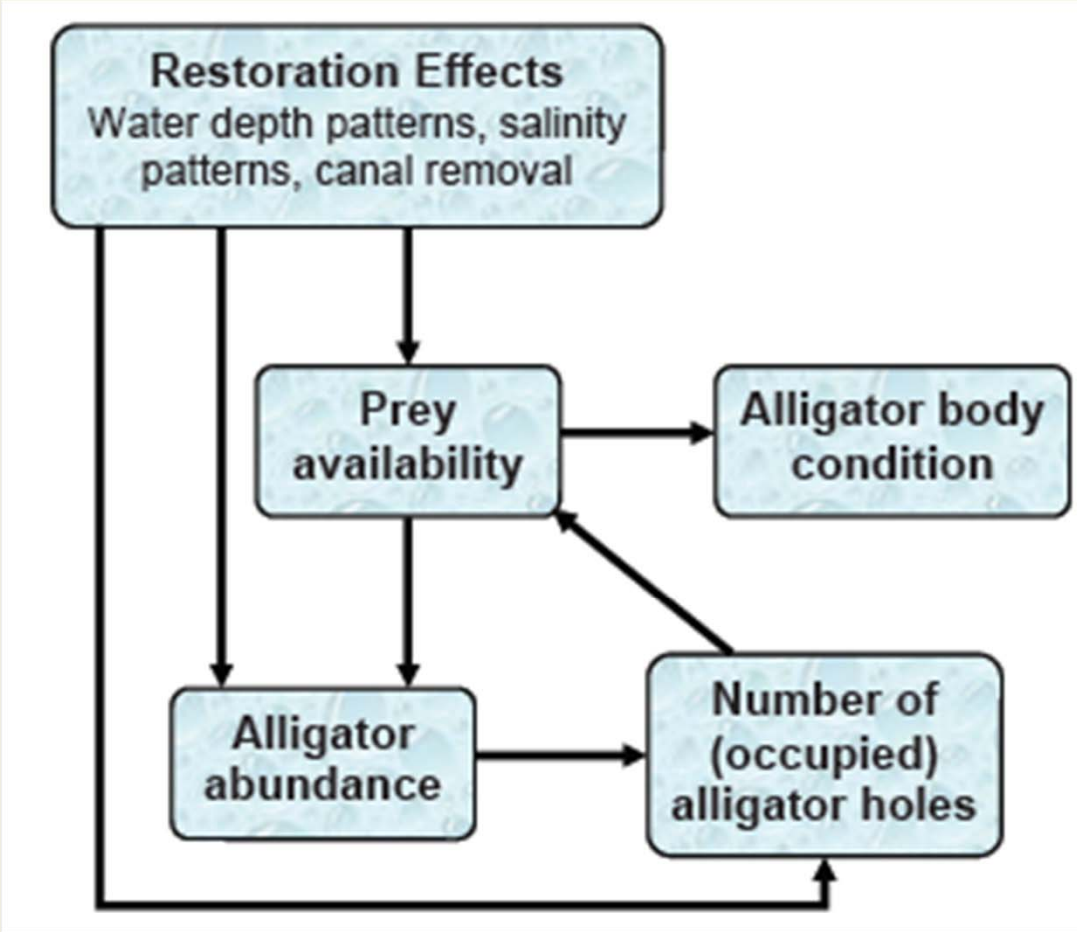
What do alligators and crocodiles tell us about restoration of Greater Everglades Ecosystems?

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

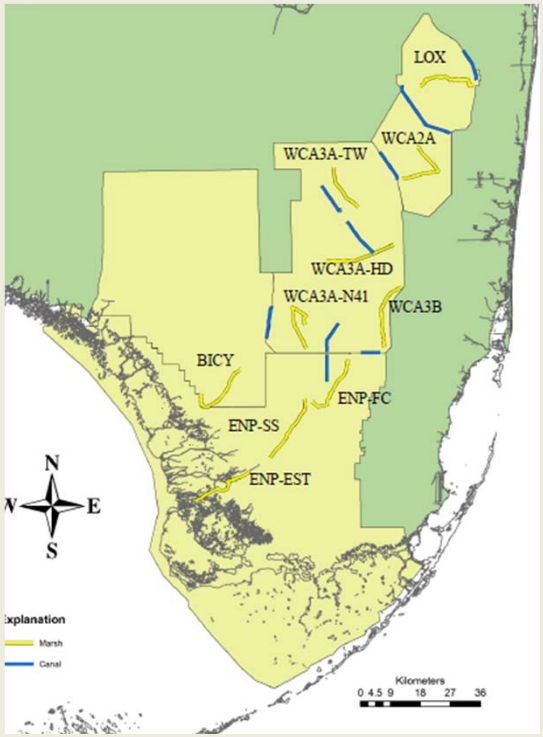
The American crocodile, a flagship federally threatened species, represents the importance of freshwater inflow to estuarine health and productivity - Mazzotti et al. (2007)

Alligators: Keystone Species Hypothesis



What have we learned?

- Alligator relative abundance
- Alligator body condition
- Alligators and canals
- Crocodile growth and survival
- Trends and integration

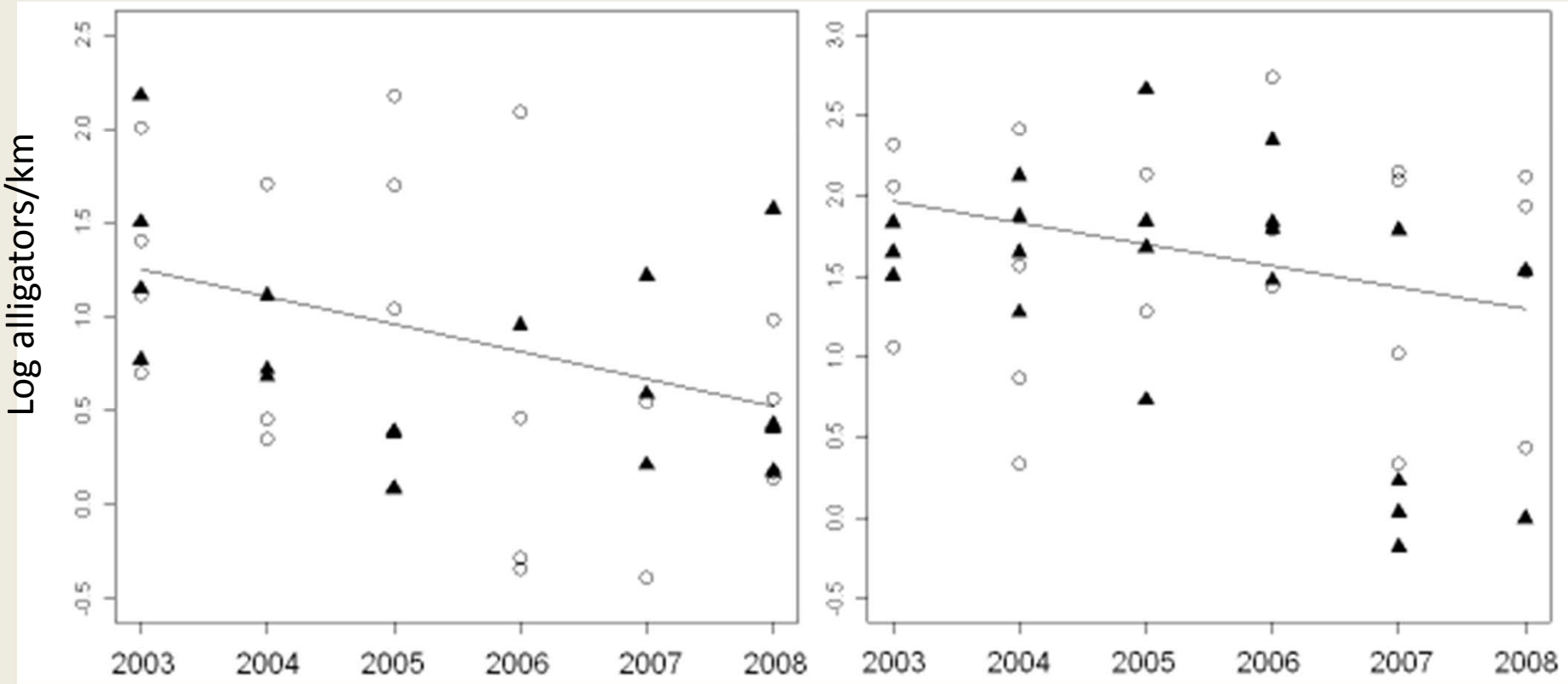


From 2001-2008 there have been negative trends in relative abundance of juvenile and subadult alligators in a majority of the areas surveyed

Everglades National Park

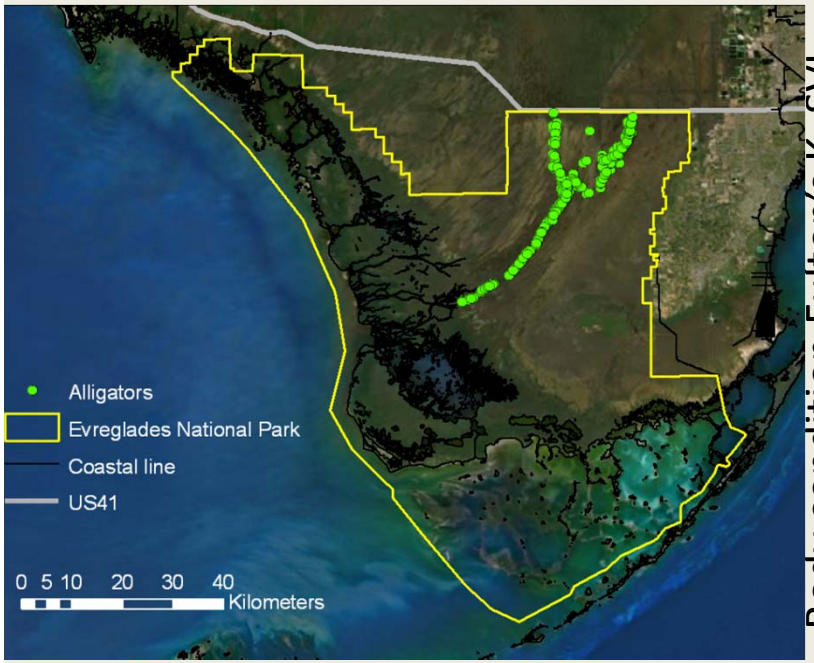
Juvenile (0.5 to <1.25 m

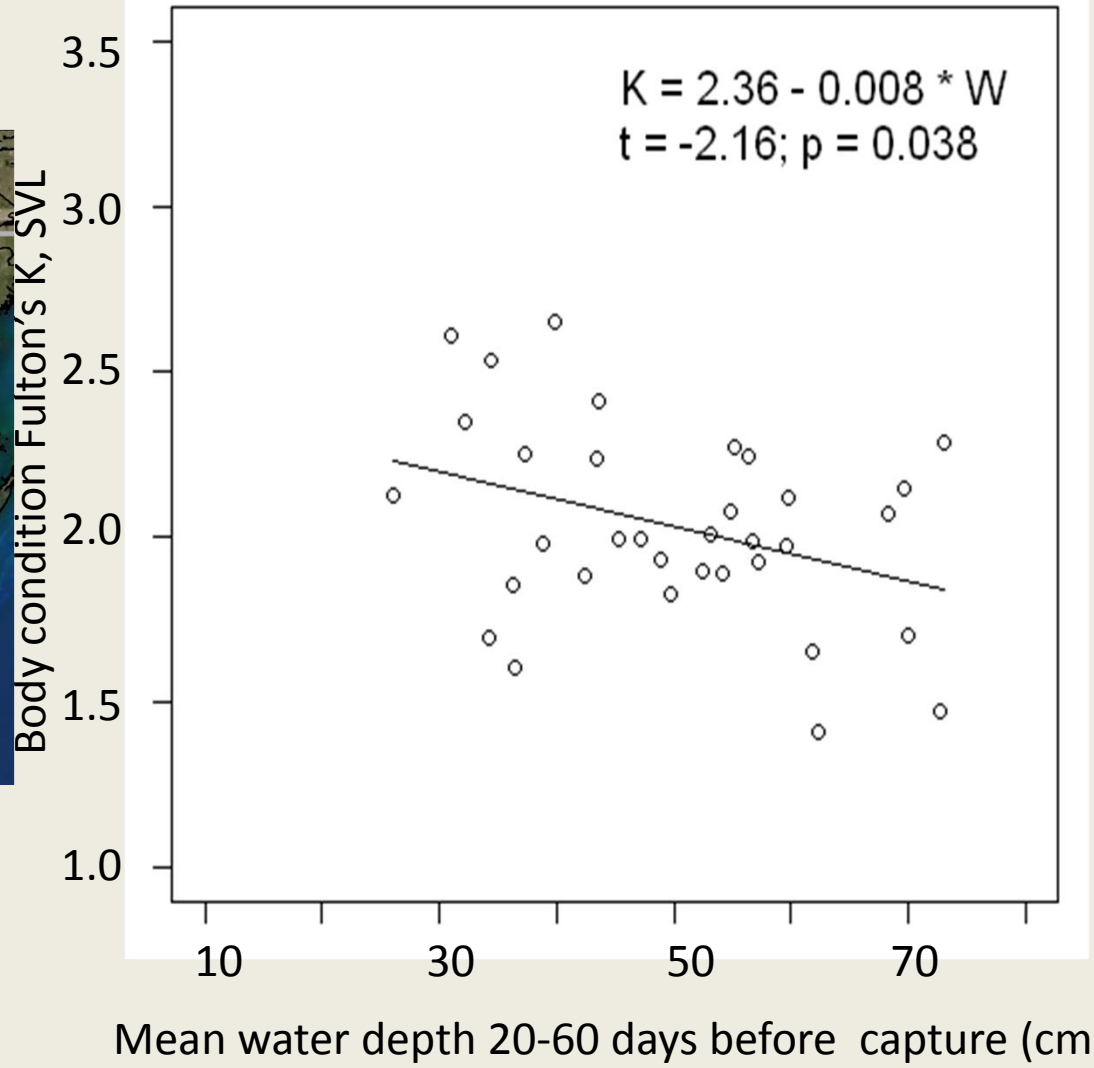
Subadult (1.25 to<1.75m



Fujisaki I, FJ Mazzotti, R Dorazio, M Cherkiss, B Jeffery. 2011. Estimating trends in alligator populations from nightlight survey data. Wetlands 31:147-155.

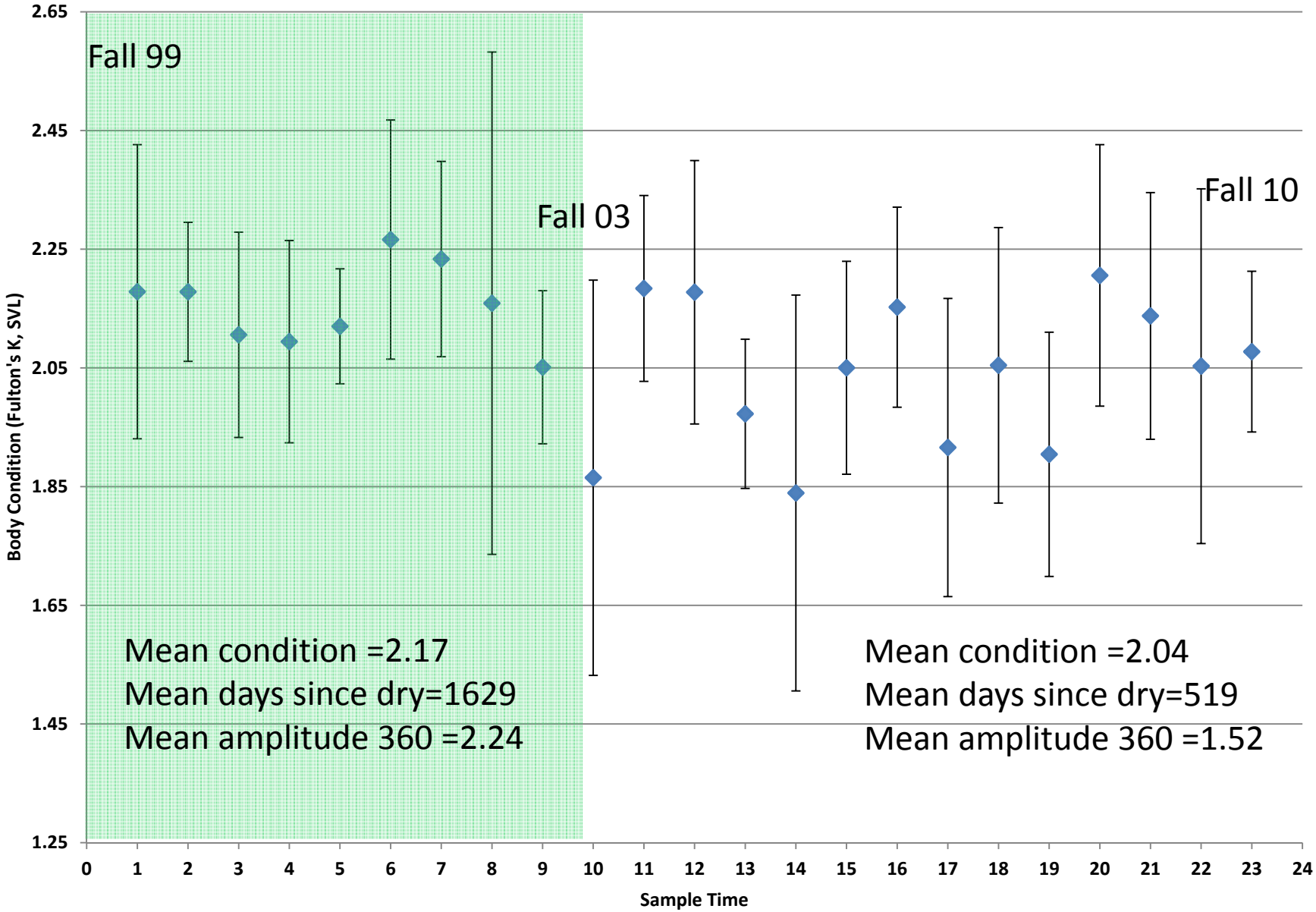
Alligator body condition is negatively correlated with water depth 1-3 months prior to capture and positively correlated with amplitude of water depth 1-2 years prior to capture





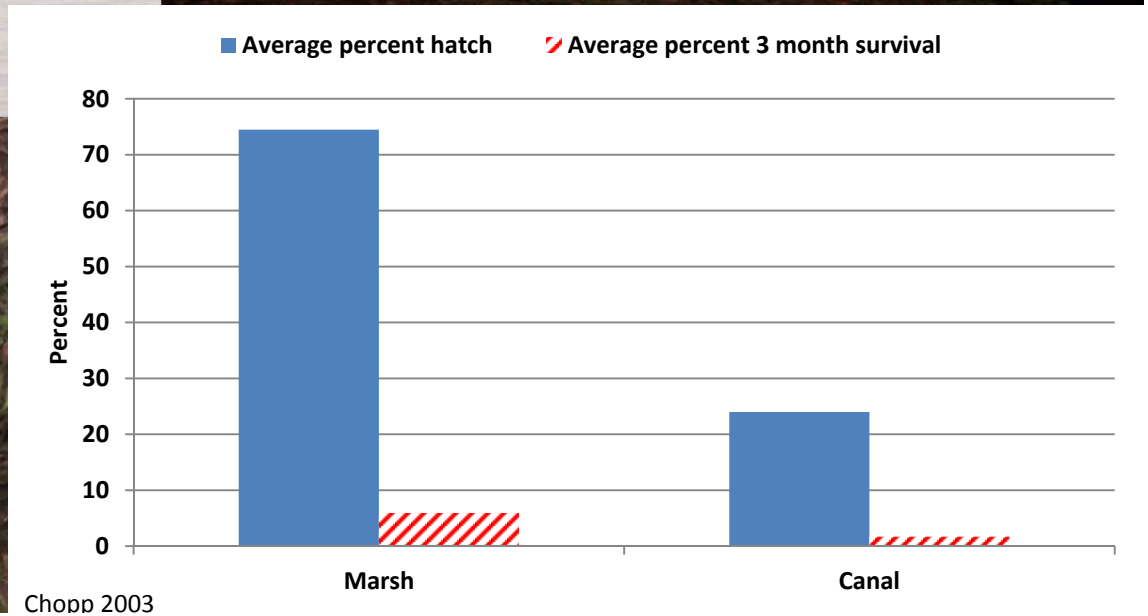
Fujisaki I, Rice KG, Pearlstine LG, Mazzotti FJ. 2009. Relationship between body condition of American alligators and water depth in the Everglades, Florida. Hydrobiologia 635:329–338.

Alligator body condition prior to Fall 2003 was significantly higher as were mean days since dry and water depth amplitude



Brandt et al. in prep. Trends in body condition of American alligators in Arthur R. Marshall Loxahatchee National Wildlife Refuge and relationship to short and long-term hydrology

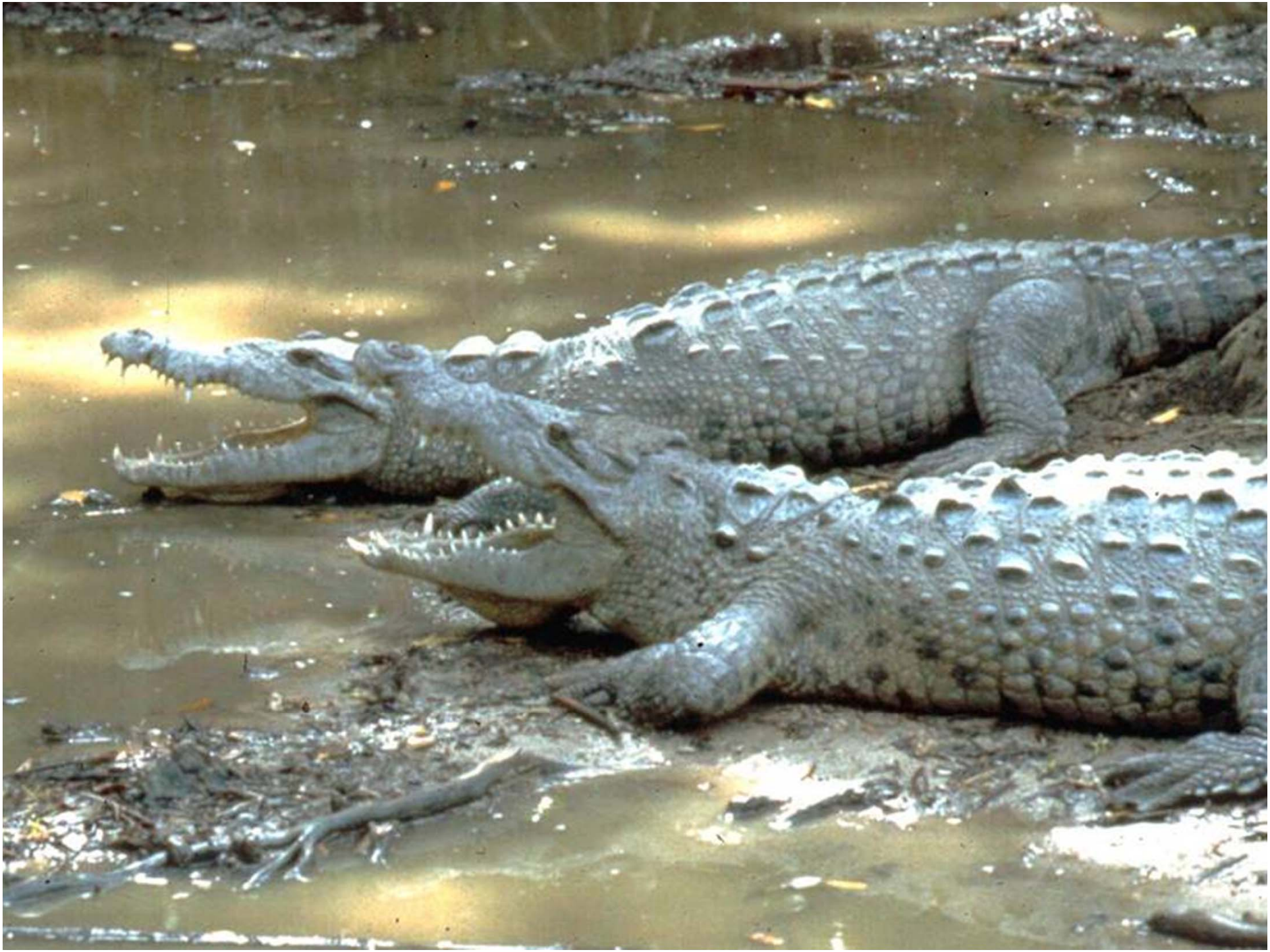
There are fewer alligator holes closer to canals. Canals are dominated by large alligators. Reproduction and recruitment in canals is low compared to marsh.



Chopp 2003

Expectations with CEPP

- Multiyear hydroperiods along with natural levels of water level fluctuations will result in
  - An increase in alligator body condition
  - An increase in abundance of alligators
- Removal of canals will result in
  - An increase in juvenile alligator survival resulting in an increase in abundance
  - An increase in active alligator holes near old canals increasing marsh diversity and productivity



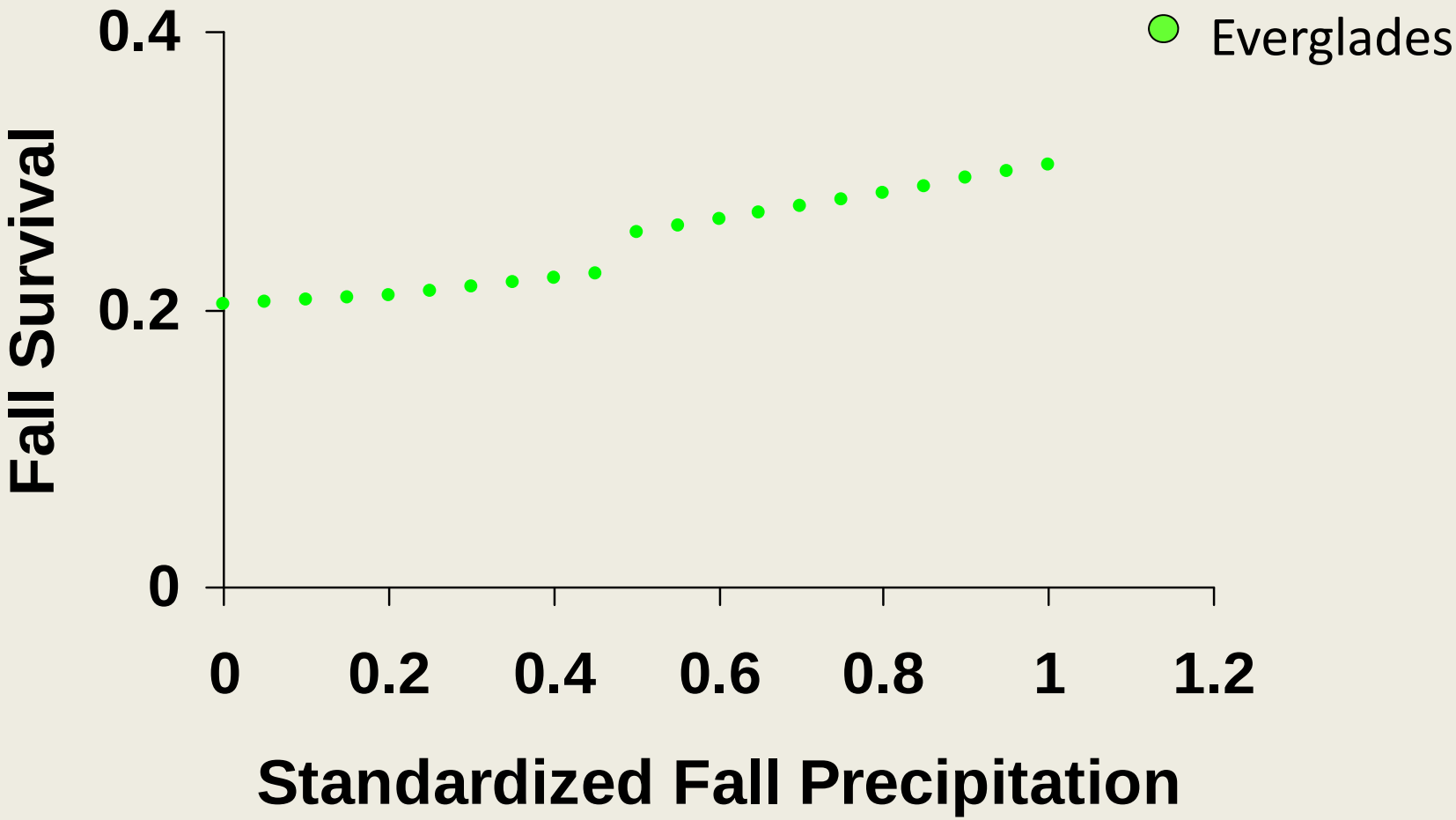
Crocodile growth and survival are lowest in NE Florida Bay, ENP where freshwater flows (salinity patterns) in estuaries have been altered

	Juvenile			
	Growth		Survival	
Location	Index	Model	Index	Model
TP	High[a]	High[a]	Inter	Inter
CLNWR	Inter[a]	Inter[b]	High	High
ENP	Low[b]	Low[b]	Low	Low

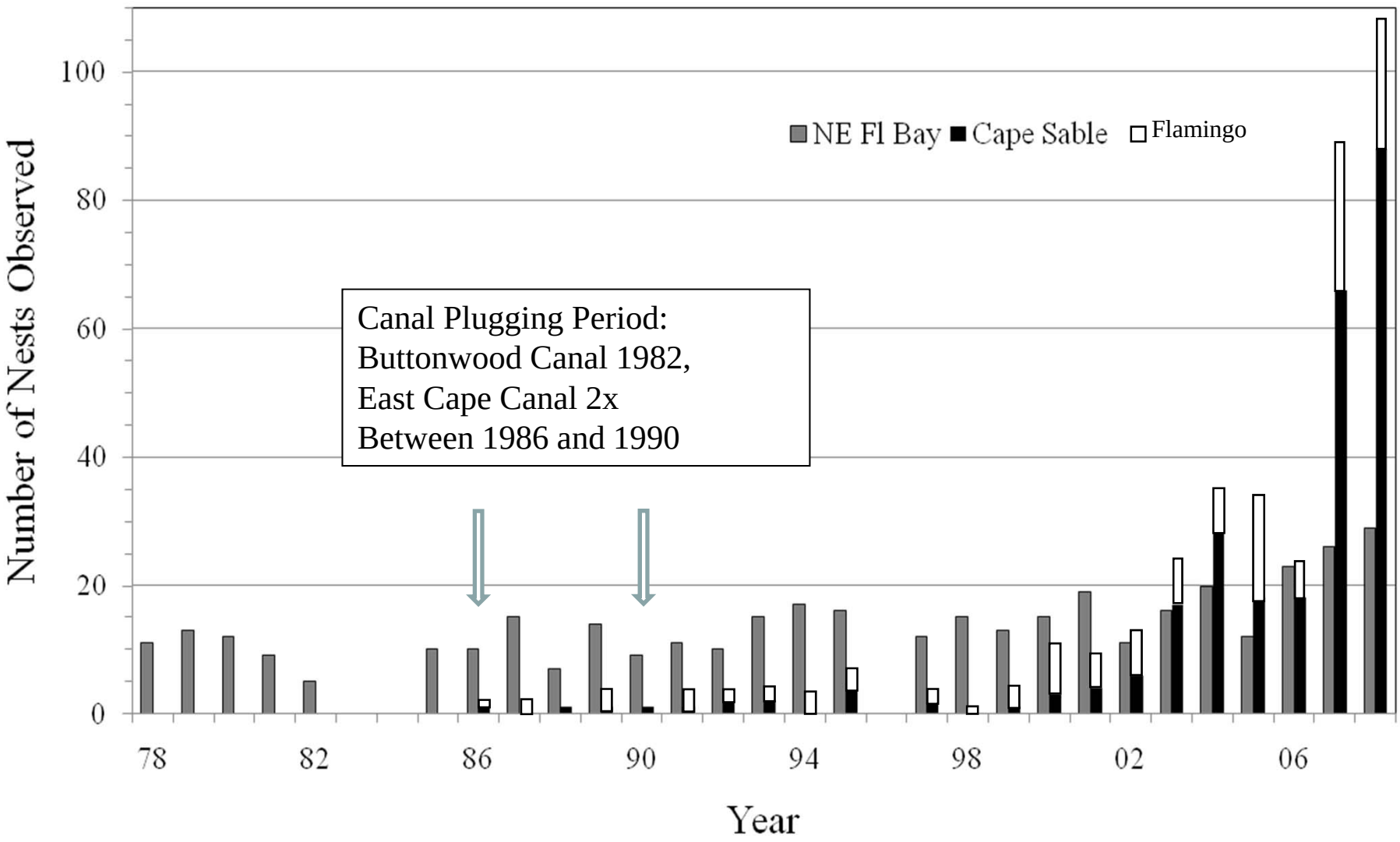
We capture ~150/yr, at least 50% are recaptures

Mazzotti et al. 2007, Mazzotti et al. 2009

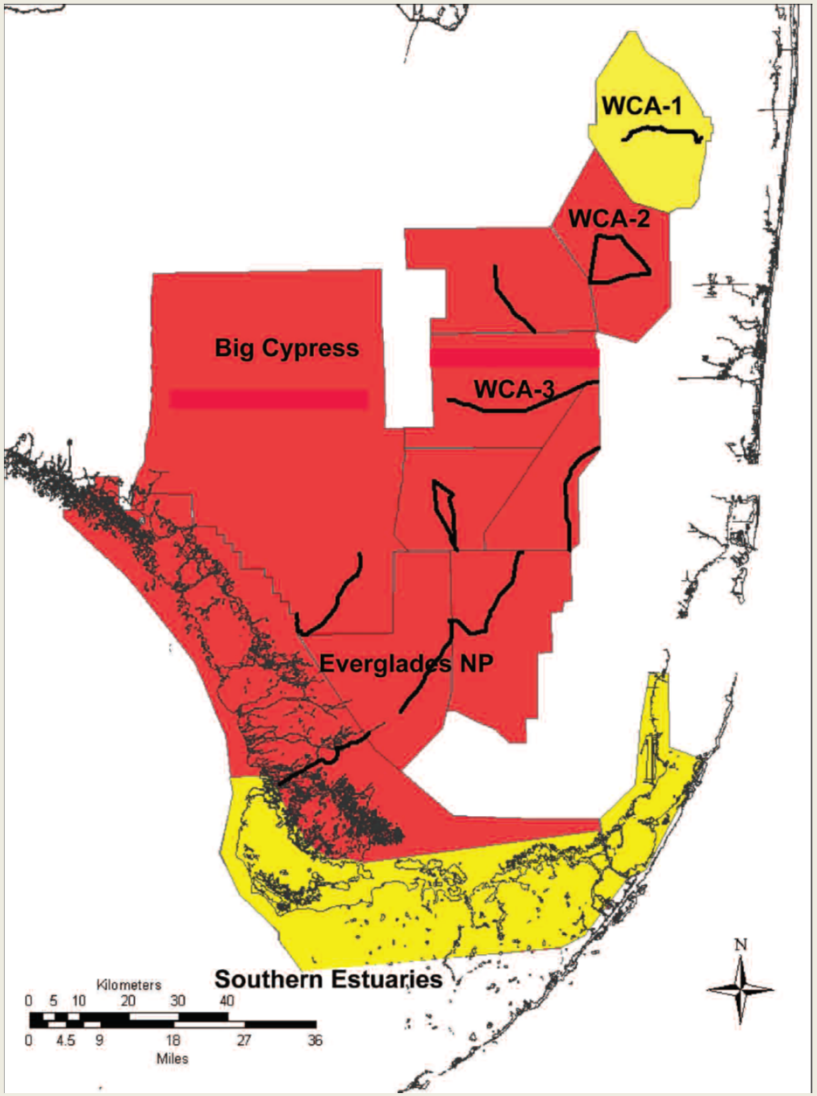
Relationship between rainfall and fall survival further supports the hypothesis that increased freshwater flows (reduced salinity) will result in increased crocodile survival



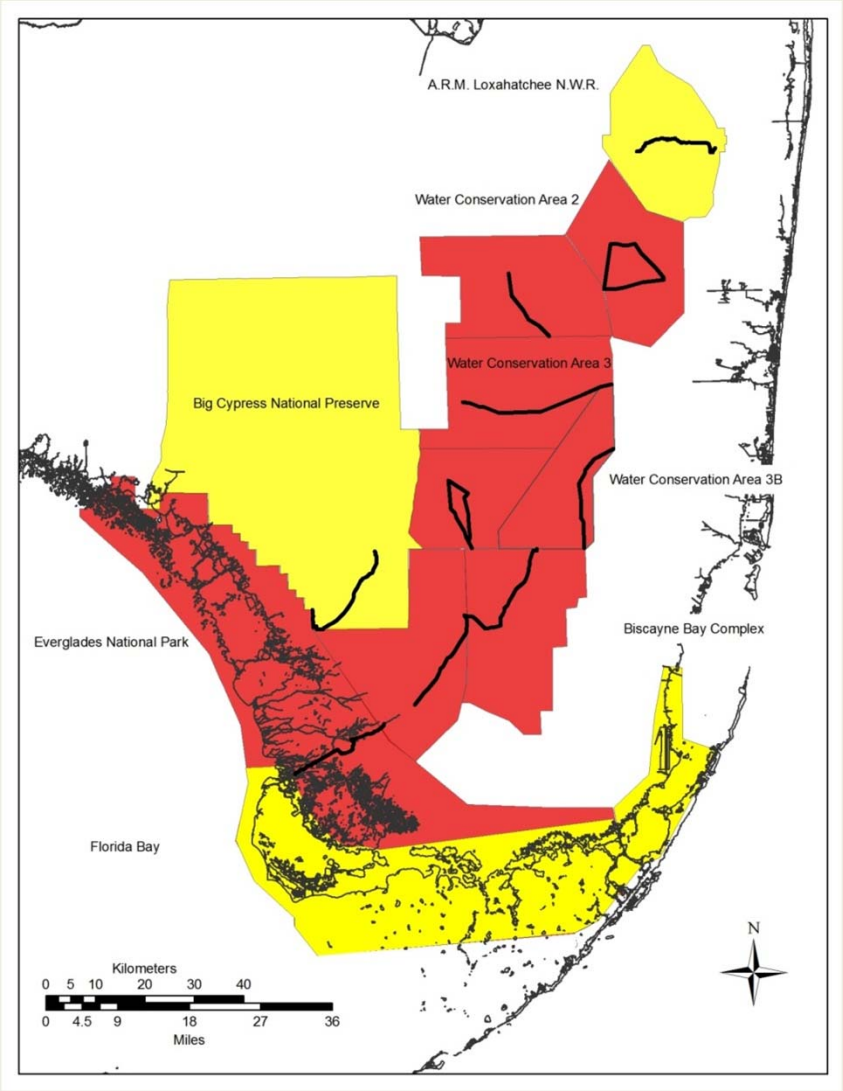
Restoration actions do result in species response



Information has been integrated into ecological tools and a report card for illustrating system-wide responses



2006



2009

Summary Points

- Unnatural patterns of drying of slough habitats results in fewer and skinnier alligators
- Canals contain primarily adult male alligators and are a reproductive sink
- Water level reversals or unnaturally fast increases in water levels are bad for both alligators and crocodiles, flooding nests and dispersing prey
- Lack of freshwater flow into Everglades estuaries has deceased the distribution and abundance of alligators (and crocodiles)
- Crocodiles in northeastern Florida Bay grow slower and survive less because of diversion of freshwater flow

Invasive (Wildlife) Species and CEPP

Invasive aquatic species present a potential threat to successful ecological restoration of greater Everglades Ecosystems (National Research Council 2005).

- Burmese pythons + Argentine Tegus & Nile Monitors
- Have CEM's for pythons and tegus (performance measures for pythons), working on habitat suitability and invasion models for pythons
- EIRAMP – system-wide and evaluates impacts on native fauna as well as spread of invasive reptiles and amphibian (ED&RR)