Responses of small herons and Wood Storks to a changing prey base

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2019 Greater Everglades Ecosystem Restoration

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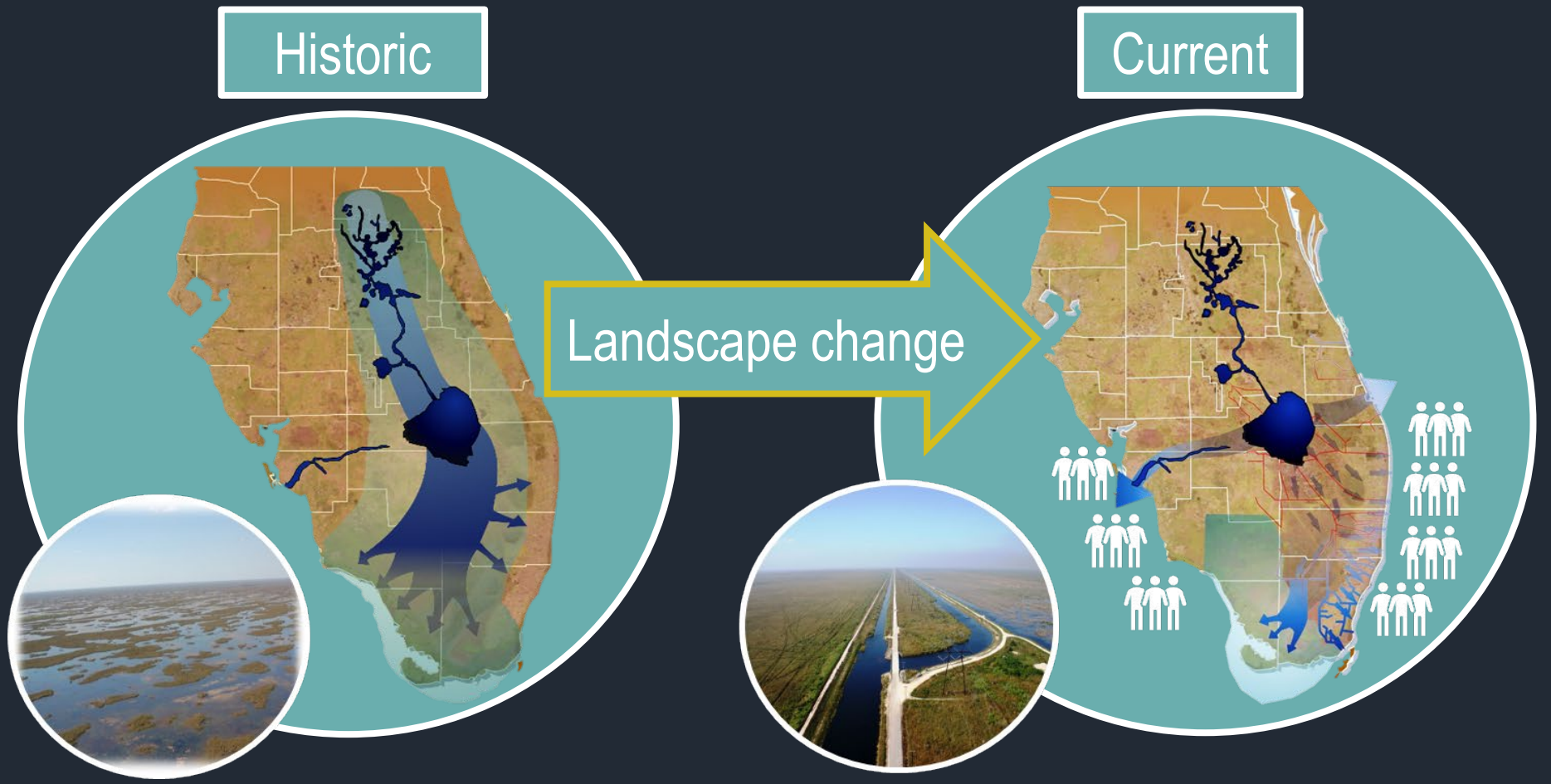
FAU Florida Atlantic University

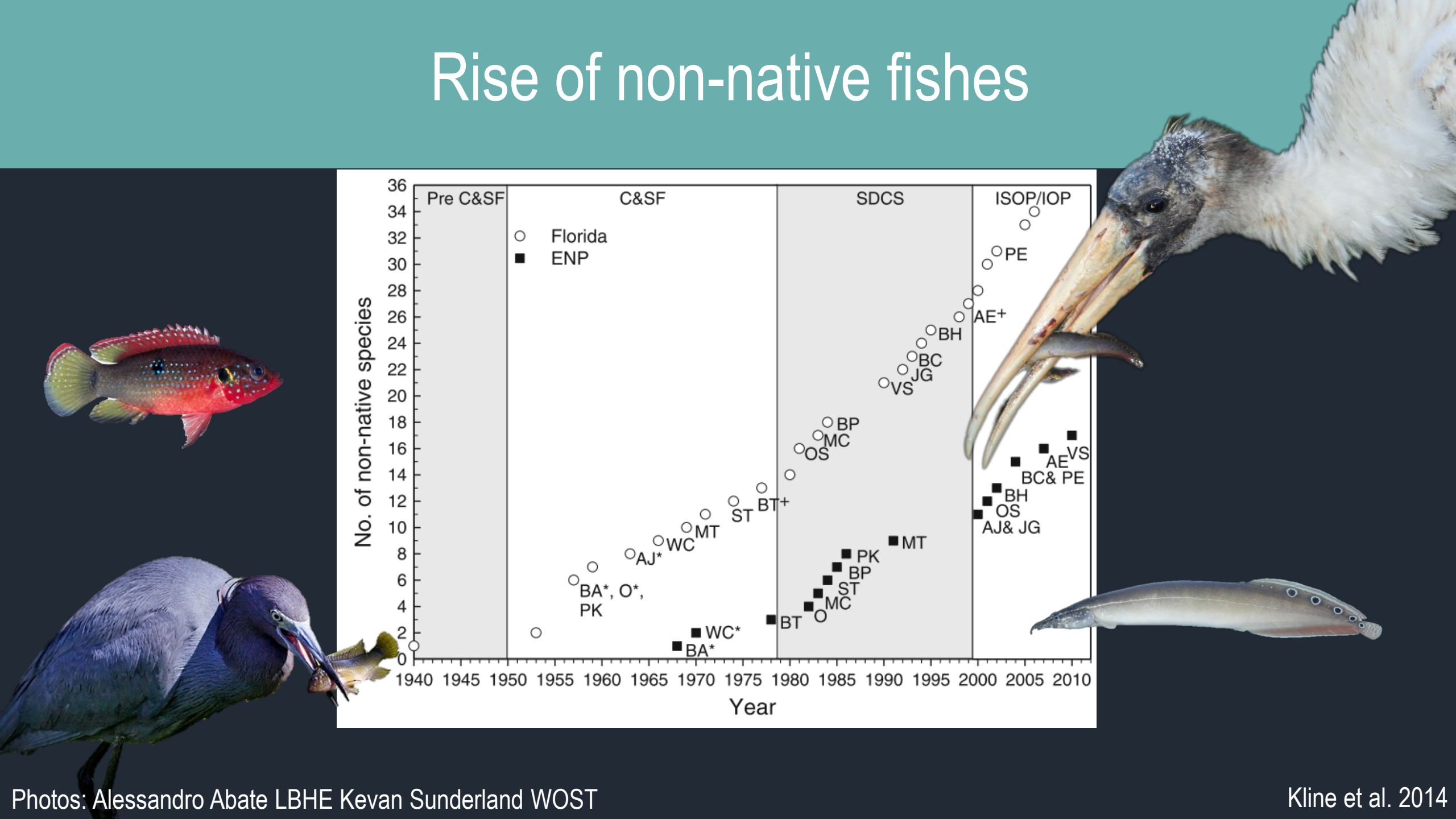
Alteration of Everglades hydrology

- Human development has fragmented the landscape
- Half its original size, with 70% less water



Anthropogenic water bodies

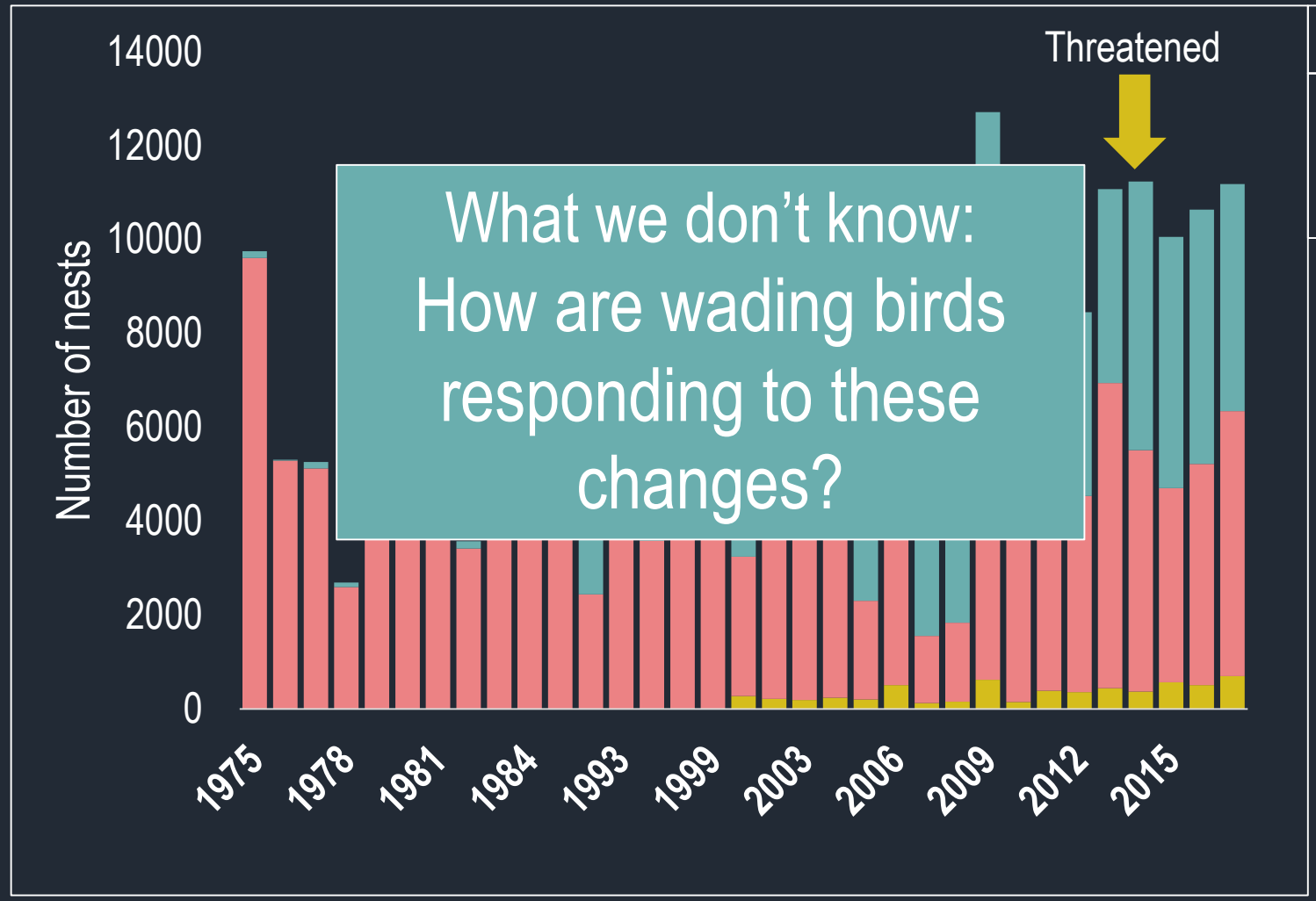
Rise of non-native fishes



Photos: Alessandro Abate LBHE Kevan Sunderland WOST

Kline et al. 2014

Wading bird response



Legend

GA+SC

Florida

Florida

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- Ac
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- H
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Robertson and Kushlan 1974, Ogden 1994, Hafner 1997, Loftus and Kushlan 1987, Gawlik 2002

Hypotheses

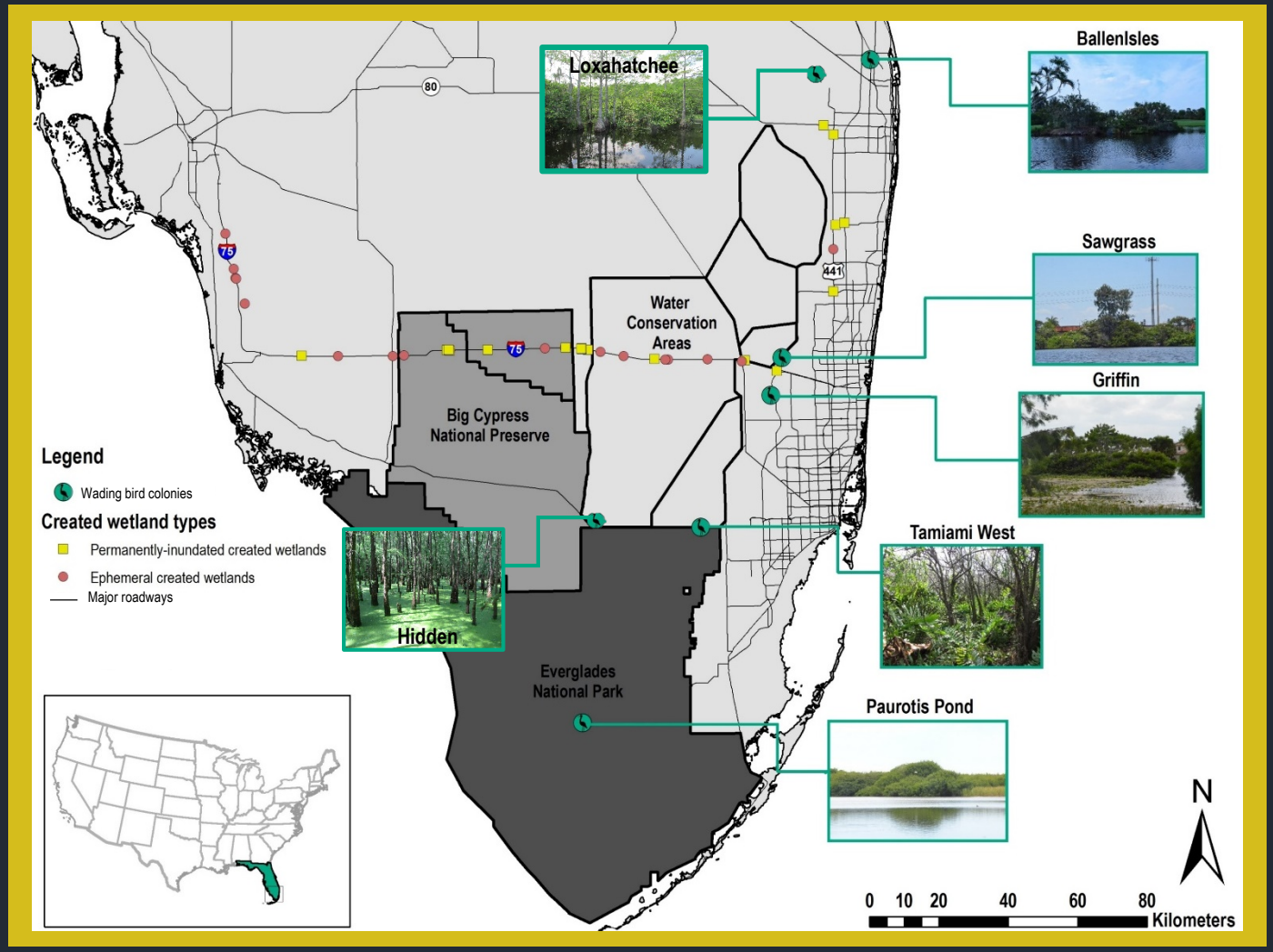
In order to examine the influence of non-native fishes and creation of alternative foraging habitats, we examined the diets of three small heron species and Wood Storks:

For all wading bird species, we expected the use of non-native species would be highest during suboptimal hydrologic/foraging conditions in the natural marsh

Likely due to accessing alternative foraging habitats where non-native species are more prevalent

For Wood Storks, we expected that non-native species and other alternative food sources provided in urban areas would influence the reproductive performance of urban nesters

Methods



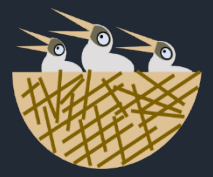
DIET

- Wood Stork N = 643 (nests = 160)
- Little Blue Heron N = 142 (nests = 60)

- Snowy Egret N = 83 (nests=48)
- Tricolored Heron N = 183 (nests = 84)

PRODUCTIVITY

- # of chicks fledged per nest
  N = 150



Hydrologic conditions 2015-2017

HYDROLOGIC CONDITIONS

Optimal

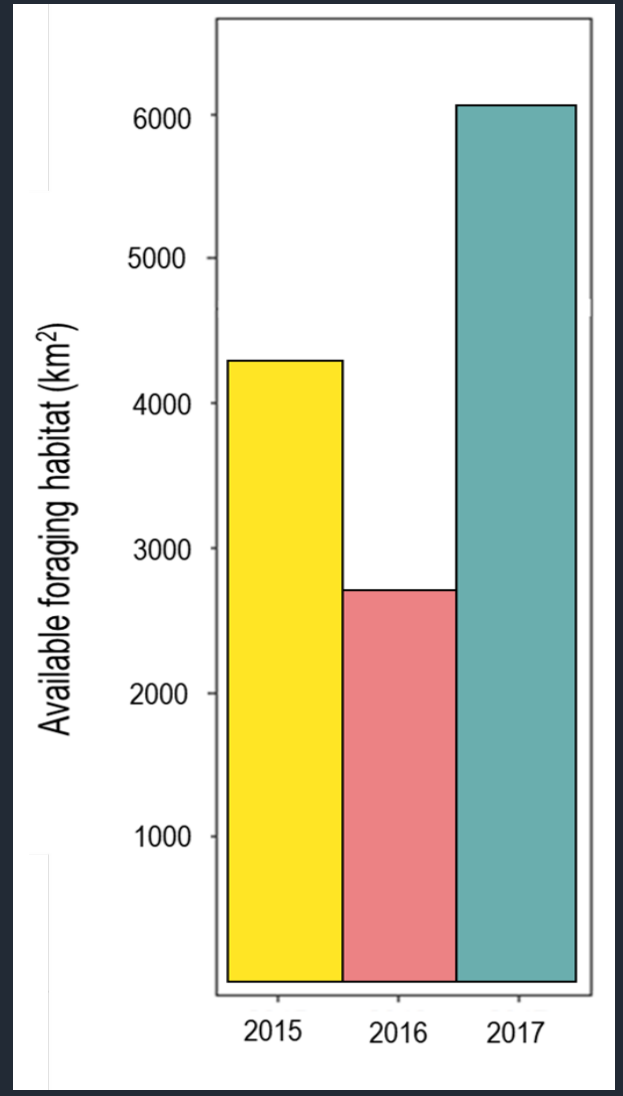
2017 Below average dry season rainfall, allowed for a steady water level recession

Moderate

2015 Moderate water levels with steady water level recession; hydrologic reversal at end of season

Suboptimal

2016 Unseasonably high rainfall with minimal water level recession



Diet differences among small herons

ANOSIM Results

Global R-statistic: 0.401

Different w/some overlap

Pairwise Tests

SNEG -TRHE: 0.203

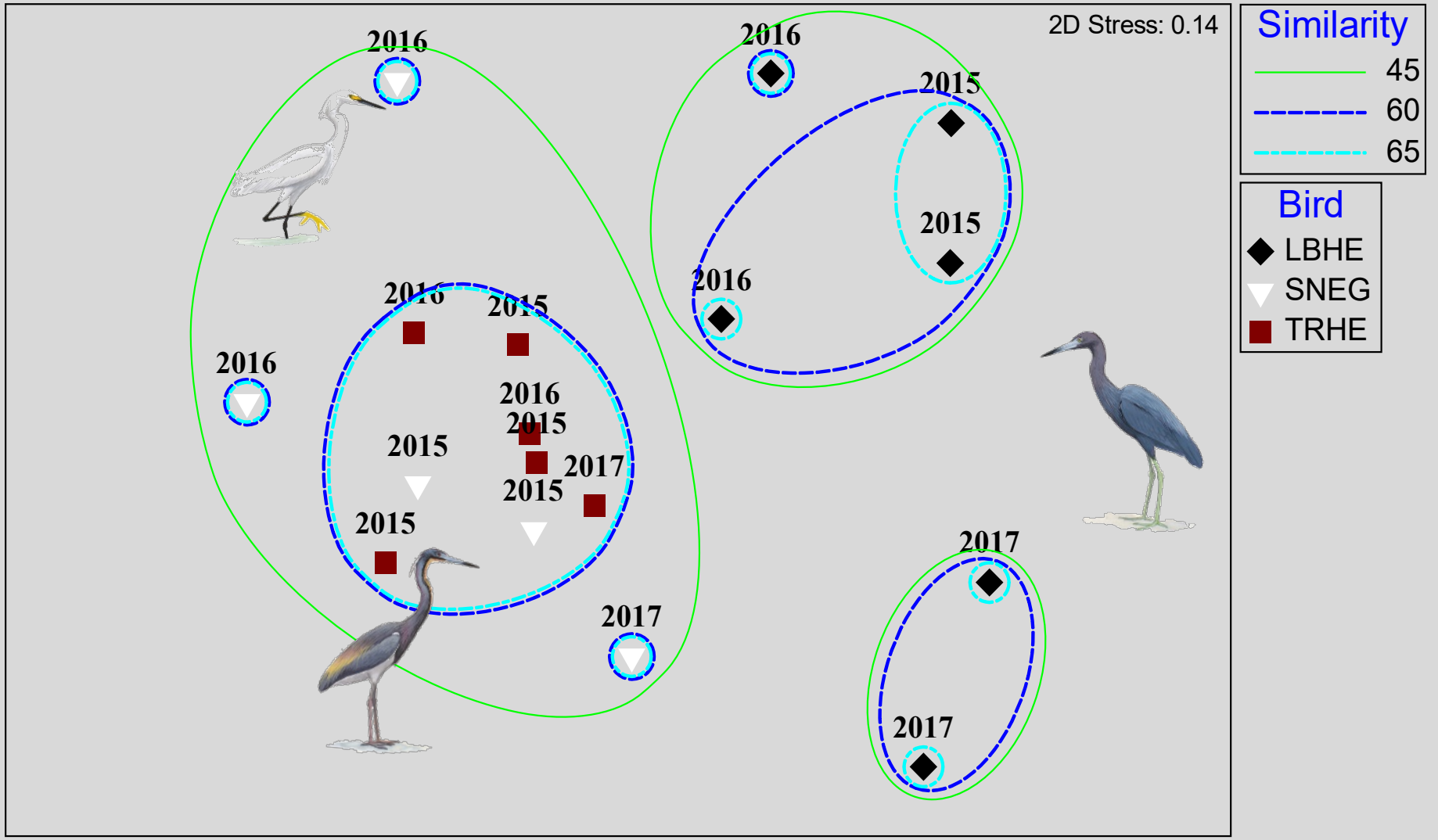
Similar w/high overlap

LBHE - SNEG: 0.448

Different

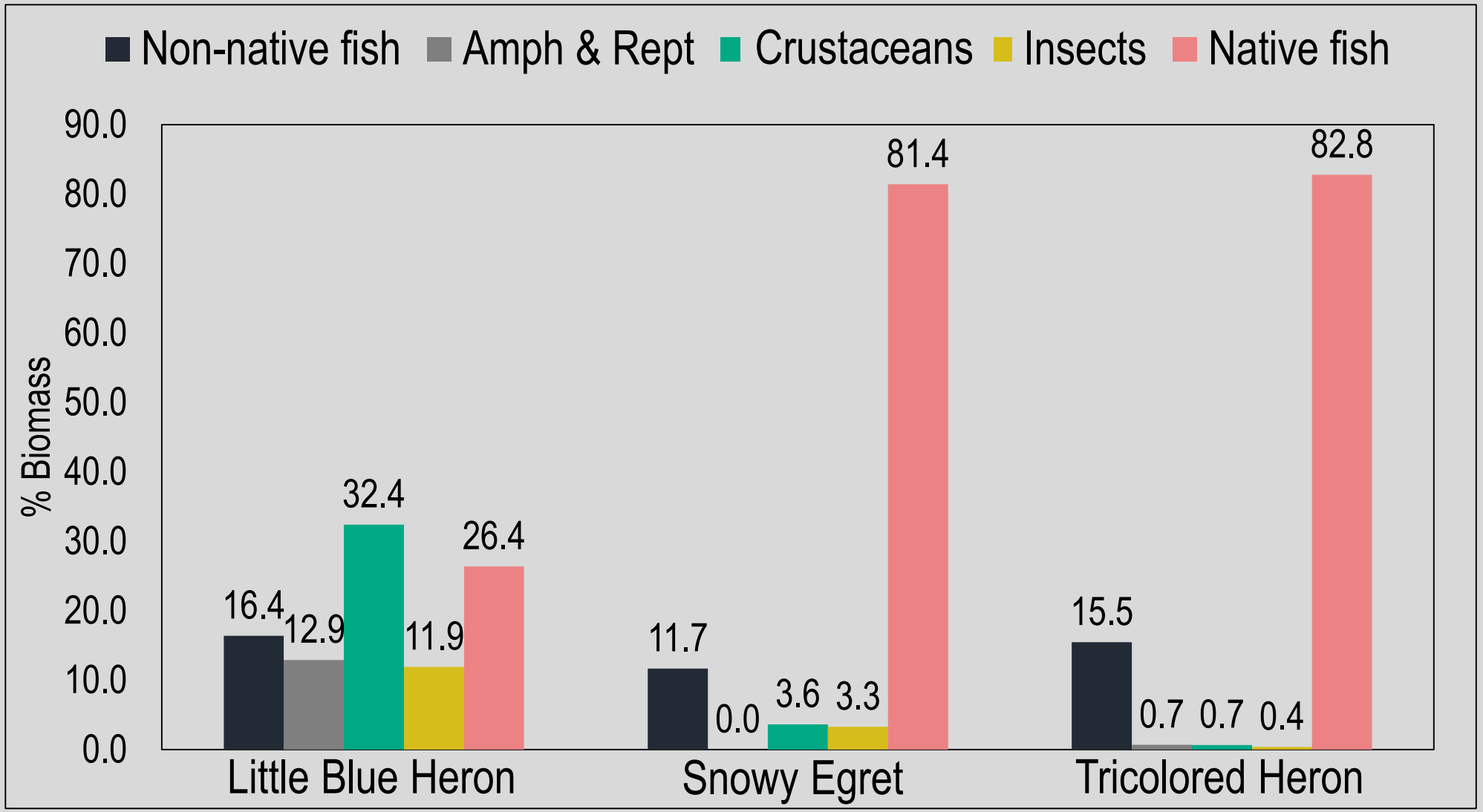
LBHE - TRHE: 0.669

Different



Small heron diet differences

Collected 6,650 prey items from 191 nests

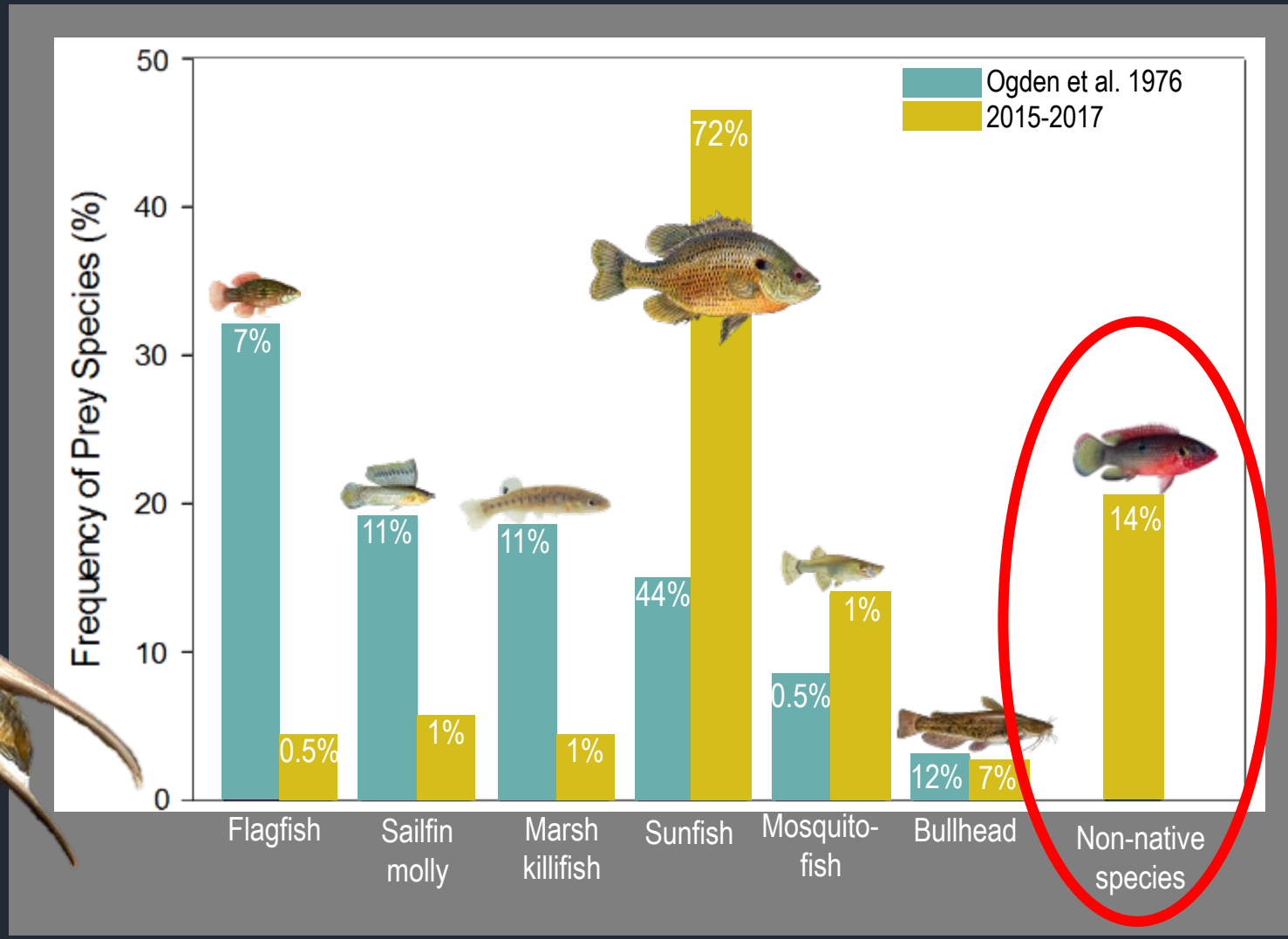


n=2,134

n=2,070

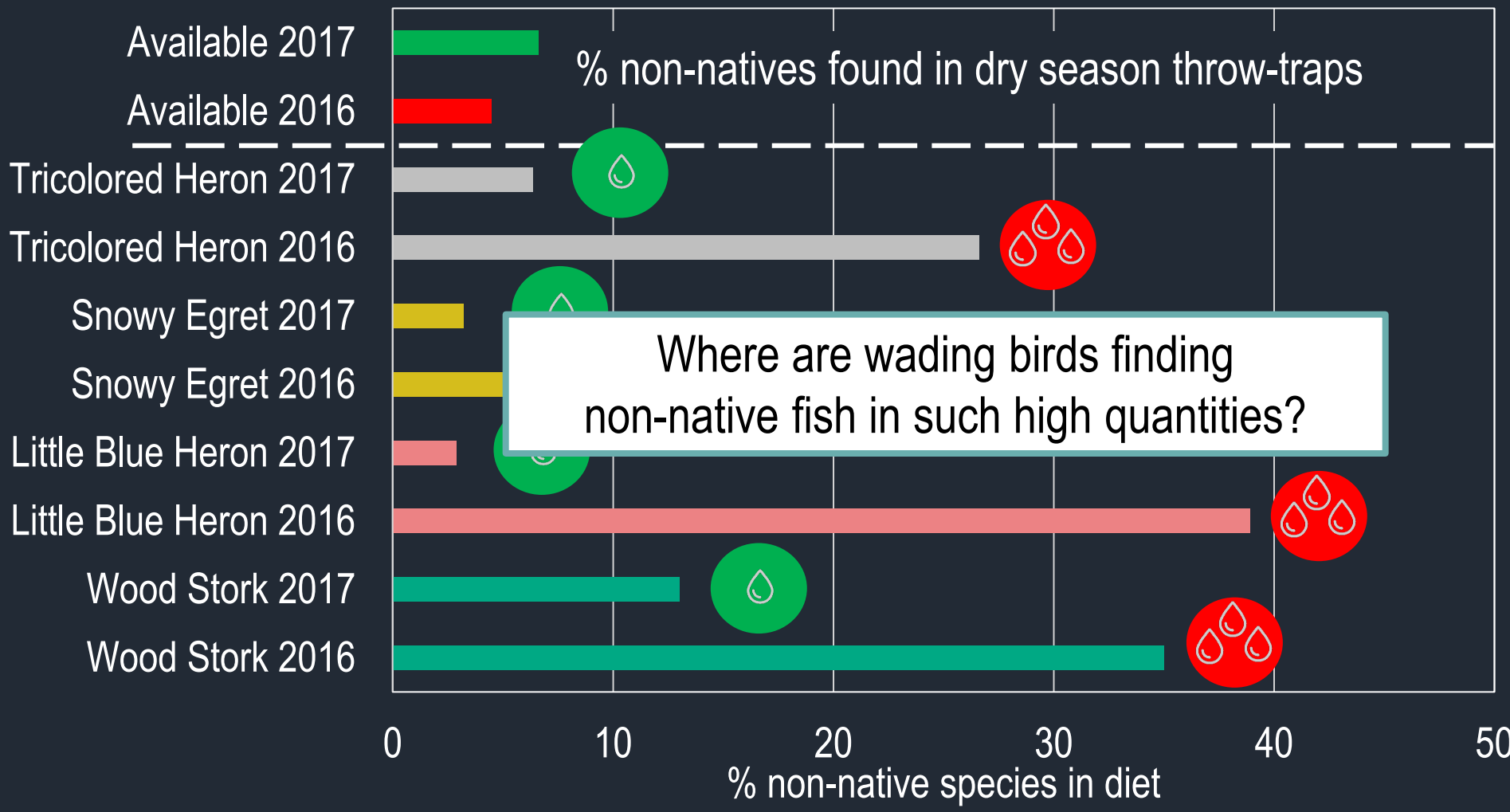
n=2,446

Wood Stork diet shift



Ogden et al. 1976

Use of non-native fish increases during suboptimal foraging conditions



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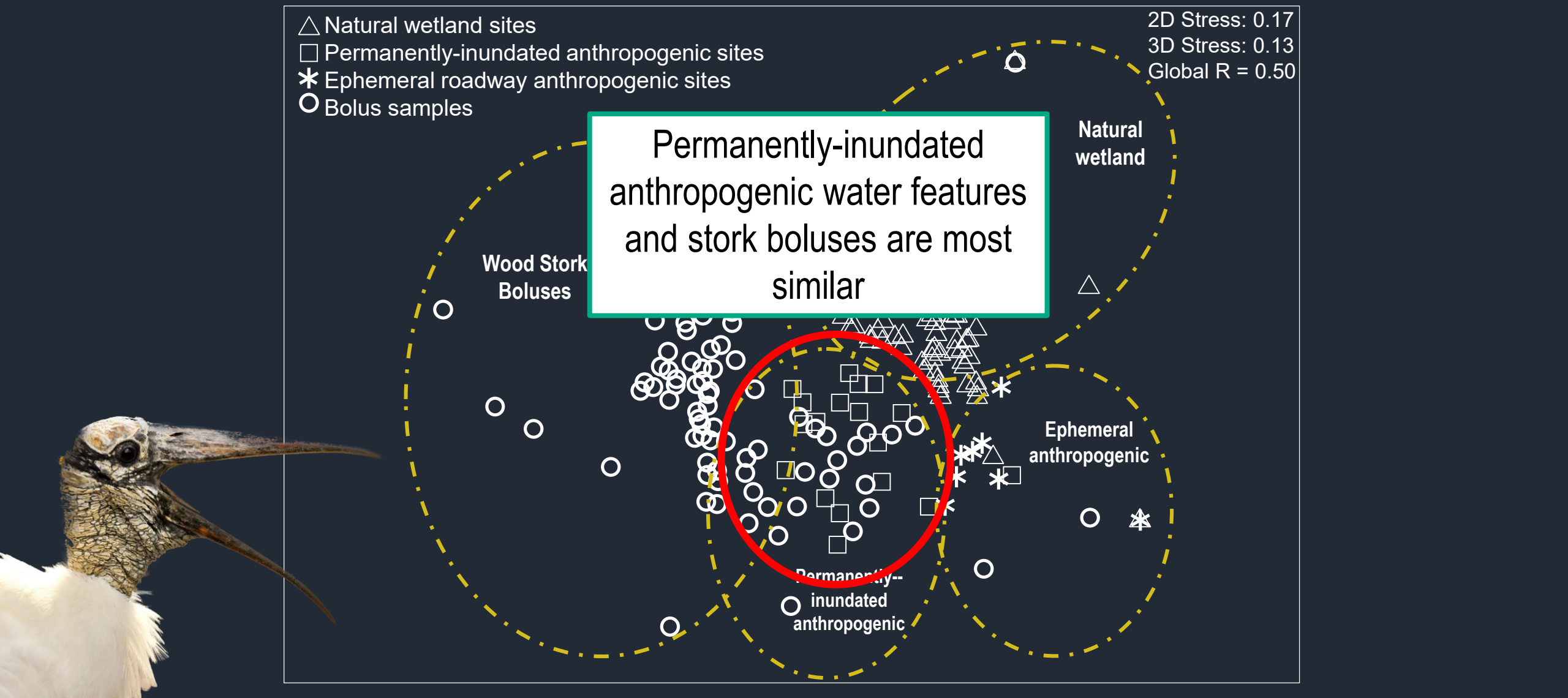
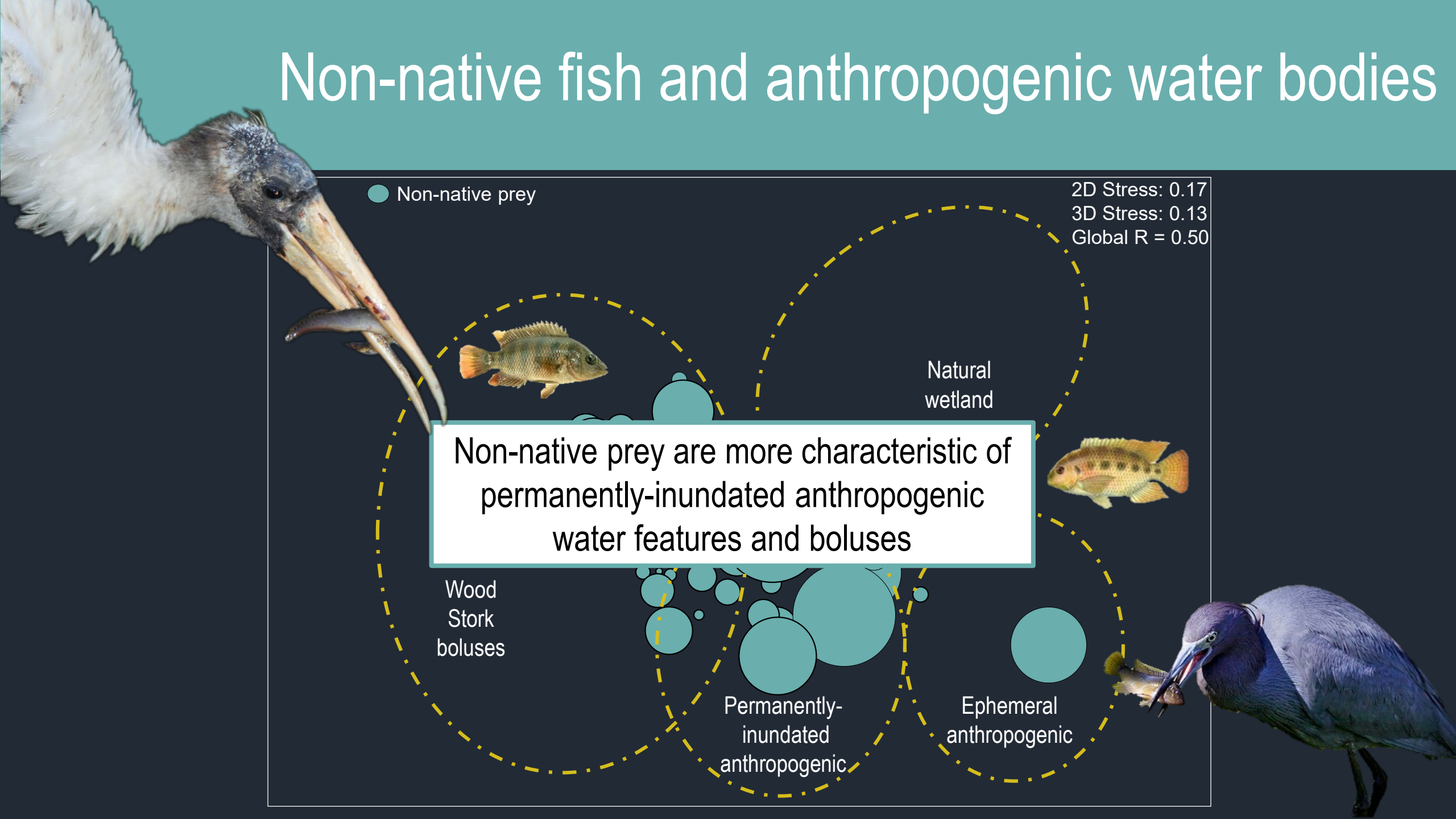
Non-native fish and anthropogenic water bodies

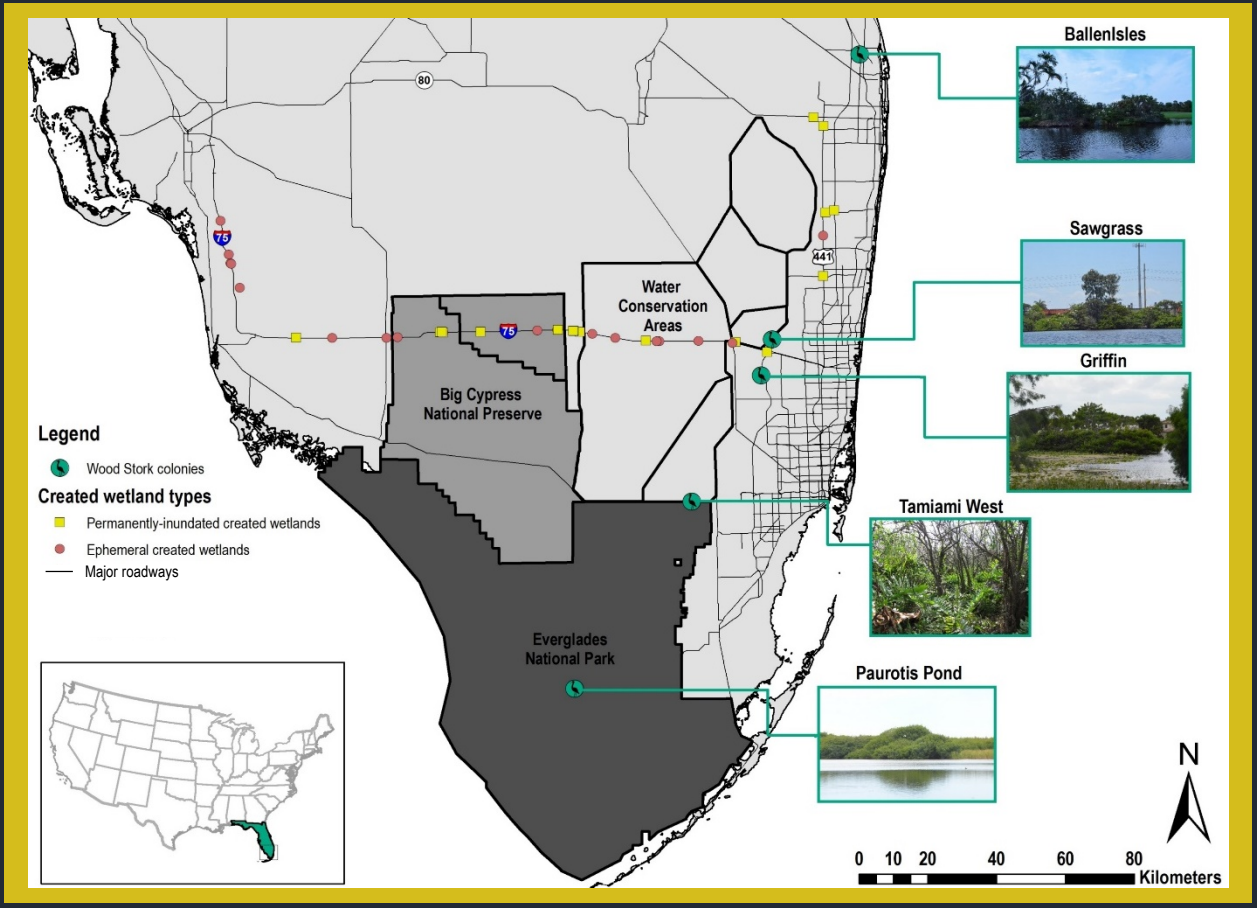


Non-native fish and anthropogenic water bodies



Do urban and natural wetland birds differ in their reproductive responses?

For Wood Storks, we expected that non-native species and other alternative food sources provided in urban areas would influence the reproductive performance of urban nesters



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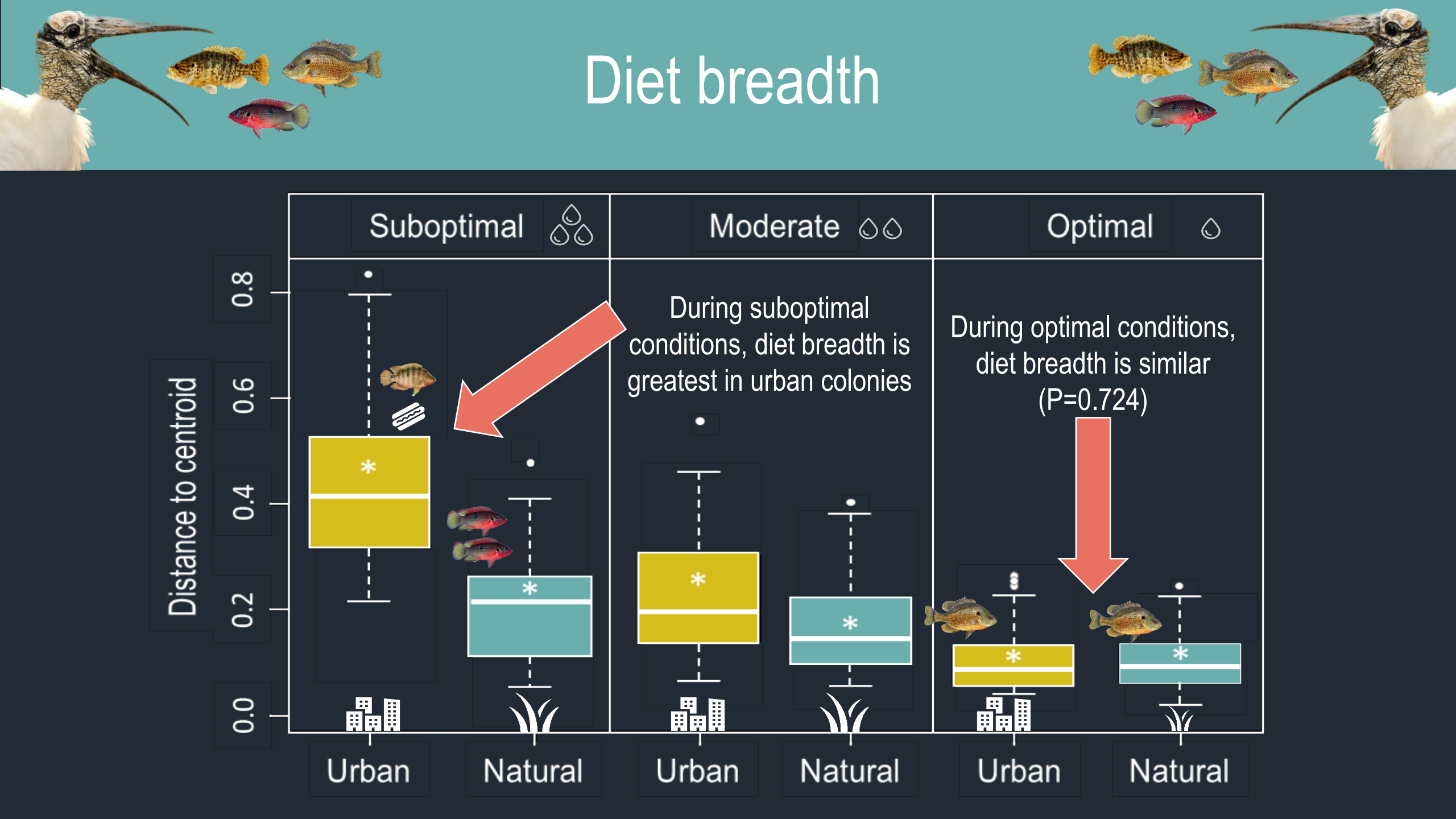
COLONY LOCATION

Urban

Natural wetland

Productivity

Diet breadth



Response of wading birds to a changing landscape and prey base

The increase of non-native fishes in the diets of small herons and Wood Storks during suboptimal conditions suggests that these species have behavioral flexibility to deal with the fluctuations of the natural marsh system.

We found that non-native fishes are more common in anthropogenic water bodies than natural wetlands, suggesting that birds may be accessing these areas when conditions in the marsh are suboptimal.

Furthermore, increased productivity of urban storks may be explained by alternative food sources that buffer urban birds from unpredictable conditions in the natural system.

These patterns suggest that the responses of small herons and storks to natural hydrologic conditions may be mediated by foraging habitat and prey species in urban environments.

Implications

- Responses of wetland fauna to natural processes are mediated by both native and non-native animals that inhabit nearby urban areas.
  - Wading birds in the Everglades are able to use urban areas during suboptimal foraging conditions in the natural system.
- Some wetland animals are able to exploit urban animals as a buffer to food shortages.
  - Wood Storks and Little Blue Herons in particular, are using non-native fish that are more commonly found in urban created wetlands.
  - These responses should be considered when evaluating restoration progress.

Acknowledgements

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