Dietary flexibility of Wood Storks in response to human-induced landscape change in South Florida

Betsy A. Evans, Jessica A. Klassen, & Dale E. Gawlik
Florida Atlantic University

GEER – April 2017

Human-induced rapid environmental change (HIREC)

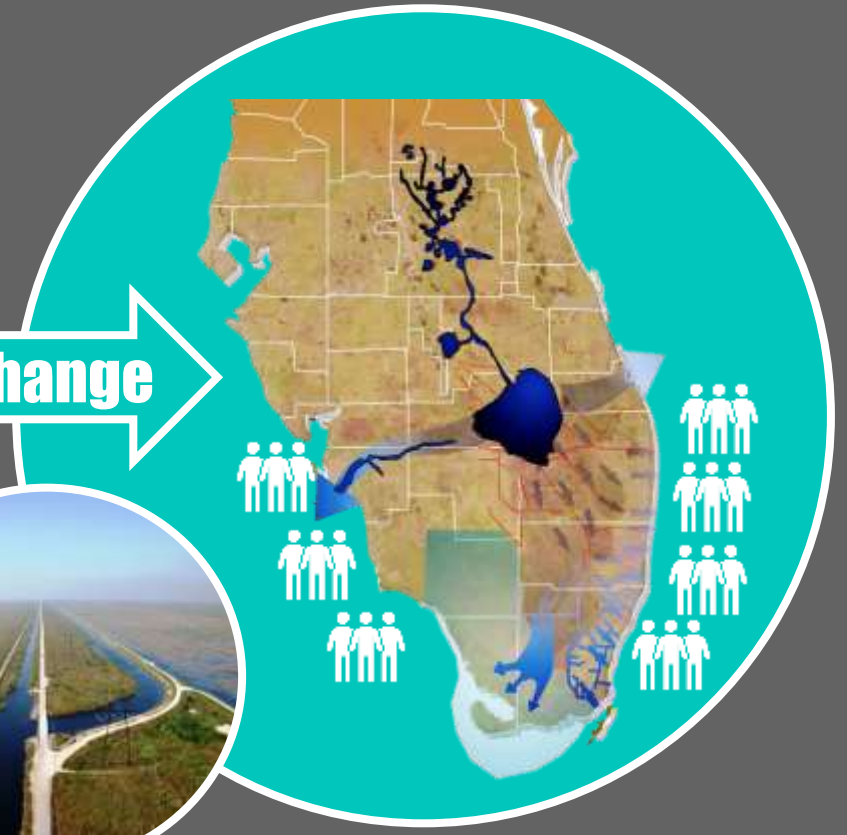
Sih et al. 2011
Sih 2013

Alteration of Everglades hydrology

Historic

Landscape change

Current

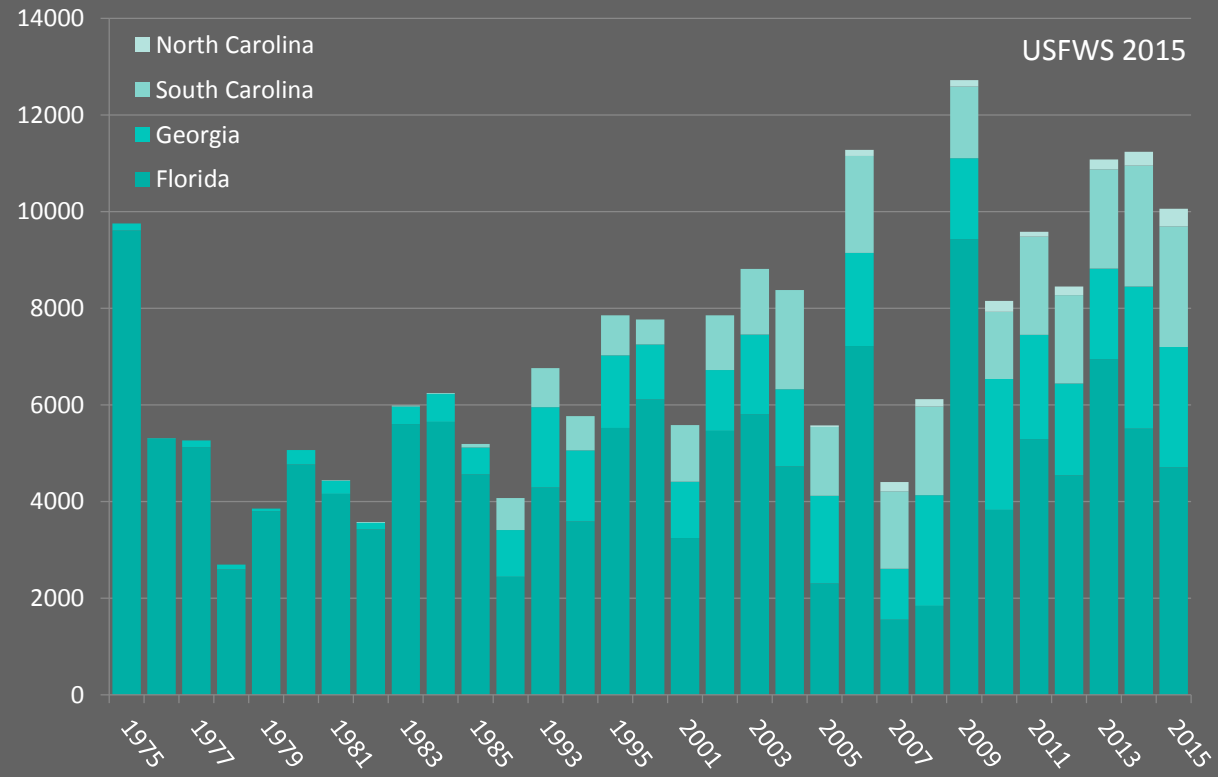


Evergladesplan.org

Urbanization in South Florida

Initial response of Wood Storks to HIREC

- 75% population decline in South Florida
- Delayed nest initiation
- Range expansion northward



Despite this well-documented sensitivity…

Permanently-inundated stormwater ponds

Canals

Ephemeral stormwater ponds

Swales

Diet change as an indicator for Wood Stork response to HIREC

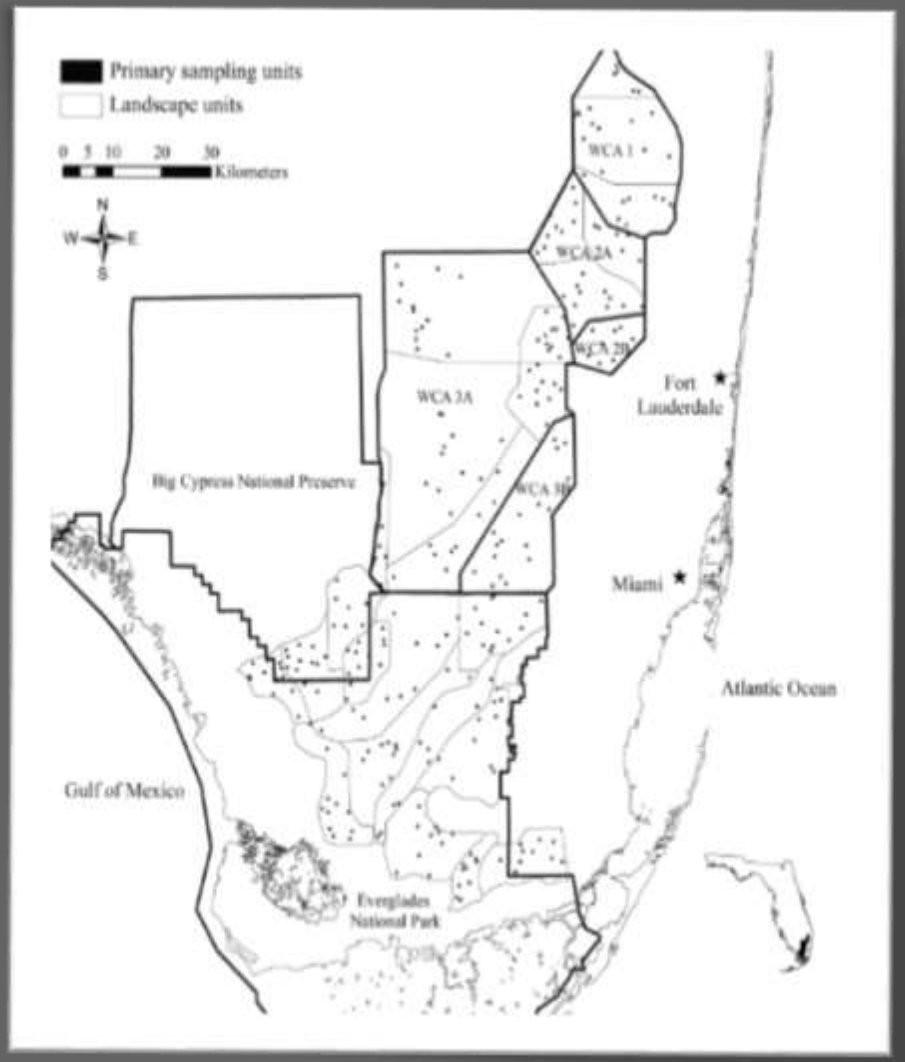
- Wood Storks are limited by the timing, abundance, and availability of food
- Dietary shifts can indicate behavioral plasticity in response to HIREC

Objectives

1) Make temporal comparisons between current Wood Stork prey composition and prey composition prior to the establishment of anthropogenic water features

2) Determine what portion of aquatic fauna produced in natural wetlands and anthropogenic water features is Wood Stork prey

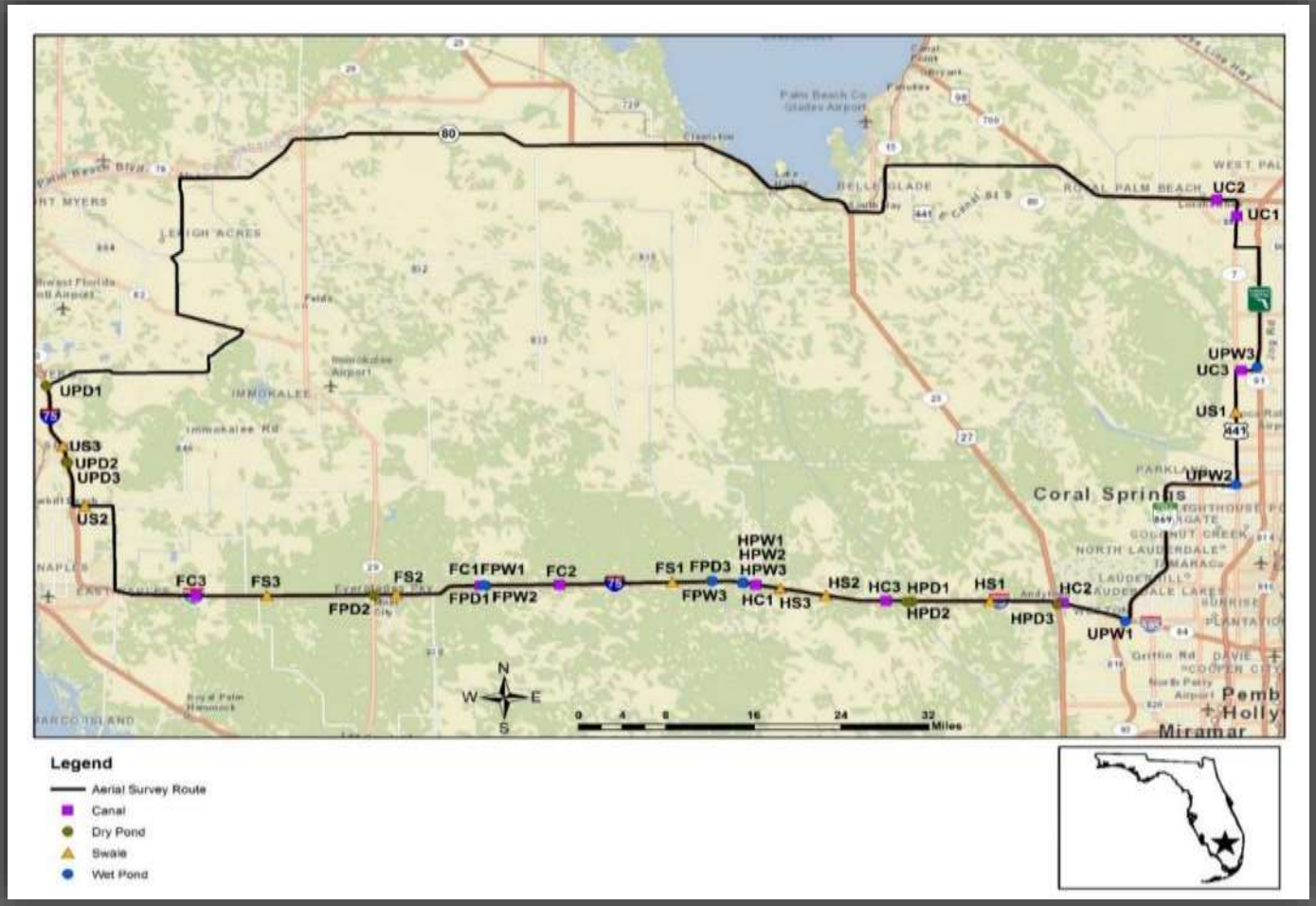
Natural wetland prey availability



N=112

Jordan et al. 1998, Botson and Gawlik 2010

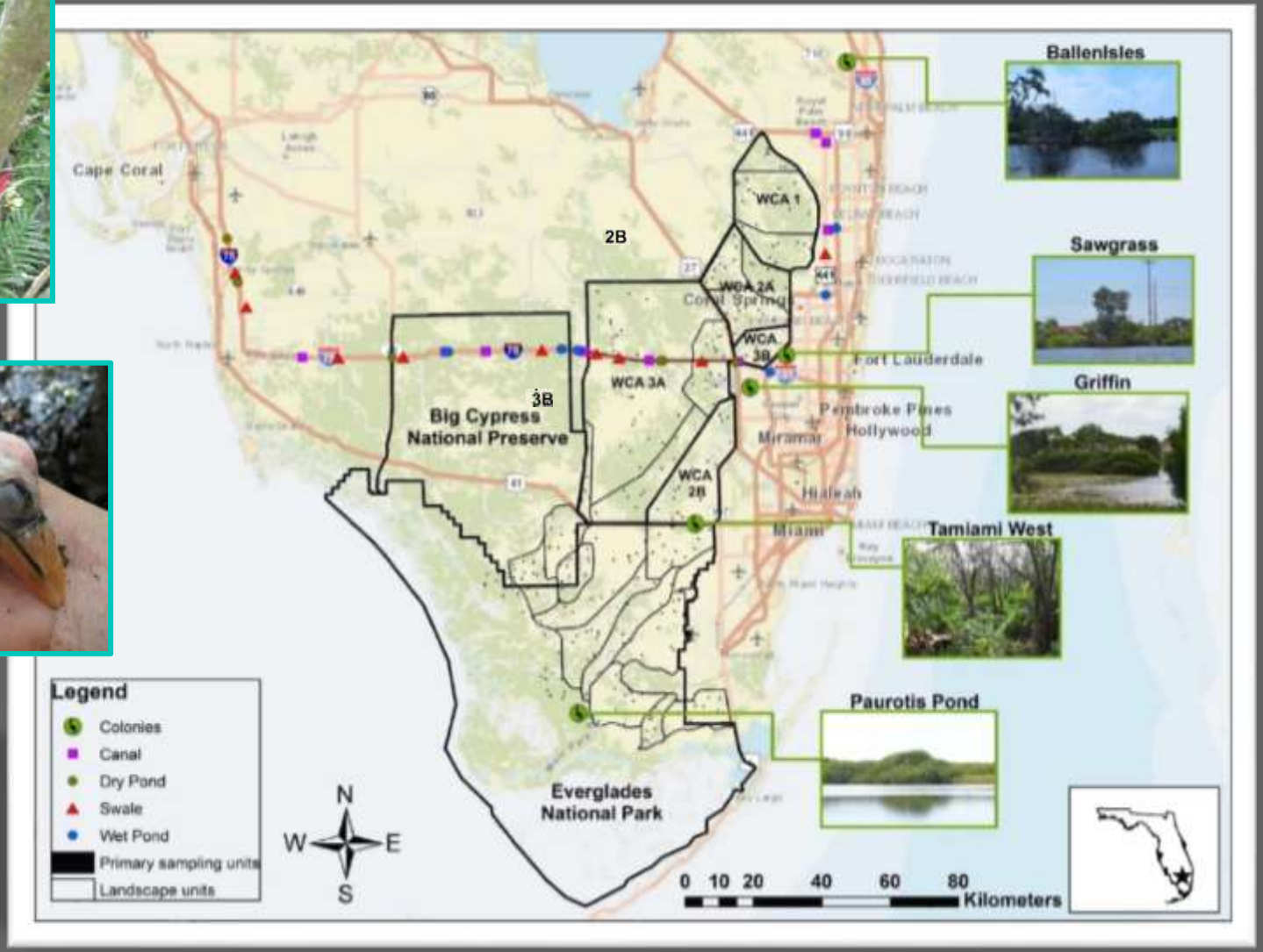
Anthropogenic water feature prey availability



N=36 sites sampled monthly for 2 years

Prey selectivity sampling locations

N=550



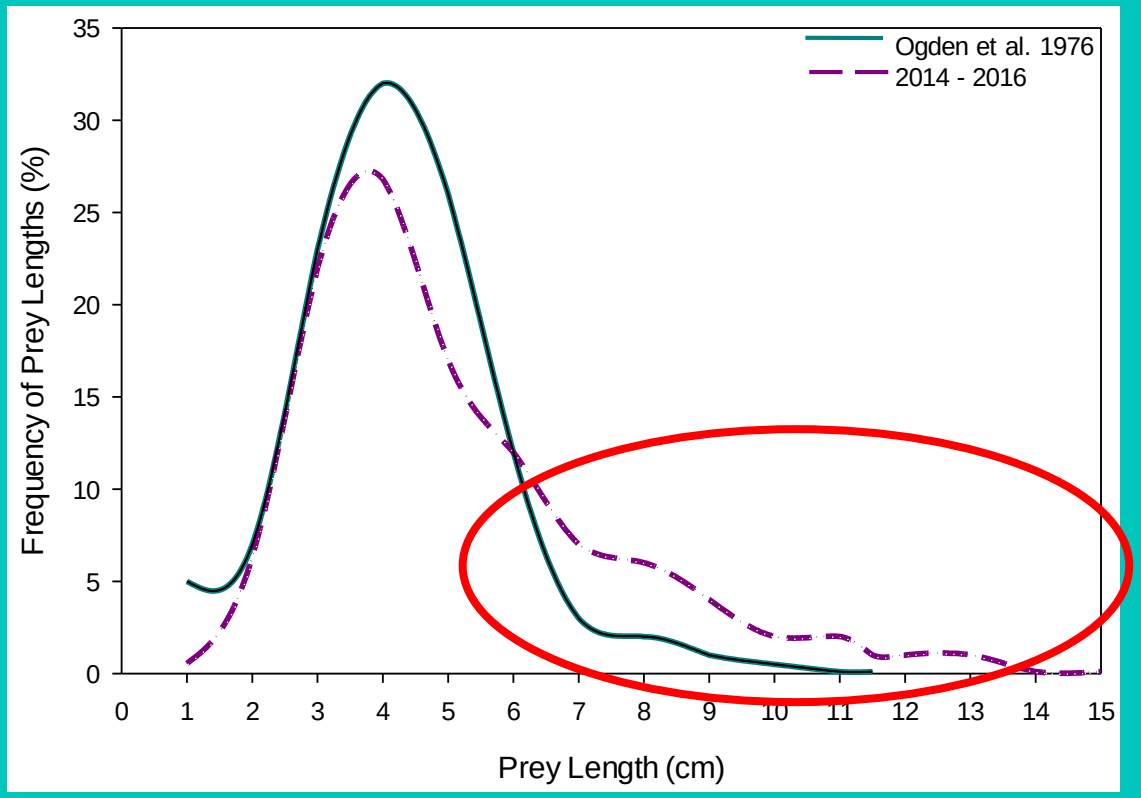
Objectives

1) Make temporal comparisons between current Wood Stork prey composition and prey composition prior to the establishment of anthropogenic water features

2) Determine what portion of aquatic fauna produced in natural wetlands and anthropogenic water features is Wood Stork prey

Frequency of large-bodied fish in Wood Stork diet

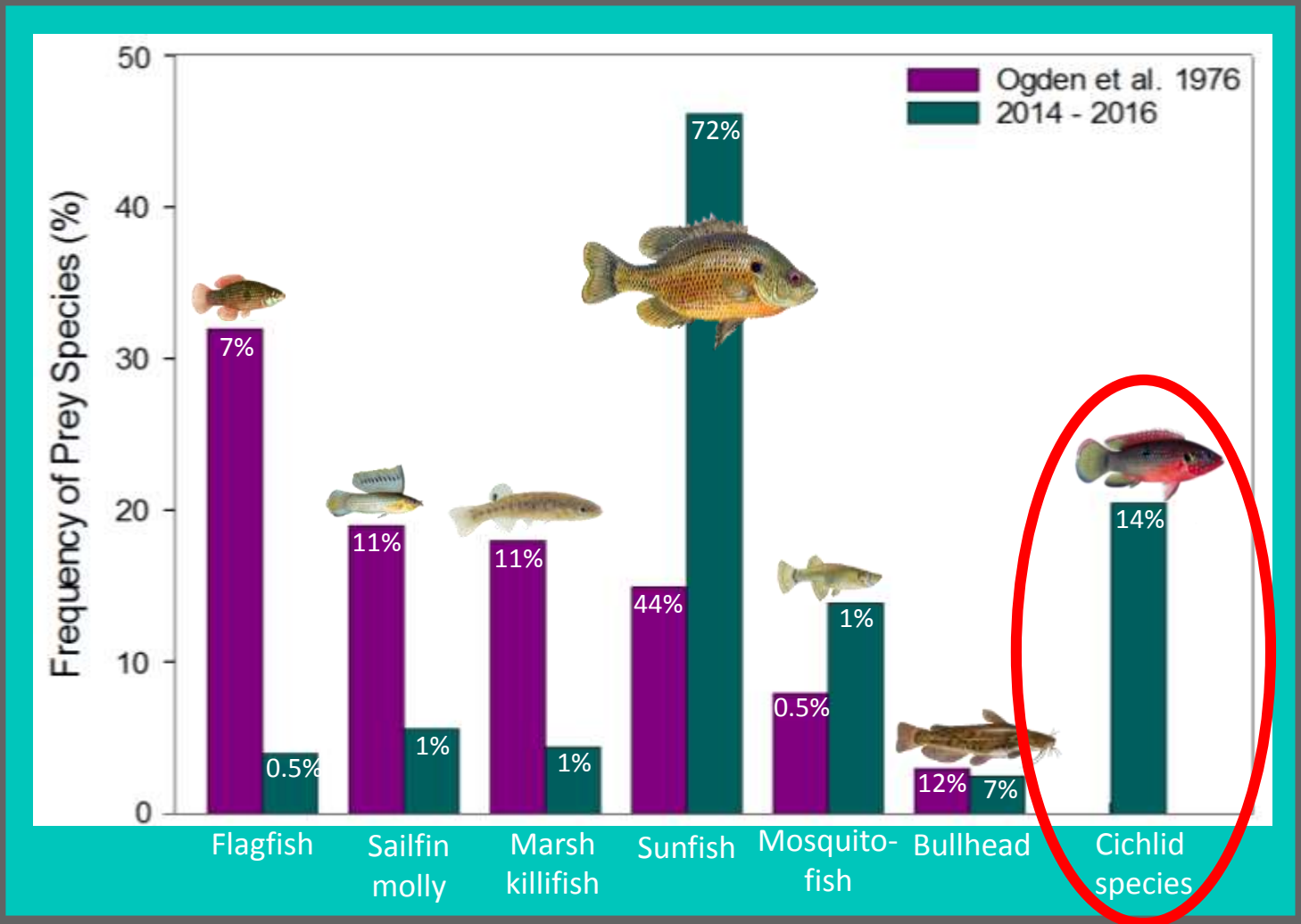
- 1970s:
  - Coastal colonies collapse
  - Few exotic fish
  - Anthropogenic water features not well-established
- 2010s:
  - Downlisted to threatened in 2014
  - Exotic fish prevalent
  - Anthropogenic water features well-established
  - Birds nesting in urban environments



Preference for even larger prey

Ogden et al. 1976

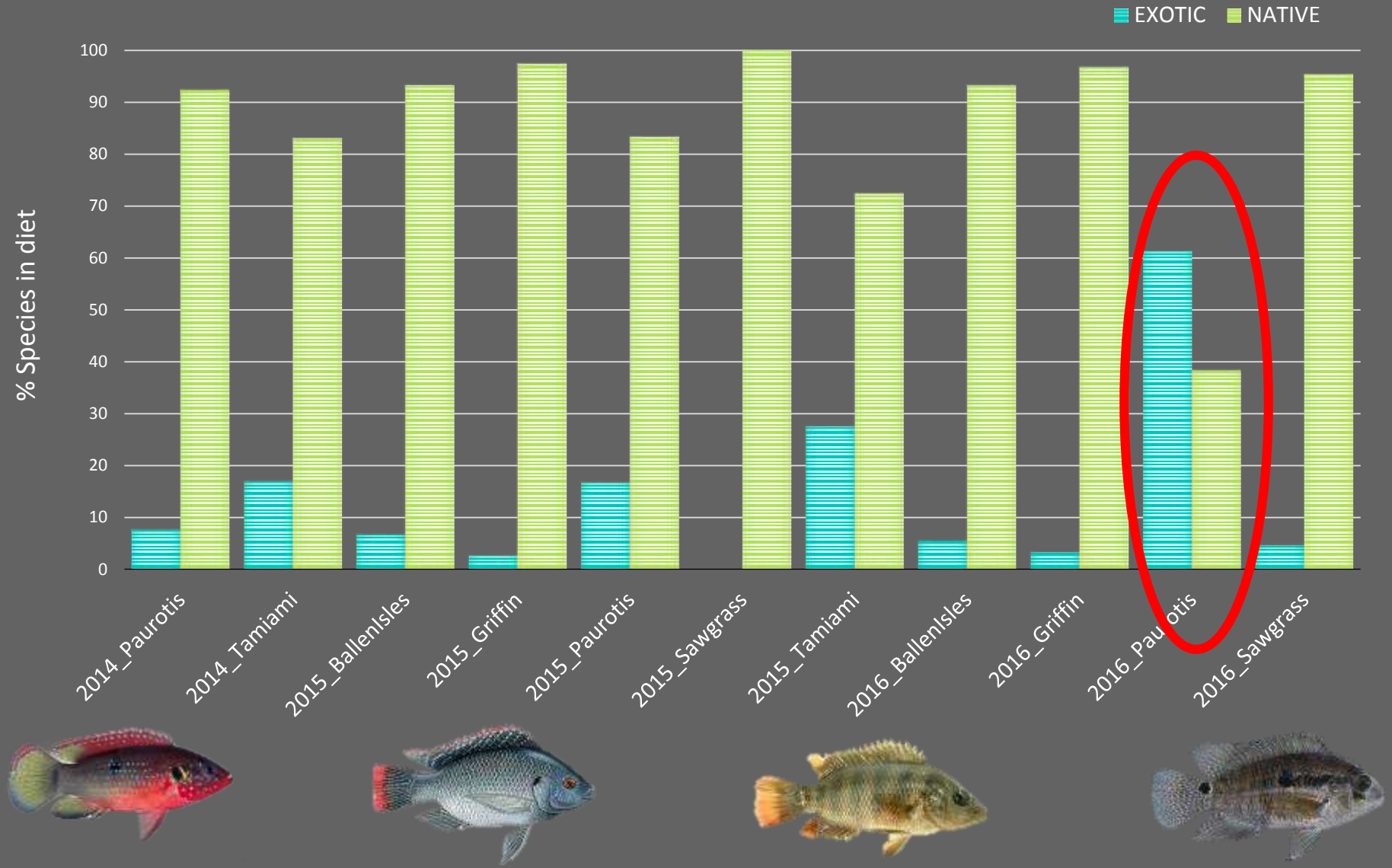
Today: Frequency of exotic fish in Wood Stork diet



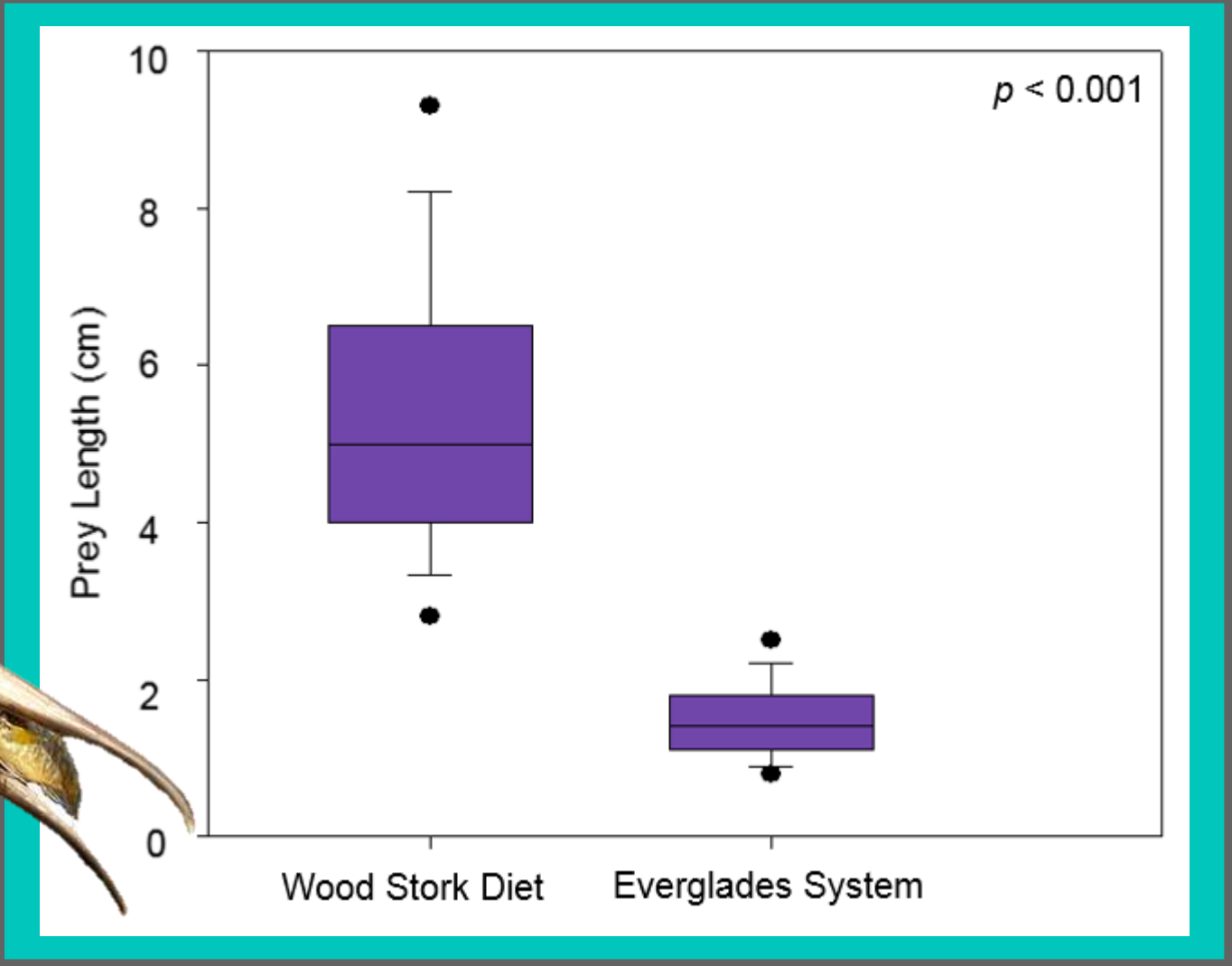
Preference for not only larger prey, but different species

Ogden et al. 1976

Exotic fish in Wood Stork diet



So...where are they finding these large fish?

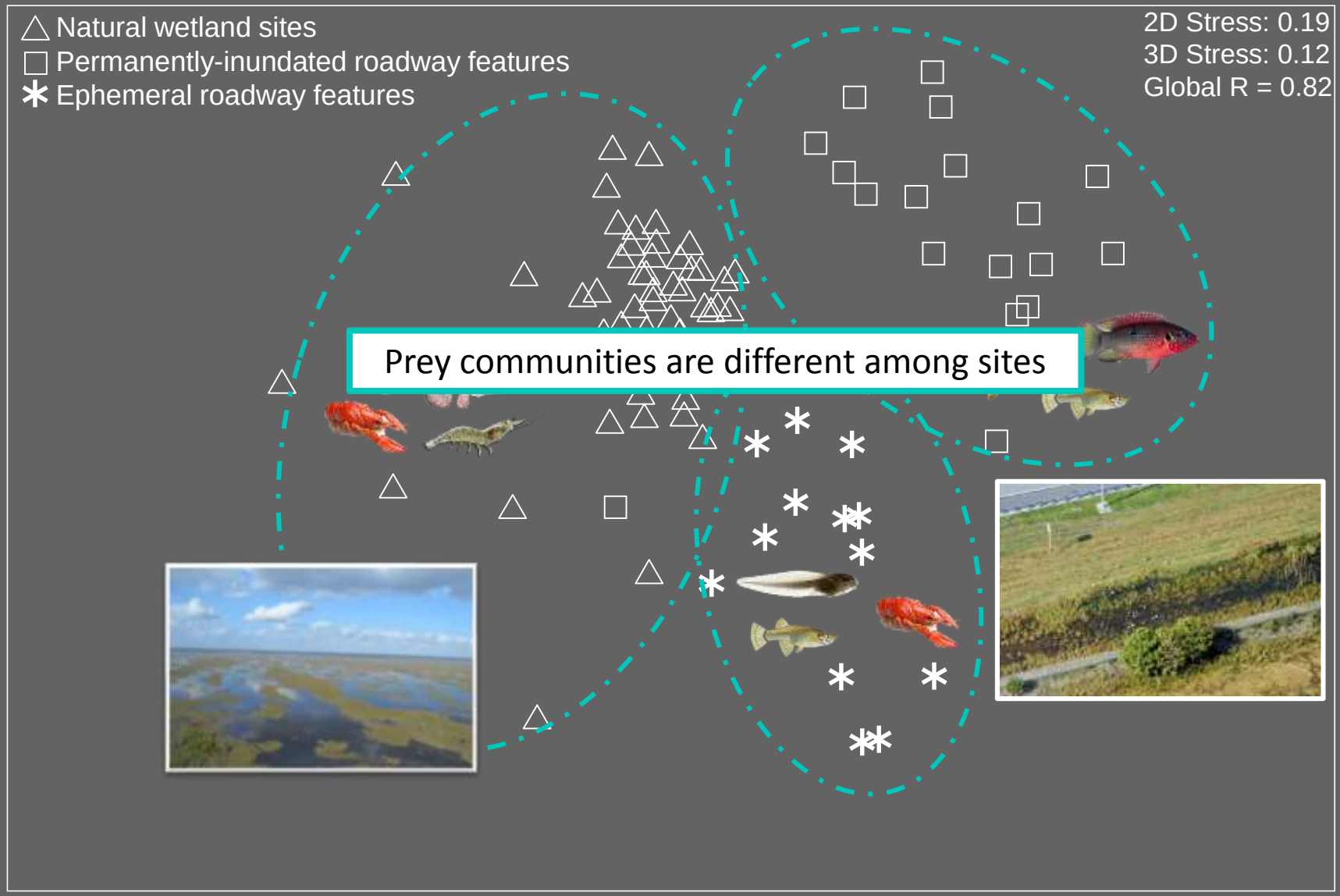


Objectives

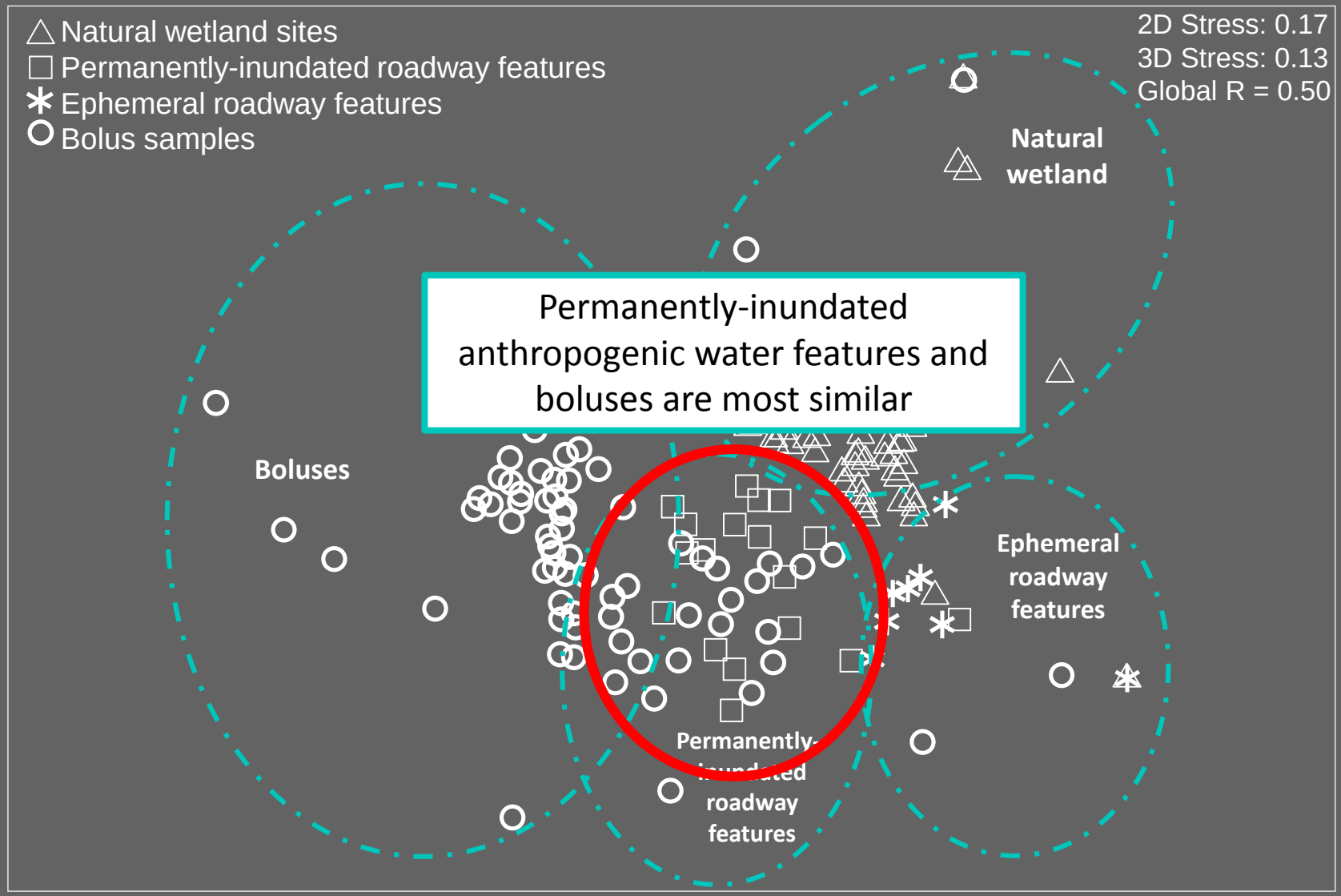
1) Make temporal comparisons between current Wood Stork prey composition and prey composition prior to the establishment of anthropogenic water features

2) Determine what portion of aquatic fauna produced in natural wetlands and anthropogenic water features is Wood Stork prey

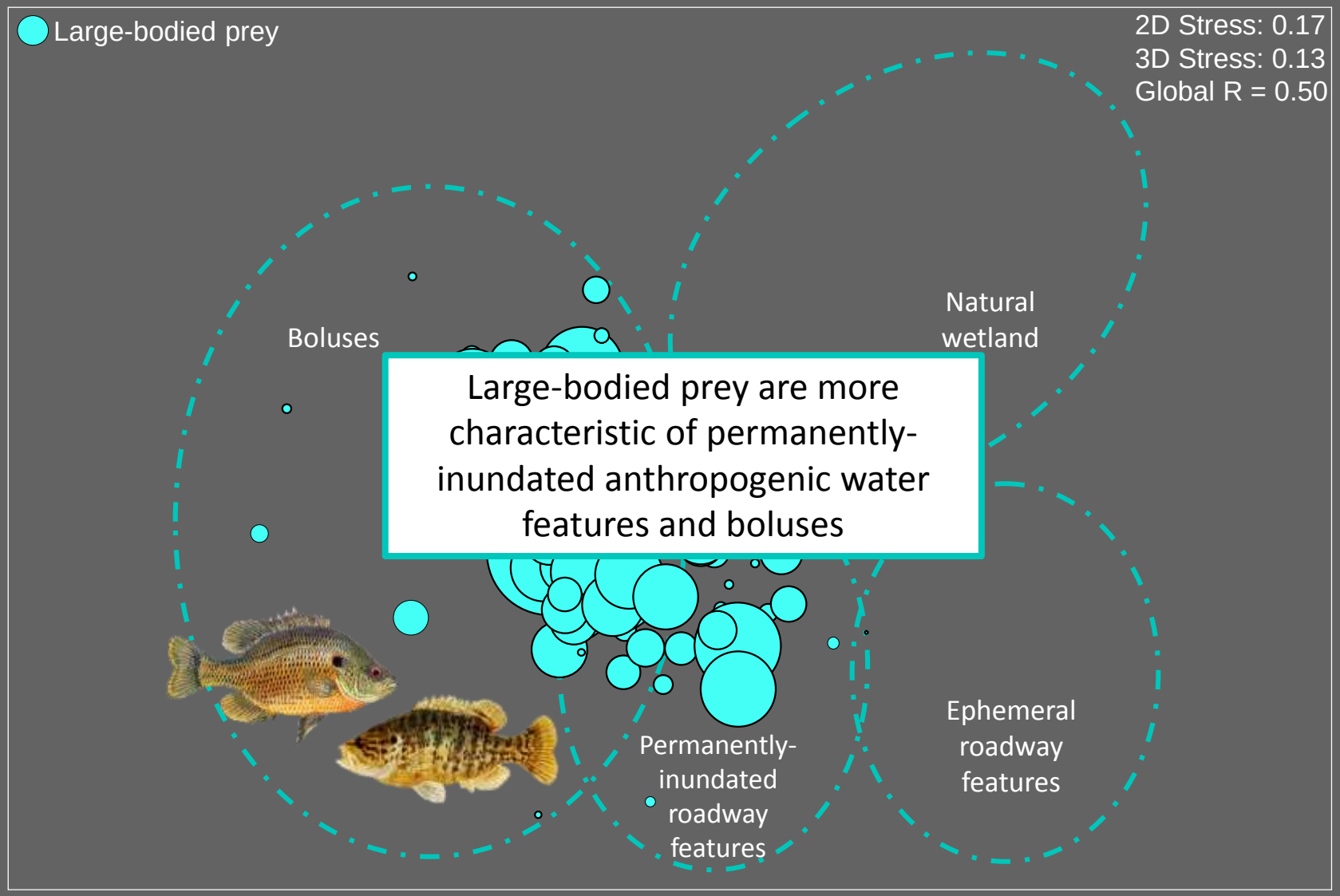
Dissimilarity between prey availability in anthropogenic water features and natural wetlands



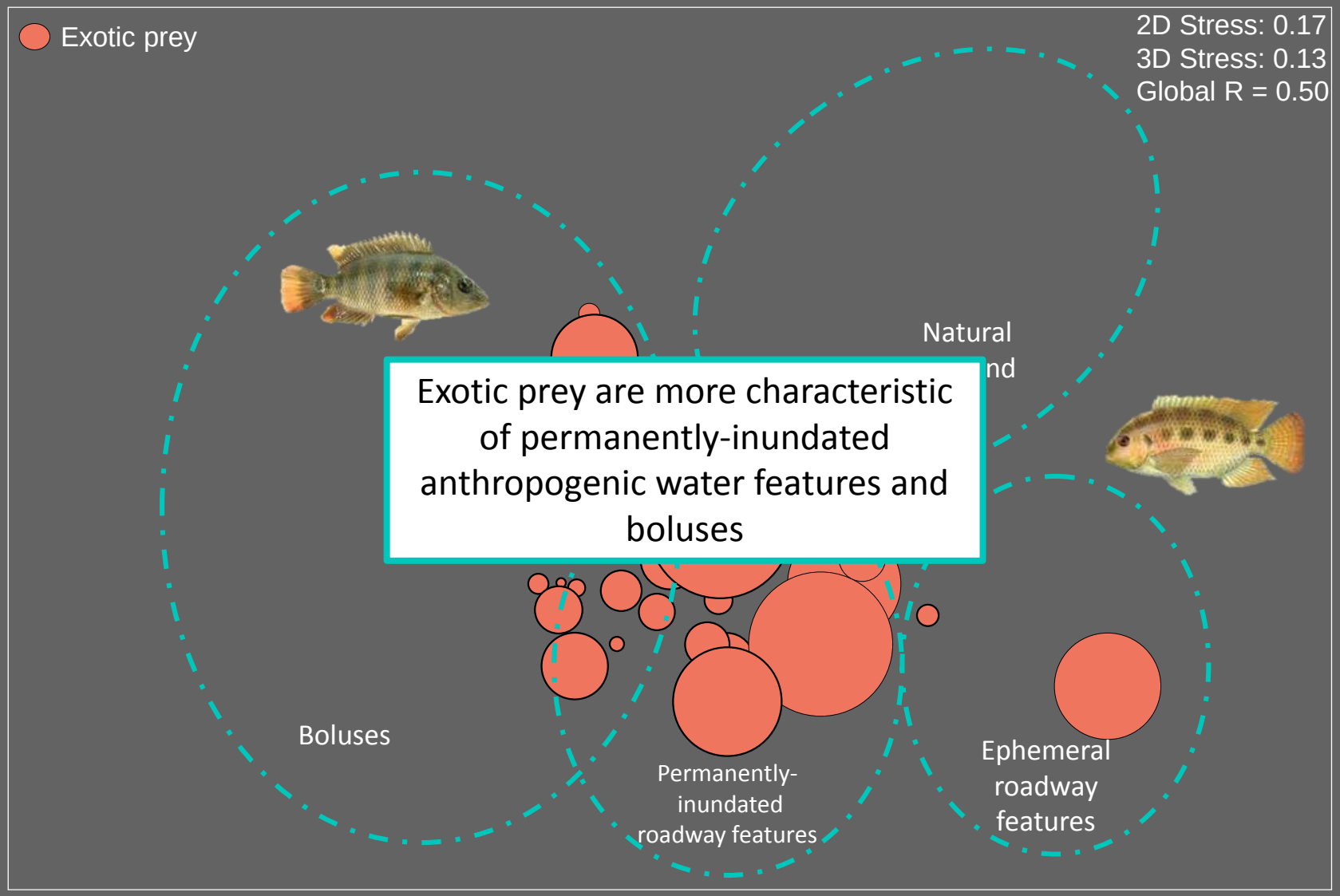
Prey composition of fish sampling sites and Wood Stork boluses



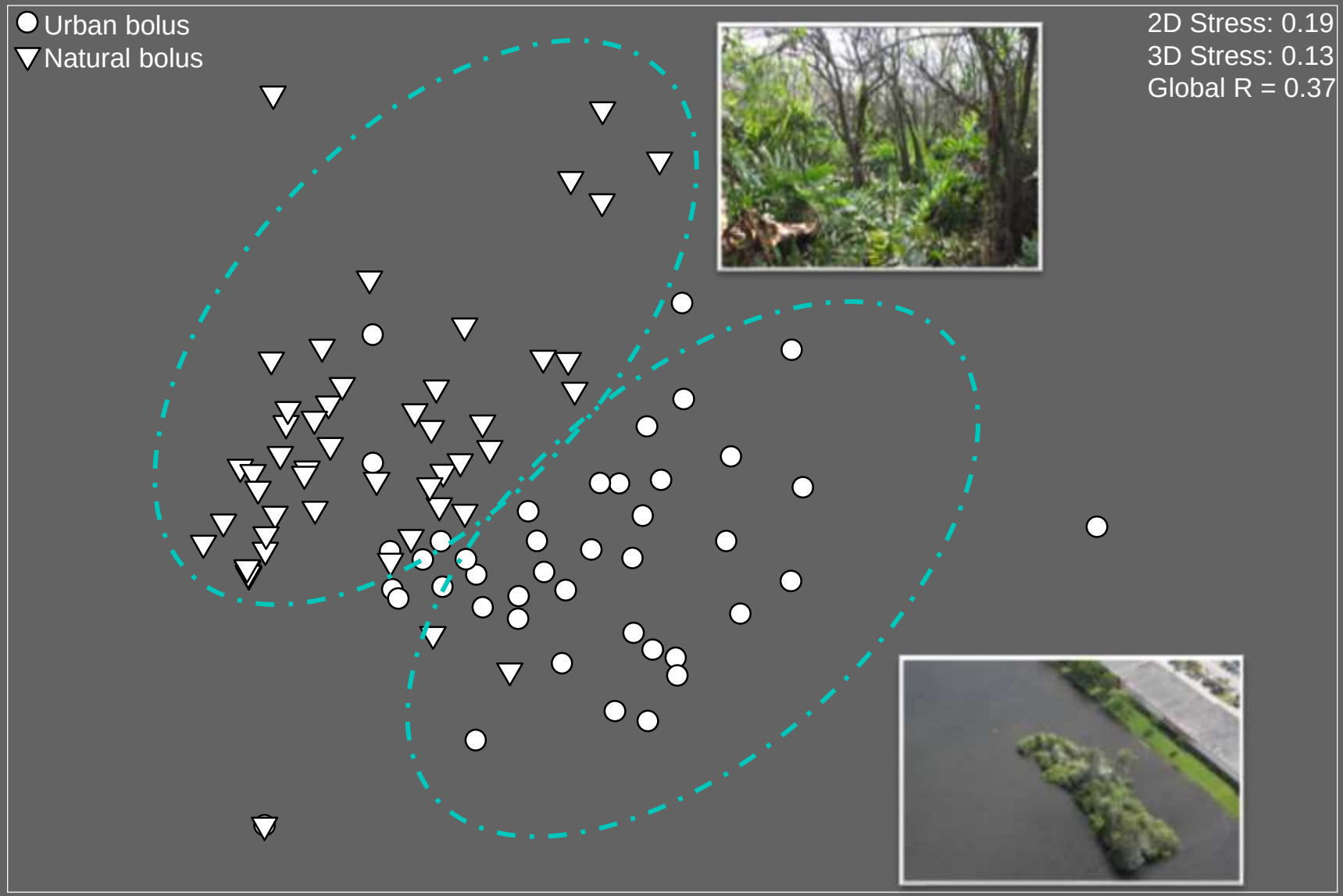
Large-bodied prey composition of fish sampling sites and Wood Stork boluses



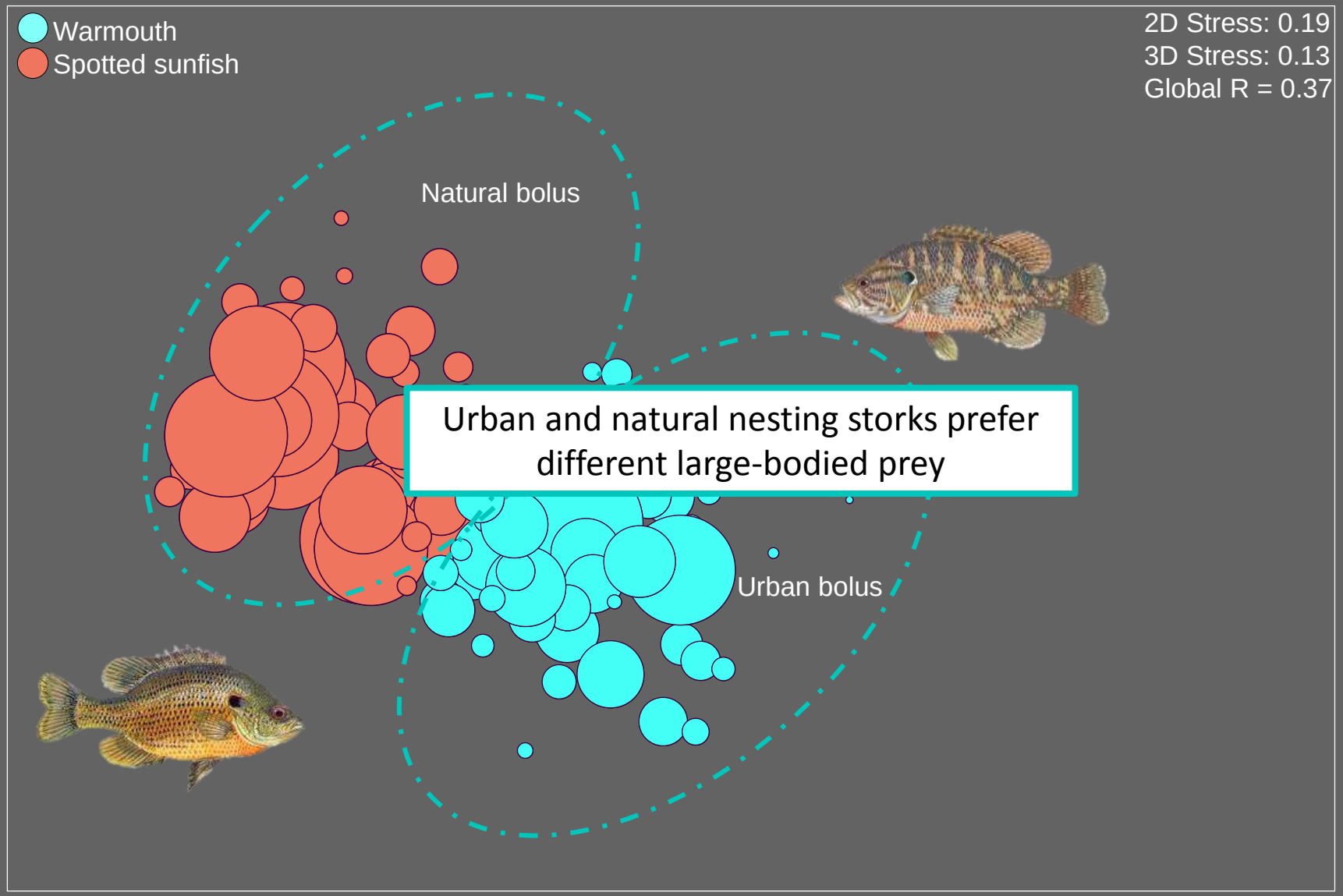
Exotic prey composition of fish sampling sites and Wood Stork boluses



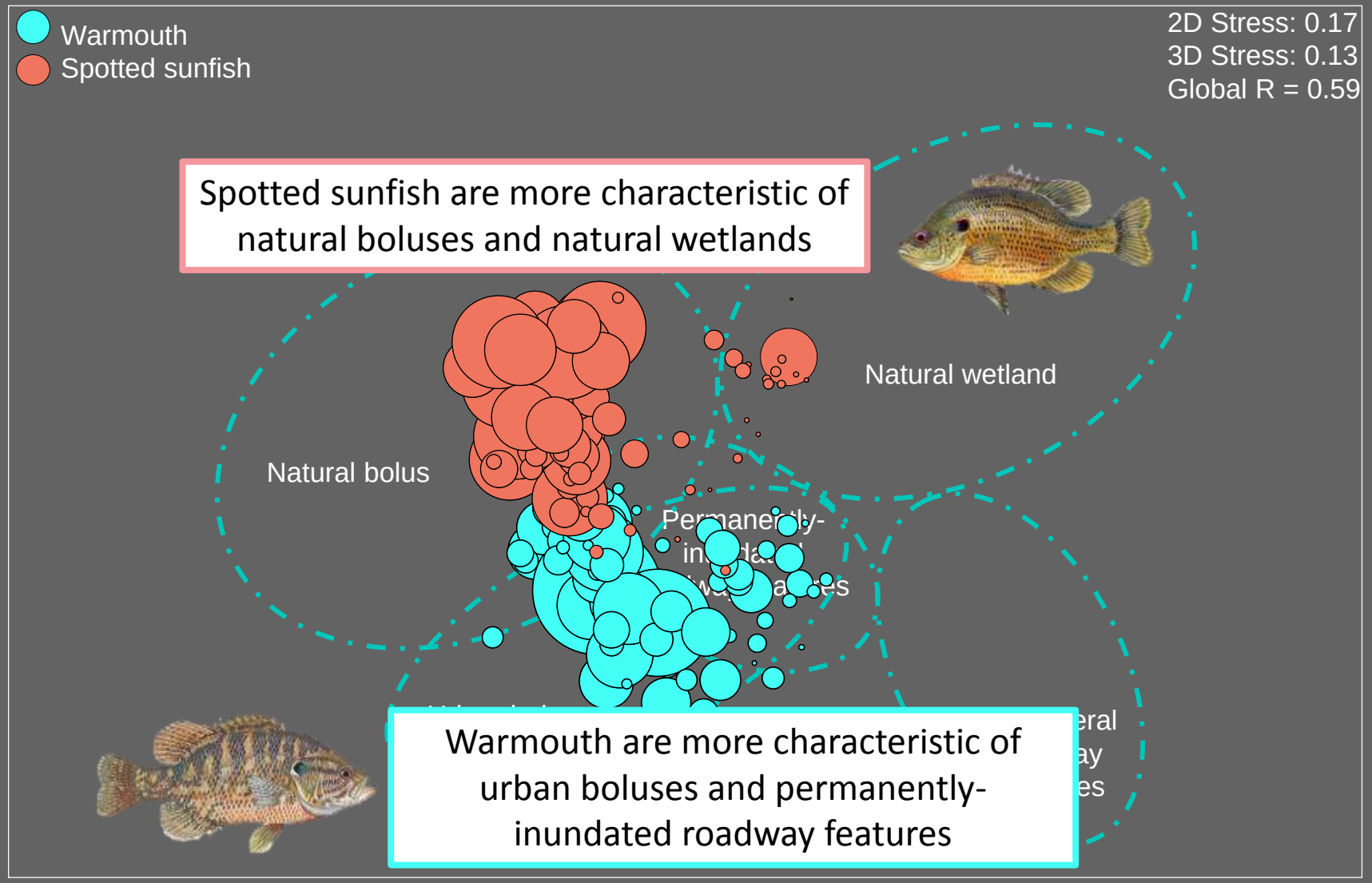
Prey composition of urban and natural Wood Stork boluses



Prey composition of urban and natural Wood Stork boluses



Frequency of warmouth and spotted sunfish across all samples



Conclusions

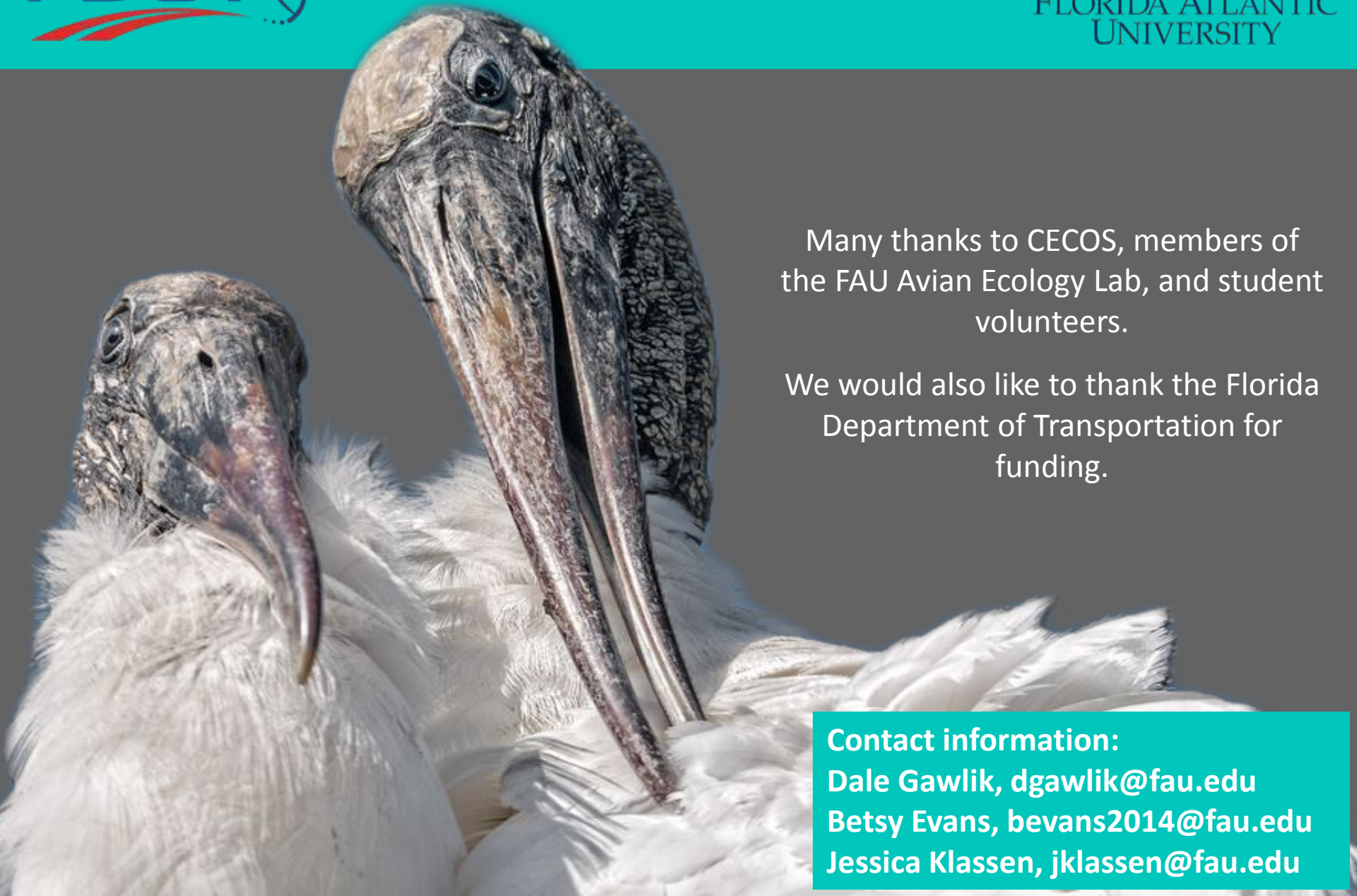
- There has been a dietary shift of Wood Storks to include exotic fish and a broader range of larger prey lengths.
- Large-bodied fish, like sunfish, are characteristic of long hydroperiod areas, that rarely experience a complete drydown in the Everglades.
- Humans have altered the landscape, creating stormwater ponds and canals.
- We found that large-bodied and exotic fish are more characteristic of anthropogenic water features and boluses than natural wetlands.
- Storks in urban and natural colonies prefer different large-bodied fish.
- These dietary patterns suggest that Wood Storks may have behavioral plasticity in foraging habitat and prey species in response to HIREC.

A new food source?

Acknowledgements

Many thanks to CECOS, members of the FAU Avian Ecology Lab, and student volunteers.

We would also like to thank the Florida Department of Transportation for funding.



Contact information:
Dale Gawlik, dgawlik@fau.edu
Betsy Evans, bevans2014@fau.edu
Jessica Klassen, jklassen@fau.edu

Citations

Botson, B. and D. E. Gawlik. 2010. Final Report to the South Florida Water Management District. West Palm Beach, FL.

Jordan, F. K., K. J. Babbit, and C. C. McIvor. 1998. Seasonal variation in habitat use by marsh fishes. Ecology of Freshwater Fish 7: 159-166.

Ogden, J. C., J. A. Kushlan, and J. T. Tilmant. 1976. Prey selectivity by the wood stork. Condor 78: 324-330.

Sih, A., M. C. O. Ferrari, and D. J. Harris. 2011. Evolution and behavioural responses to human-induced rapid environmental change. Evolutionary Applications 3: 367-387.

Sih, A. 2013. Understanding variation in behavioural responses to human-induced rapid environmental change: a conceptual overview. Animal Behaviour 85: 1077-1088.

U.S. Fish and Wildlife Service. 2015. Wood Stork foraging habitat assessment methodology. U. S. Fish and Wildlife Service Southeast Region. Vero Beach, Florida. 13 p.