth (Brandt et al. in press)

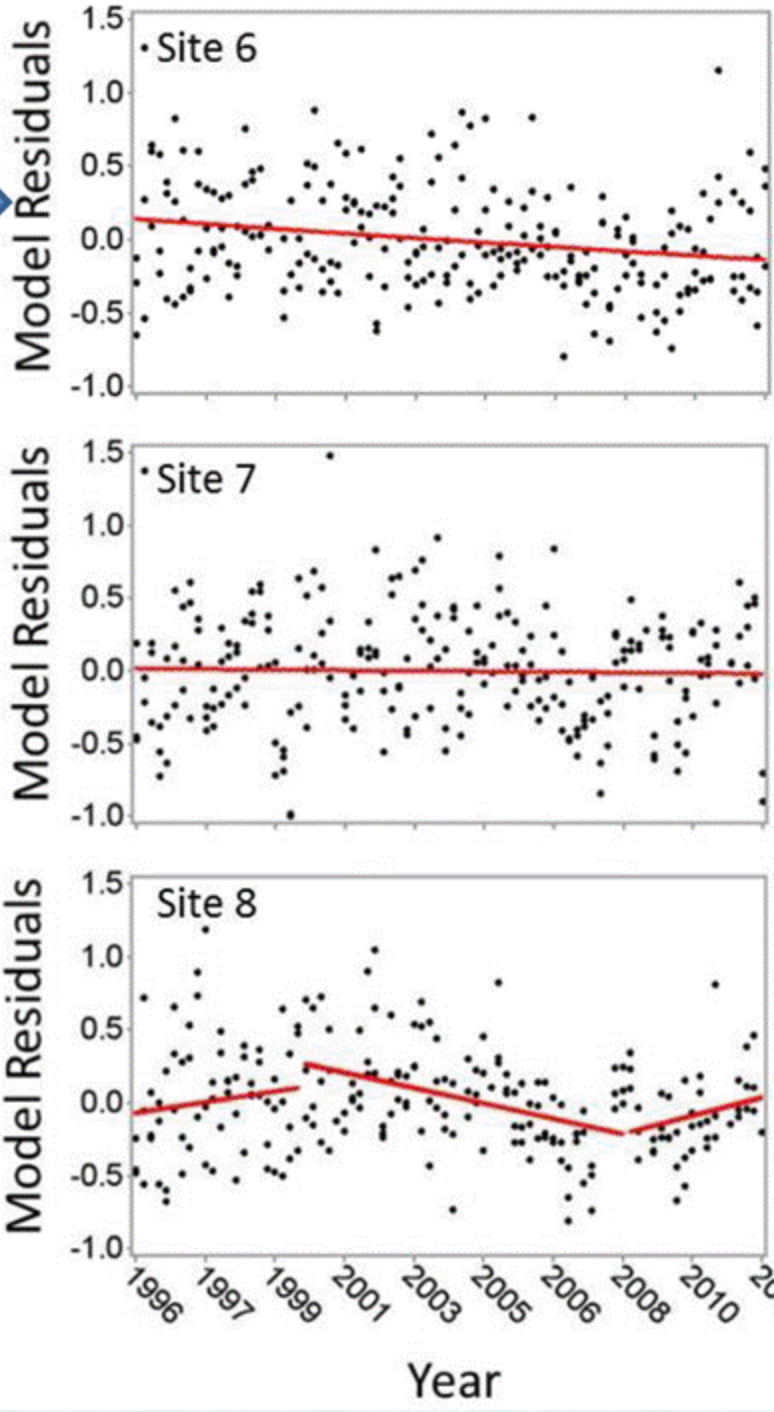

Productivity
Hydrology
Aquatic fauna
Growth and survival
Reproduction
Body condition
alligators
Microtopography
Landscape patterns
Wading birds



Fish Biomass from Trexler et al. 2012

ENP-SS





Next Steps

- Integration of alligator captures and aquatic fauna work
- Better understanding of what alligators are eating in different areas
  - Stable isotope
  - Food sampling

Alligators eat…

- Everything that moves
- Some things that don't
- The bigger they are the bigger the things they eat.

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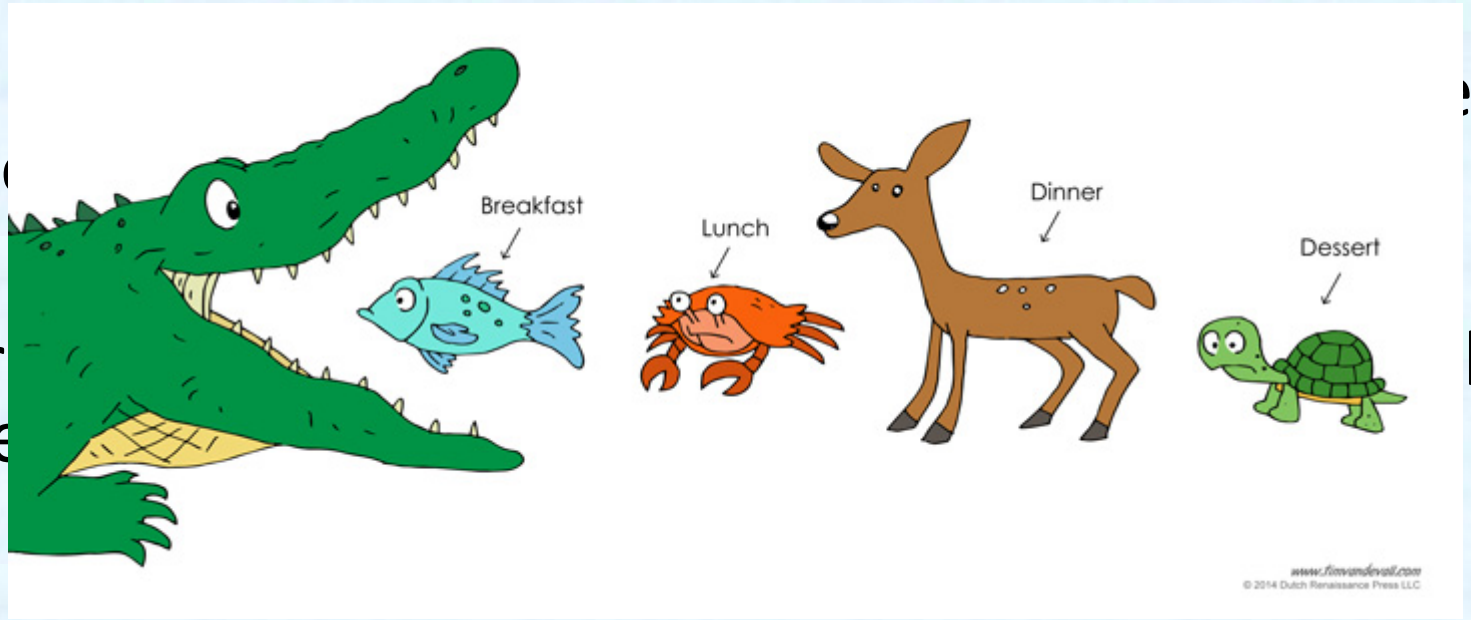

FOOD WEBS, INTERACTION WEBS, AND MONITORING: USING A TROPHIC CONCEPTUAL MODEL TO SELECT ECOLOGICAL INDICATORS

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