

Effects of Novel Water Regimes, Invasive Predators, and Contaminants on Wading Birds in the Everglades of Florida

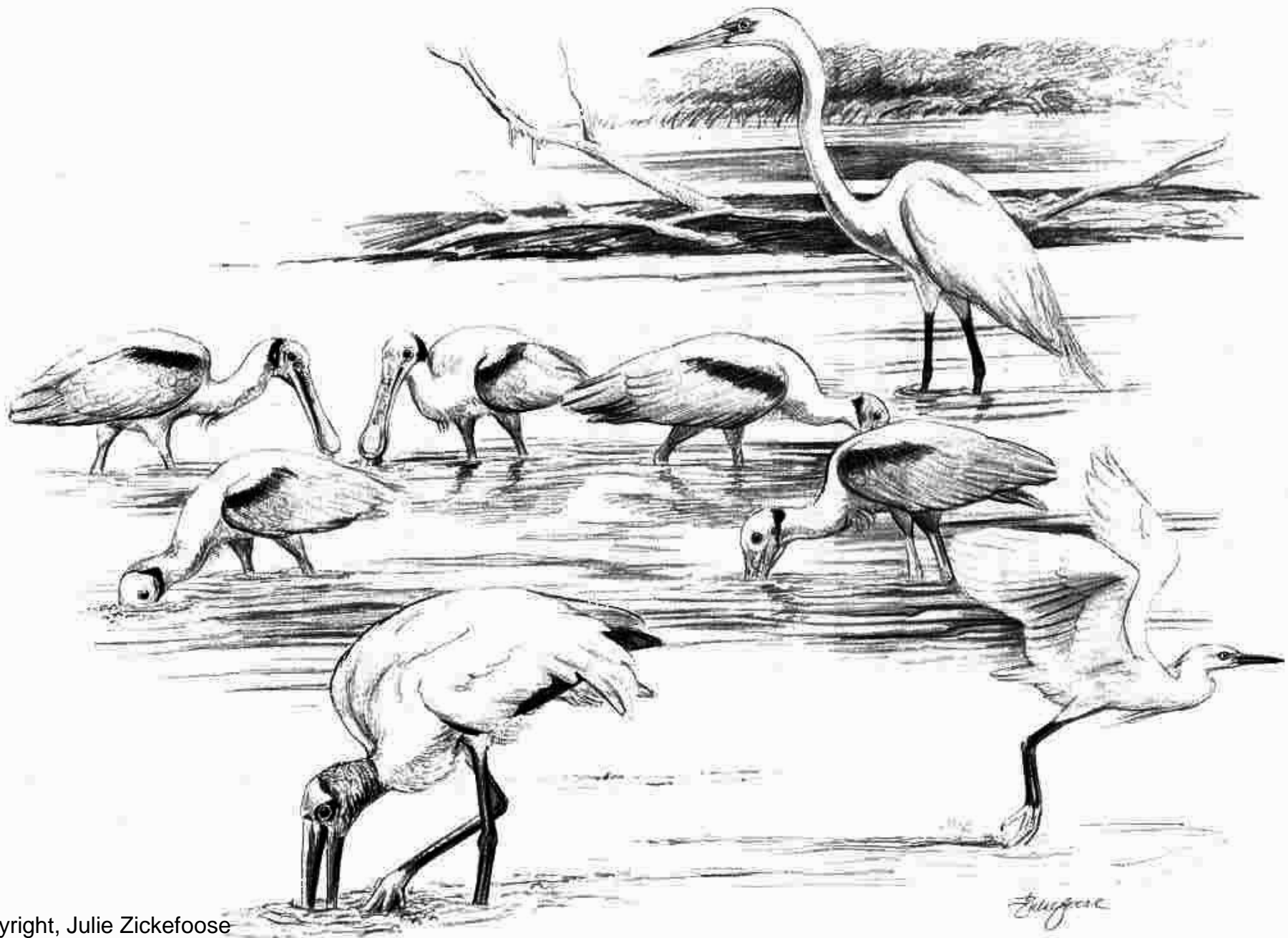


Peter Frederick

University of Florida

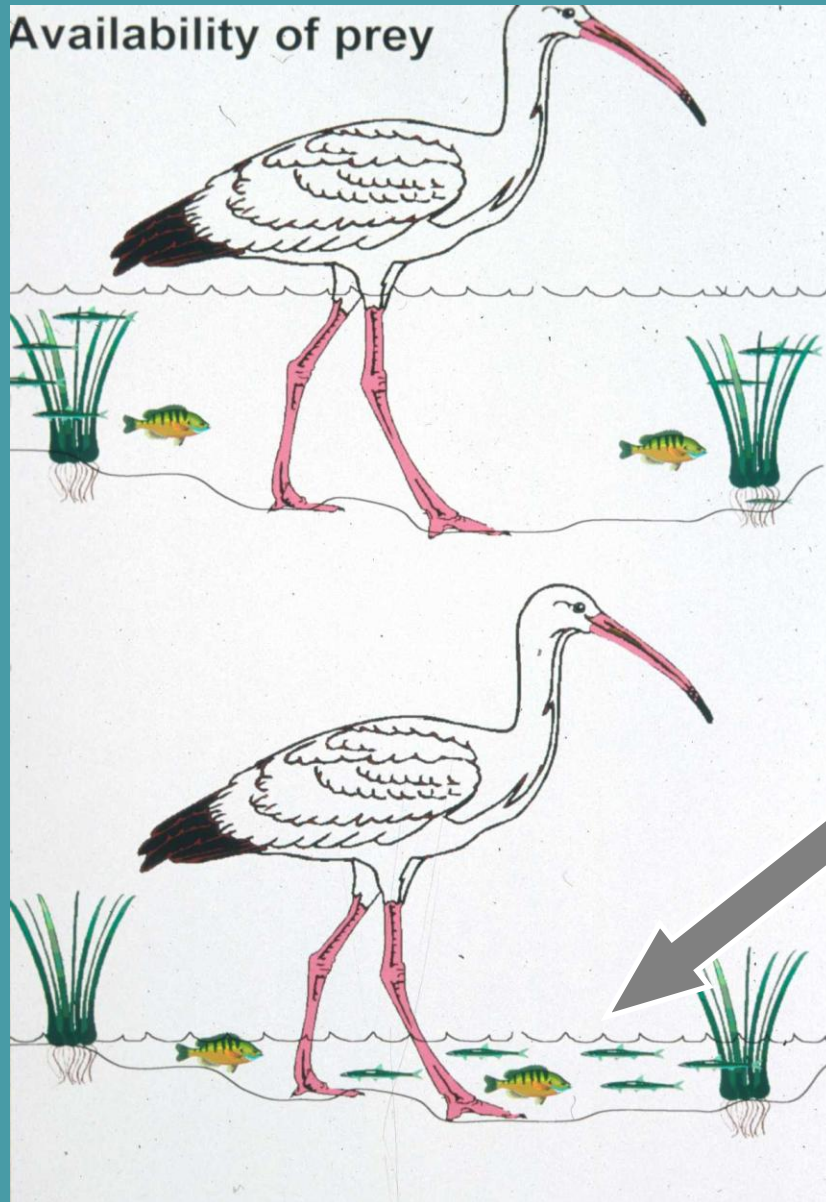
Department of Wildlife Ecology and Conservation





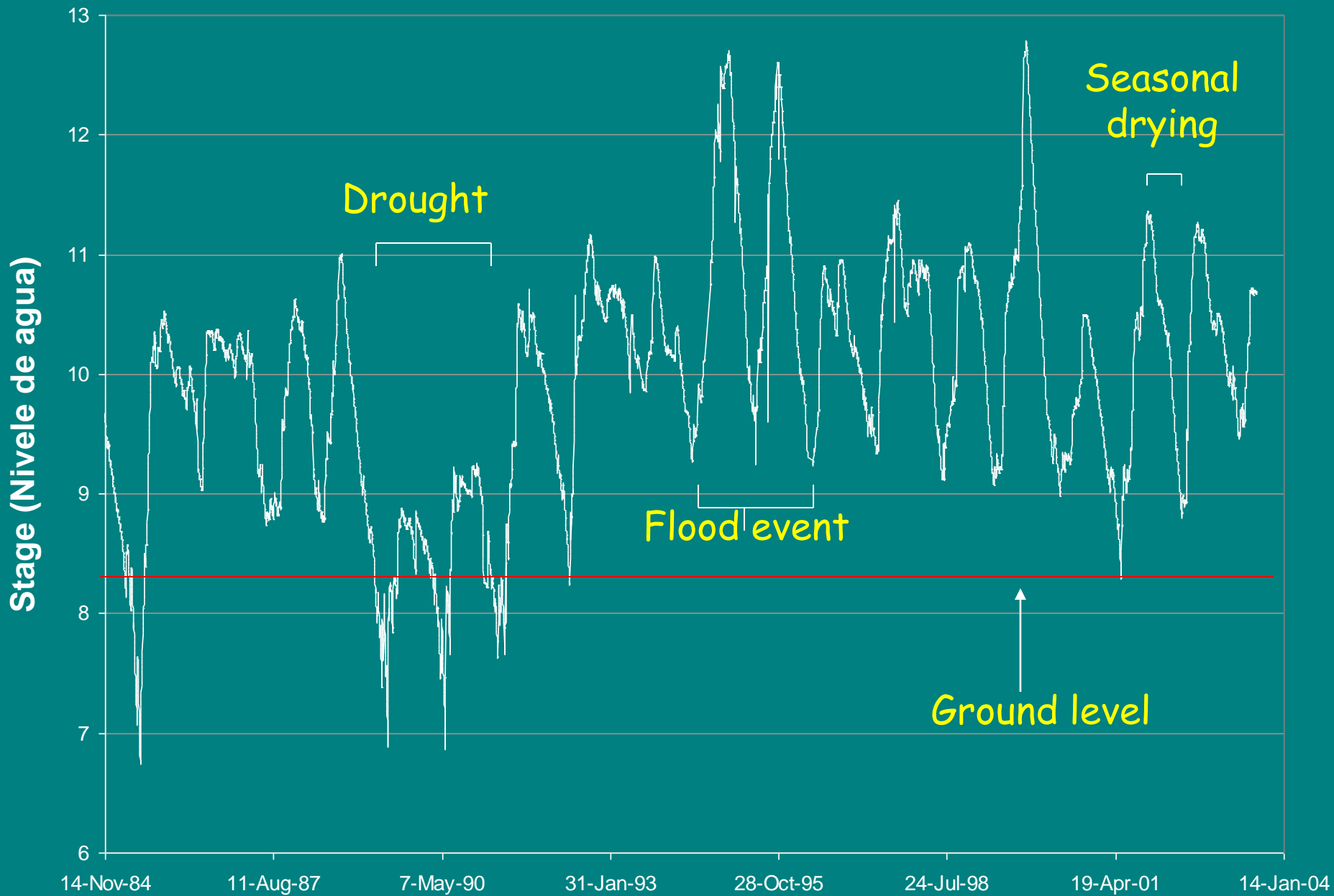
Engel

Hydrology and Availability of Prey Animals



Seasonal drying of
Surface water

Effects of hydroperiod
on prey animal populations
and vegetation



Stage (Nivele de agua)

Drought

Flood event

Seasonal drying

Ground level

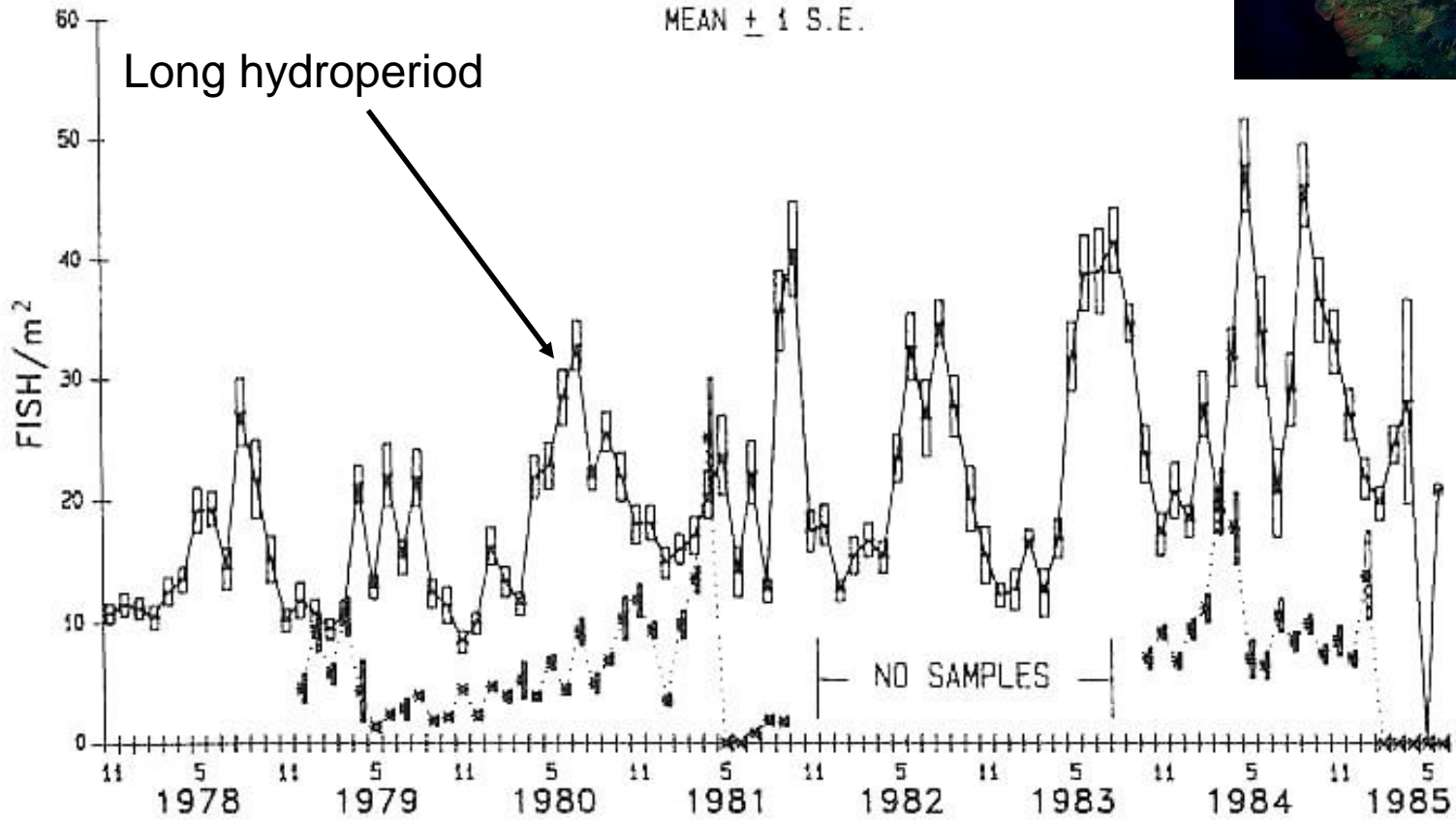
14-Nov-84 11-Aug-87 7-May-90 31-Jan-93 28-Oct-95 24-Jul-98 19-Apr-01 14-Jan-04

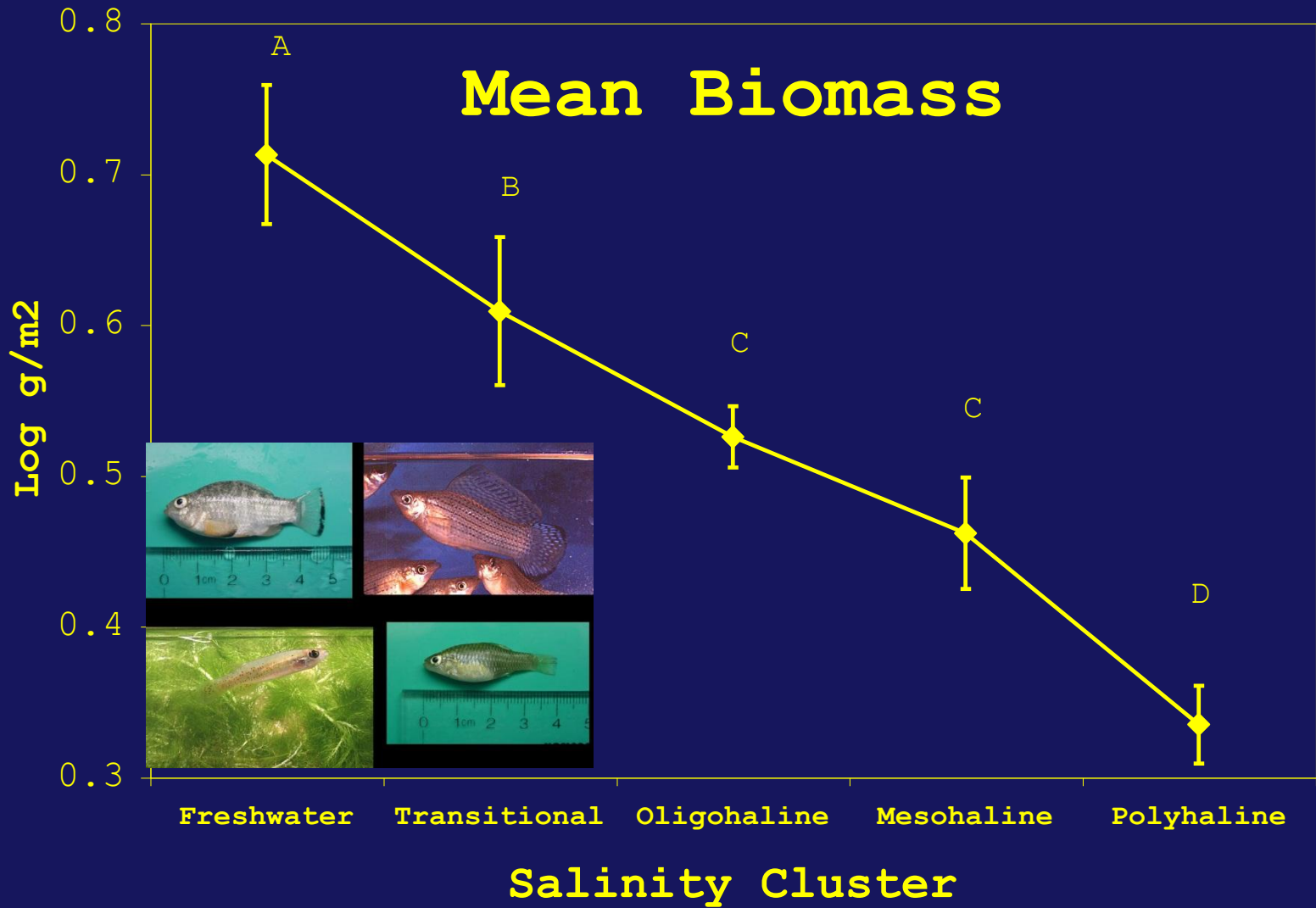




From: Loftus F. and Eklund 1994. In: Everglades: the ecosystem and its restoration. St. Lucie Press, Del Ray Bch FL.

FISH DENSITY
MEAN \pm 1 S.E.





Lorenz 2000, Ph.D. Dissertation RSMAS, U of Miami

Novel Hydrology and its effects

Lake Okeechobee littoral zone destroyed

Sawgrass prairies now sugarcane

Central slough - deep, dominated by big fish

Shallow marshes urbanized

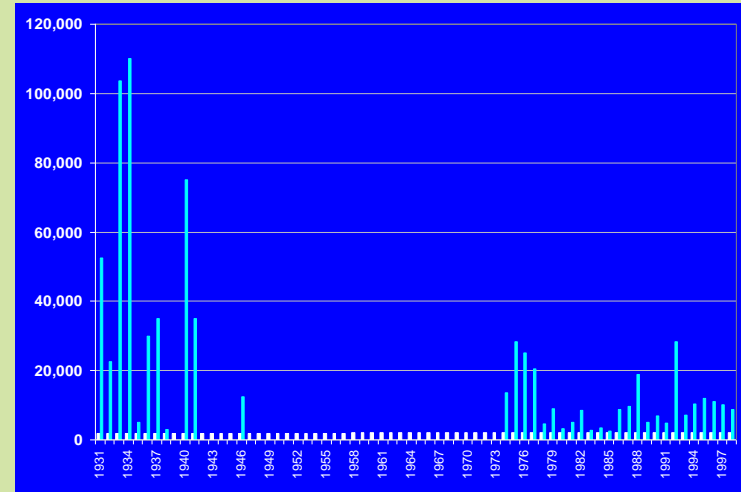
Coastal area overdrained low productivity



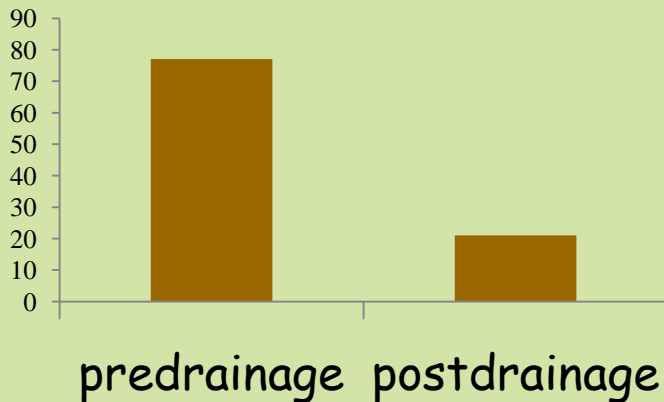
Colonies moved away from the coast



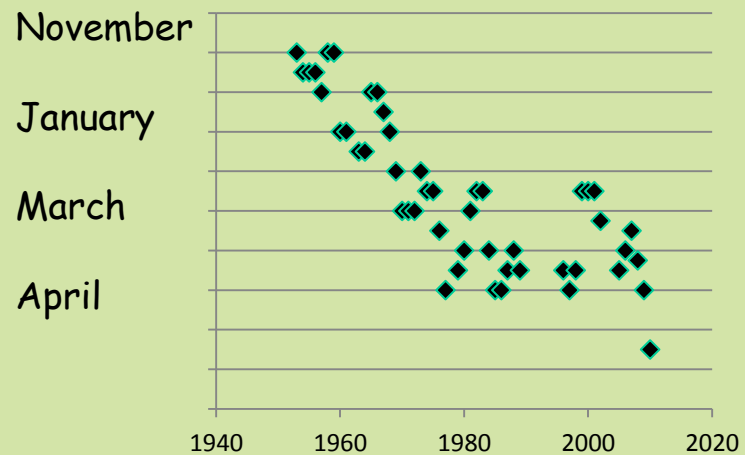
Large decrease in nesting birds



Stork nesting success declined



Storks nested later





Hydrological Restoration Hypothesis:

Increased flow to estuaries
Removal of barriers
Natural timing of flows
Natural variability in hydroperiod



Increased prey productivity
More “right-sized” fish
Greater availability to birds



Increased numbers of nesting birds
Increased nesting success
Movement back to the estuary

BIRDS

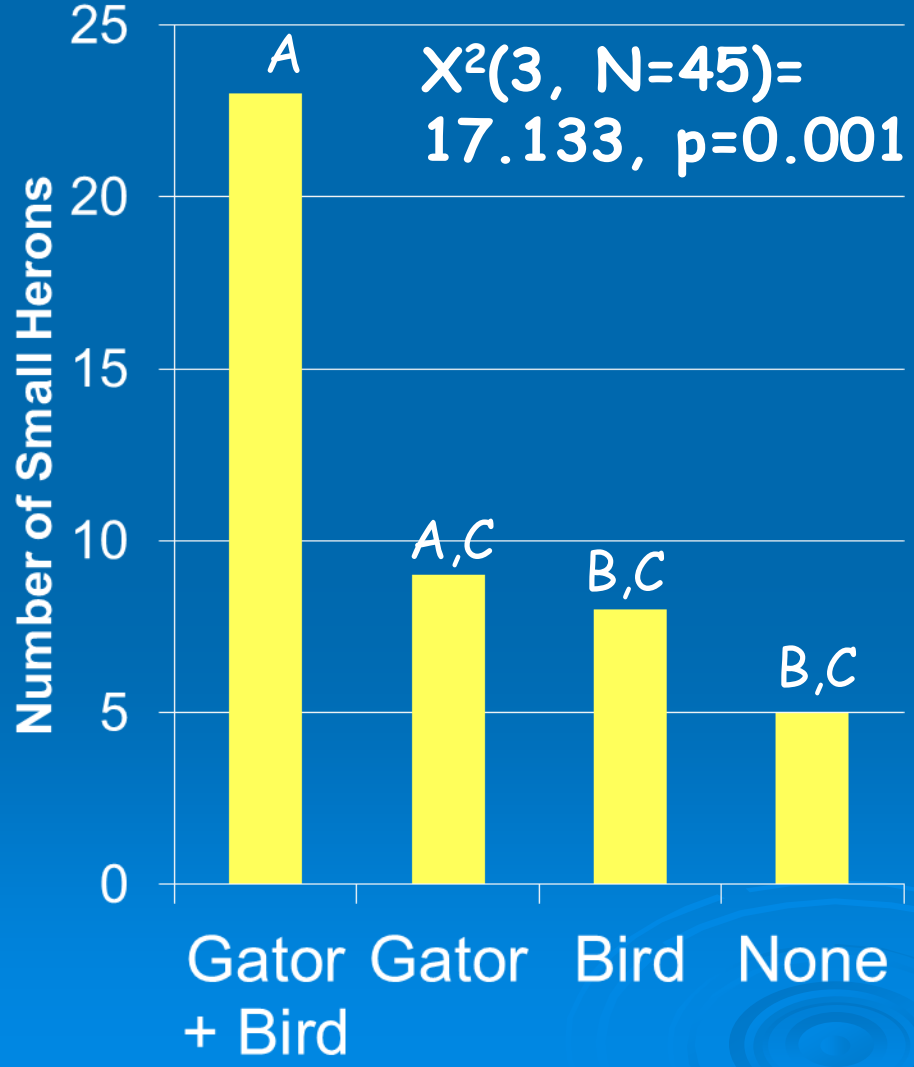


**ALLIGATOR
Pond**

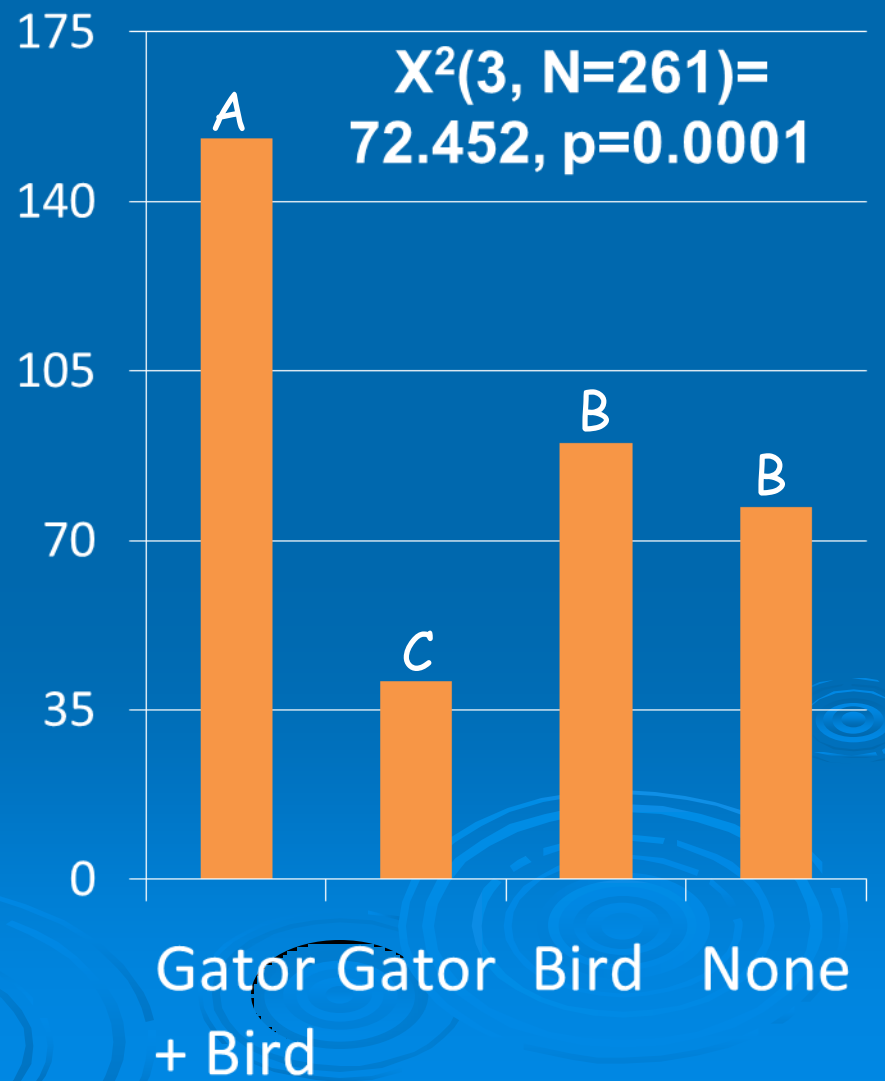


Bird Response to Decoys

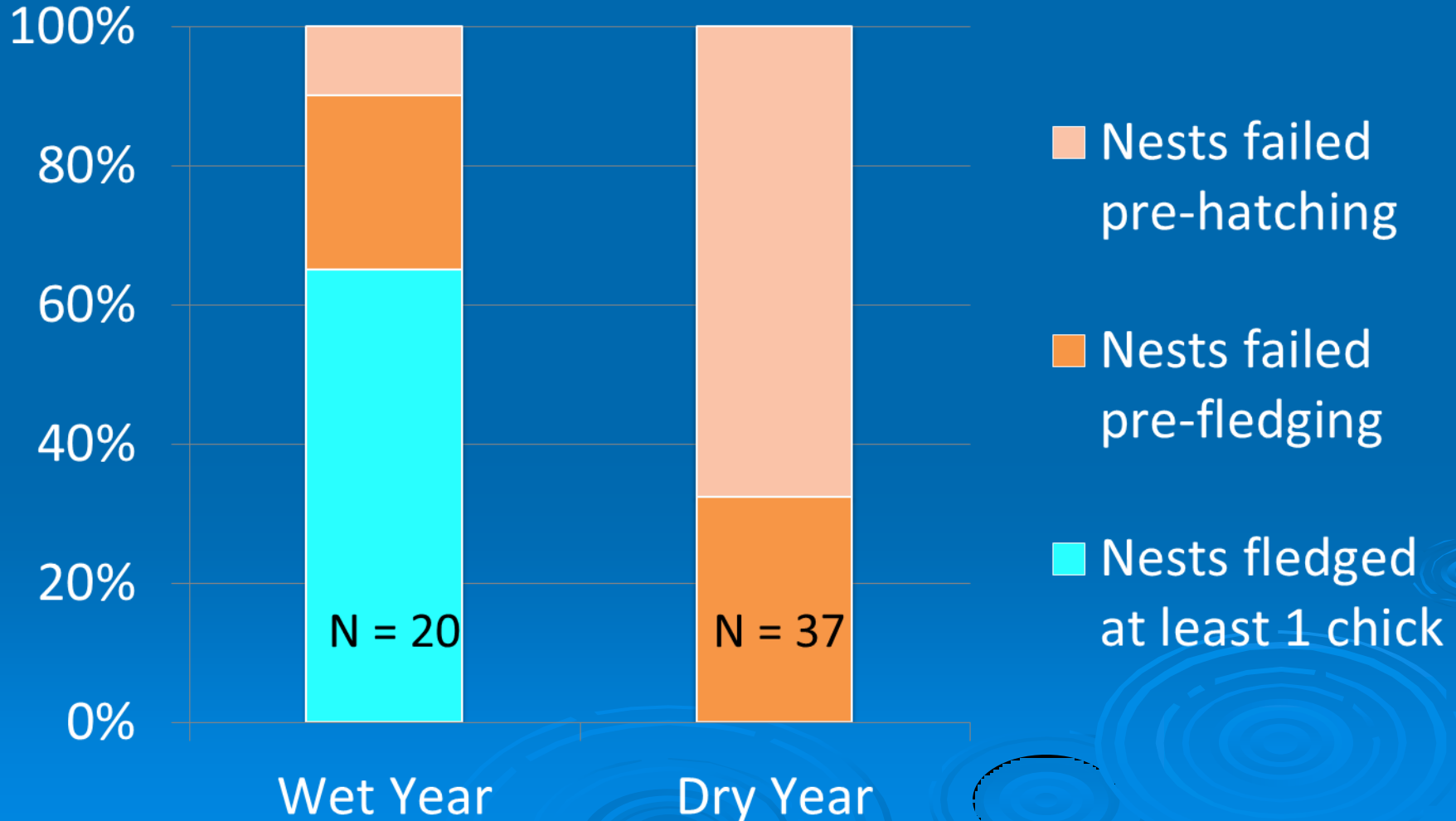
2010



2011



Nest success



Raccoons win, wading birds lose

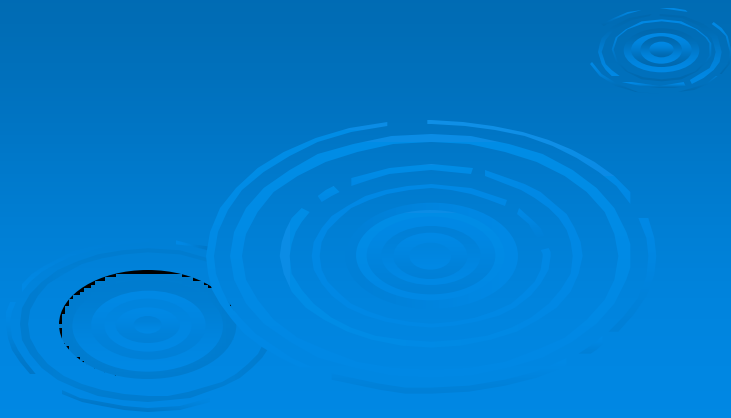


Raccoons don't even try



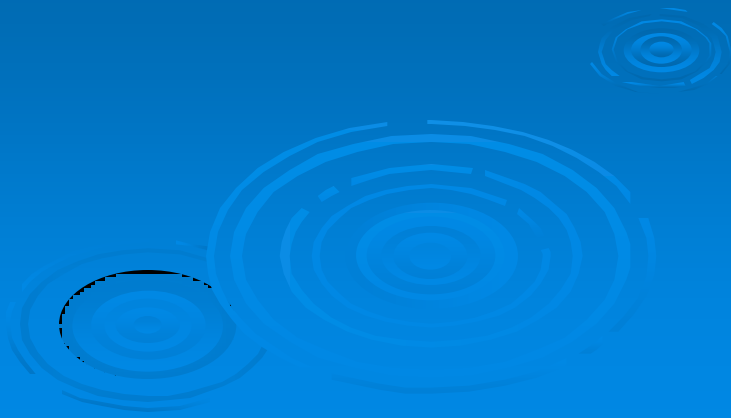
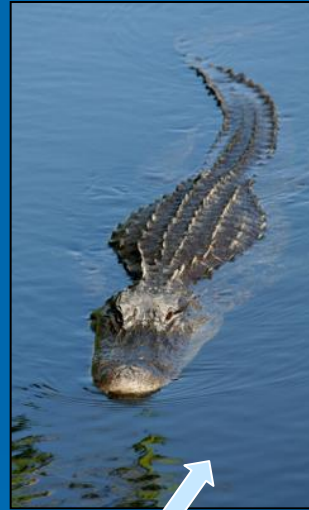


Water
Depth





Water
Depth



Novel Predators

Burmese Pythons

Aquatic, omnivorous

99% reduction in raccoons

Aquatic bird predator

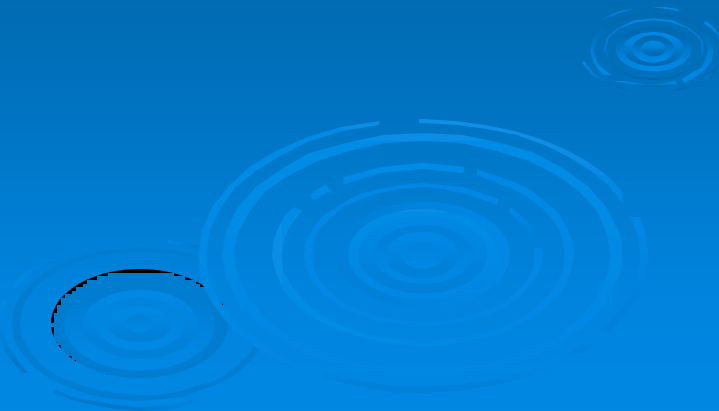
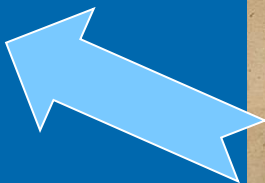
Gator killer or gator food?





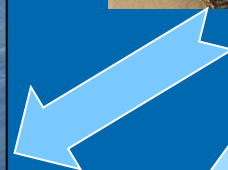
Water
Depth

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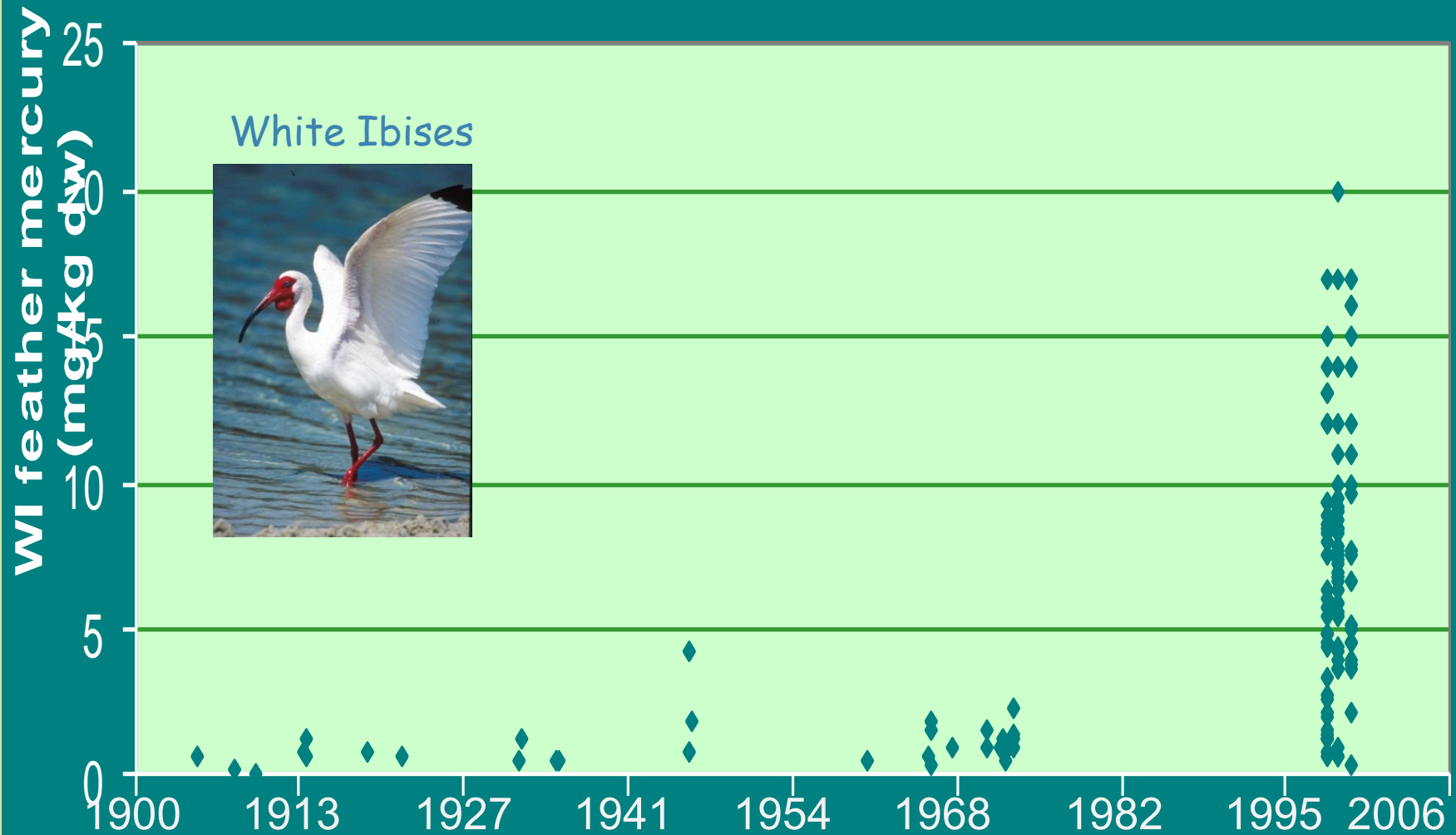




Water
Depth

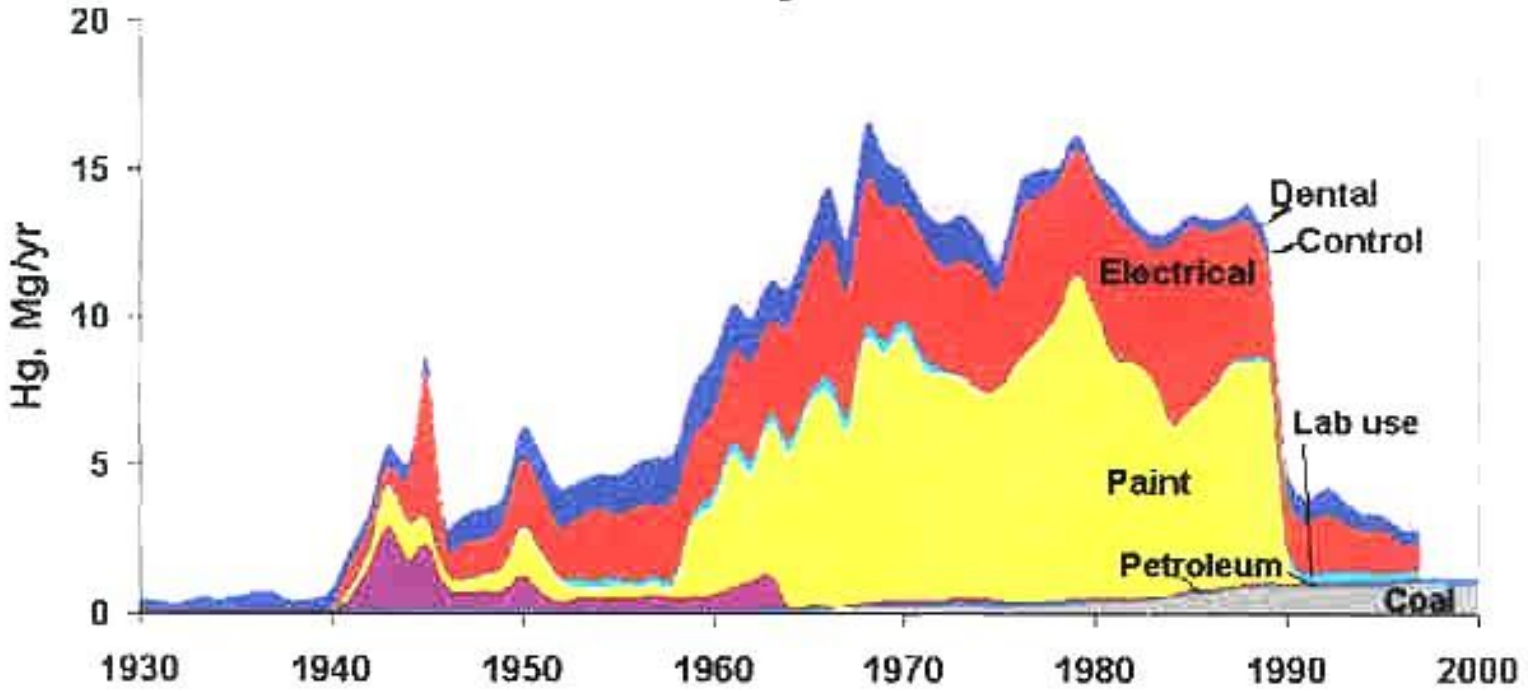


Novel Contaminants: Methylmercury



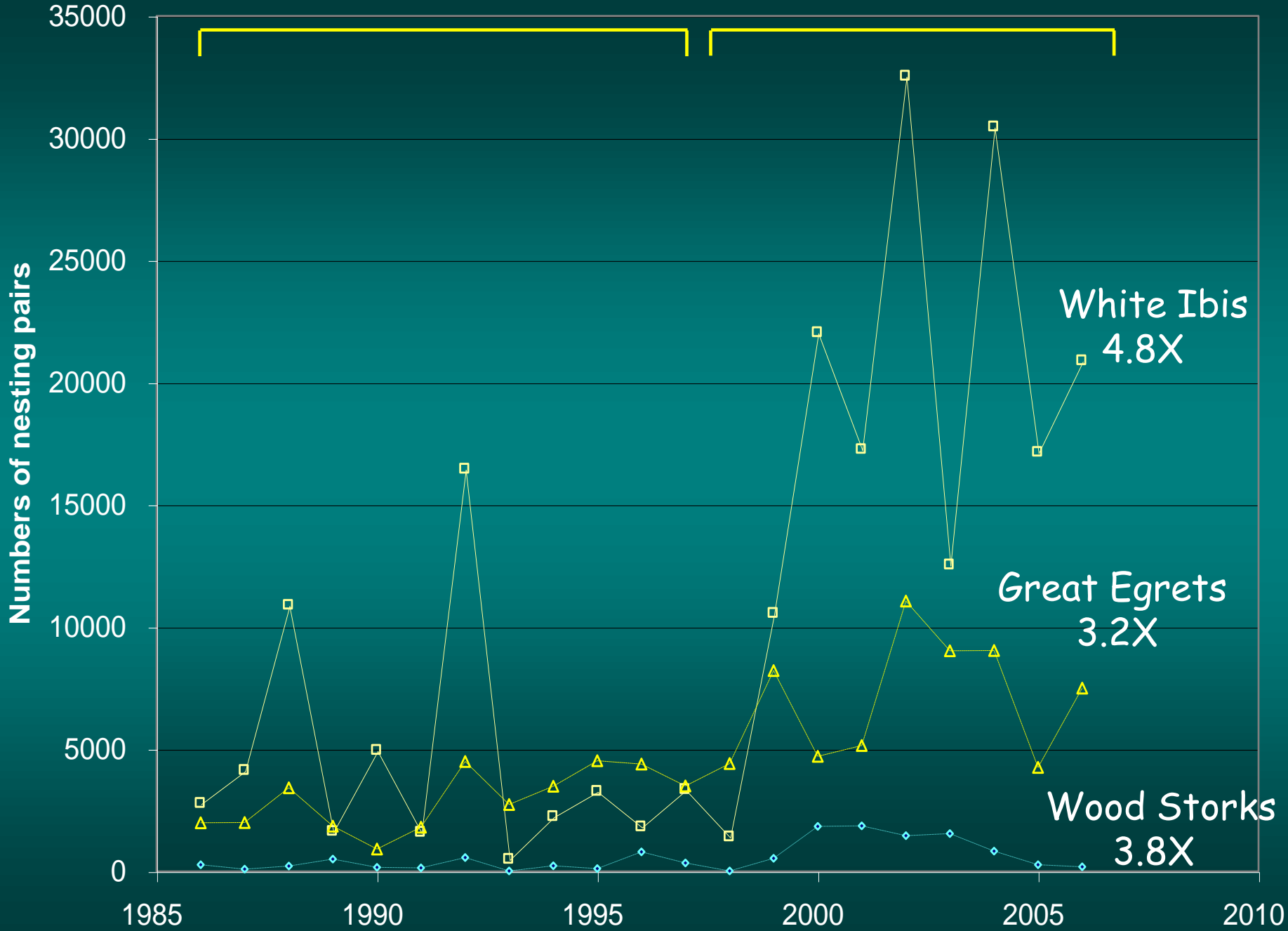
Frederick et al. 2004. Environ Tox & Chem. 23:1474-1478.

Florida Mercury Emissions



Pre-1998

Post-1998



White Ibis
4.8X

Great Egrets
3.2X

Wood Storks
3.8X

Effects of methylmercury in captive birds

Dosed groups had fewer nests with eggs

Lack of laying was due to male-male pairing
(to 55% of males)

Male-male pairing dose-dependent

Dosed males had altered
hormone expression

Heterosexual pairs had trouble
raising young.

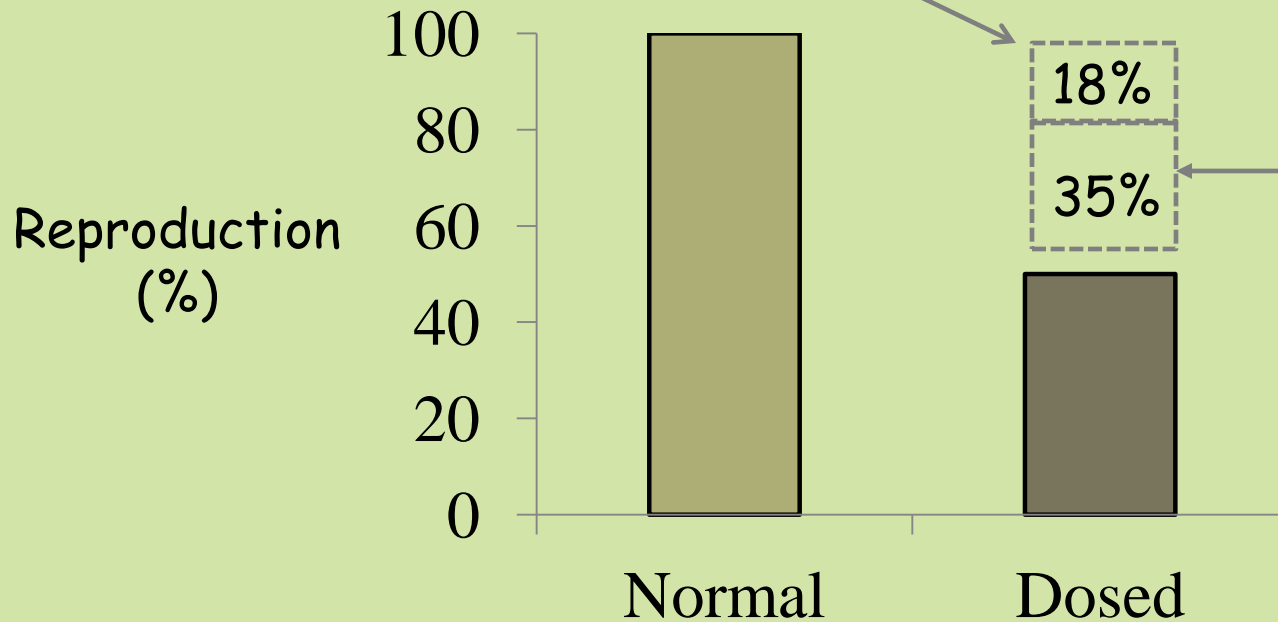




Homosexual pairing
No Eggs



Heterosexual pairing
Poor parenting



Sublethal
methylmercury
exposure

Endocrine disruption

Reproductive impairment

Population
level effects

Other novelties?

Future contamination

Distant magnets

Rising sea level

Thirsty cities

Phosphorus pollution

Political will



