FISH COMMUNITY RESPONSES TO WATER LEVEL FLUCTUATIONS IN BUTTONLAND SWAMP, ILLINOIS

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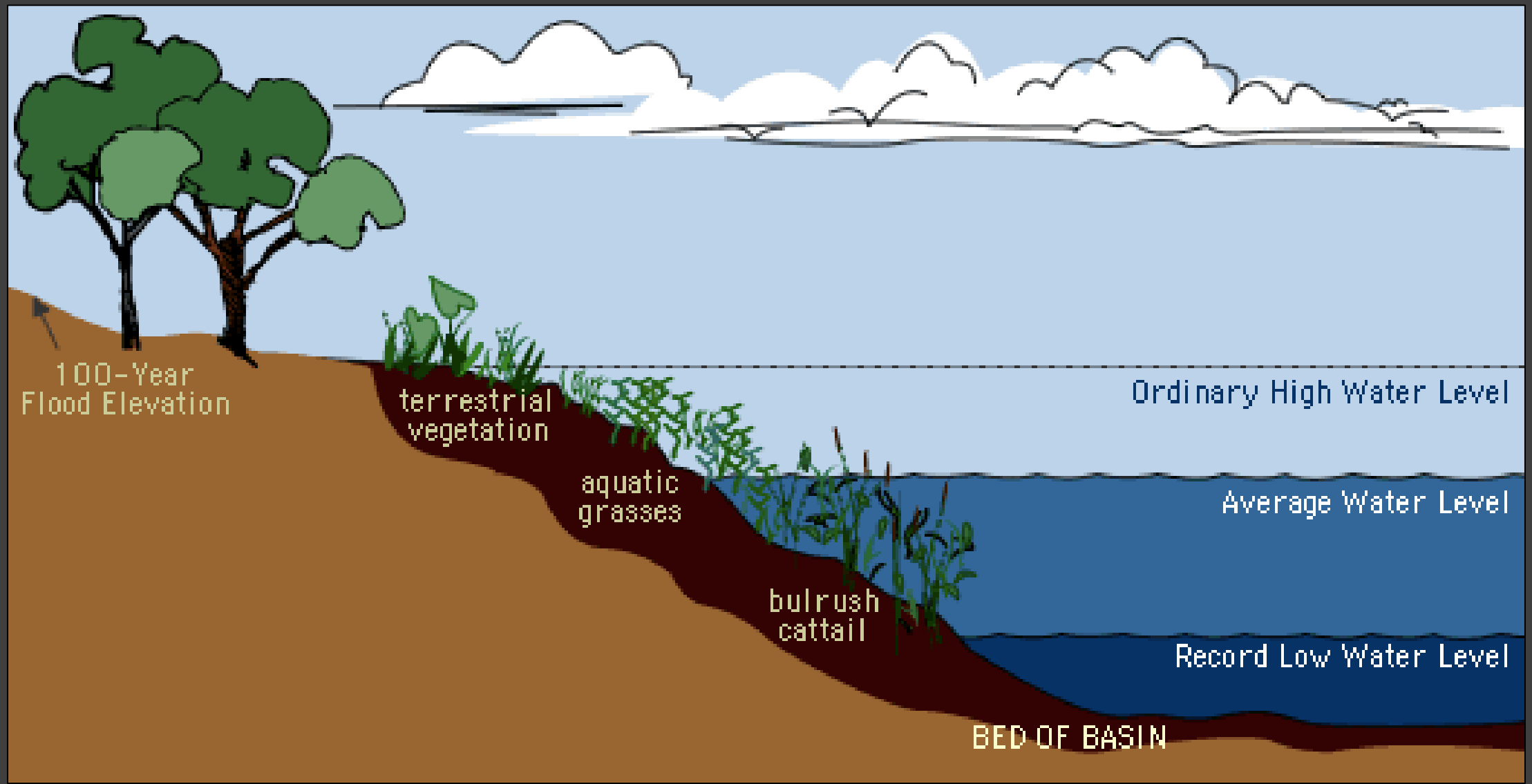
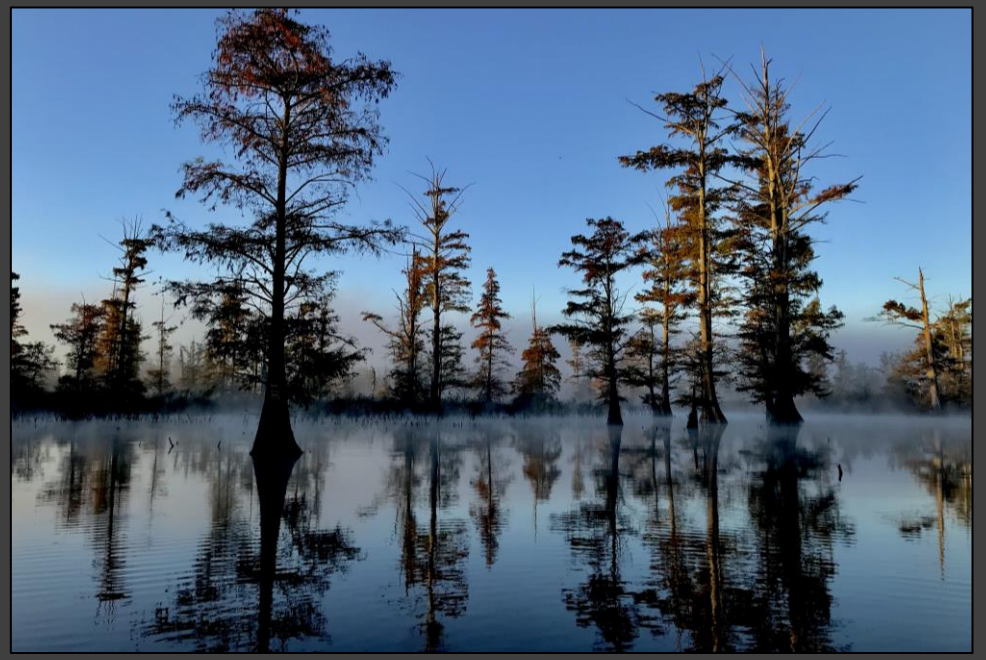
Habitat structure and hydrology affect fish communities by impacting what habitat are present and what amount is usable

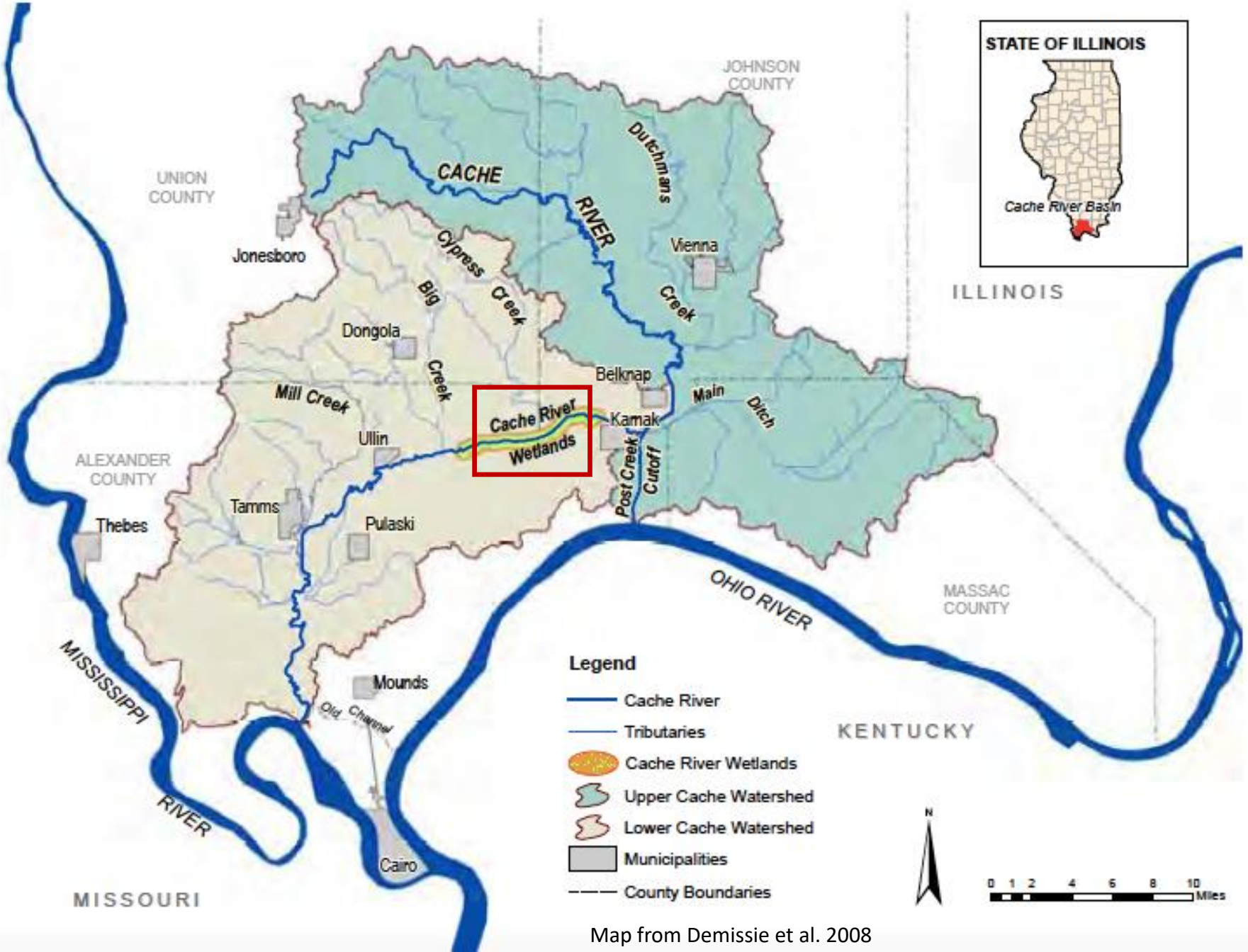


Habitat

- 450-acre wetland within the Lower Cache River
- Illinois Land and Water Reserve and a Wetland of International Importance
- Northernmost range

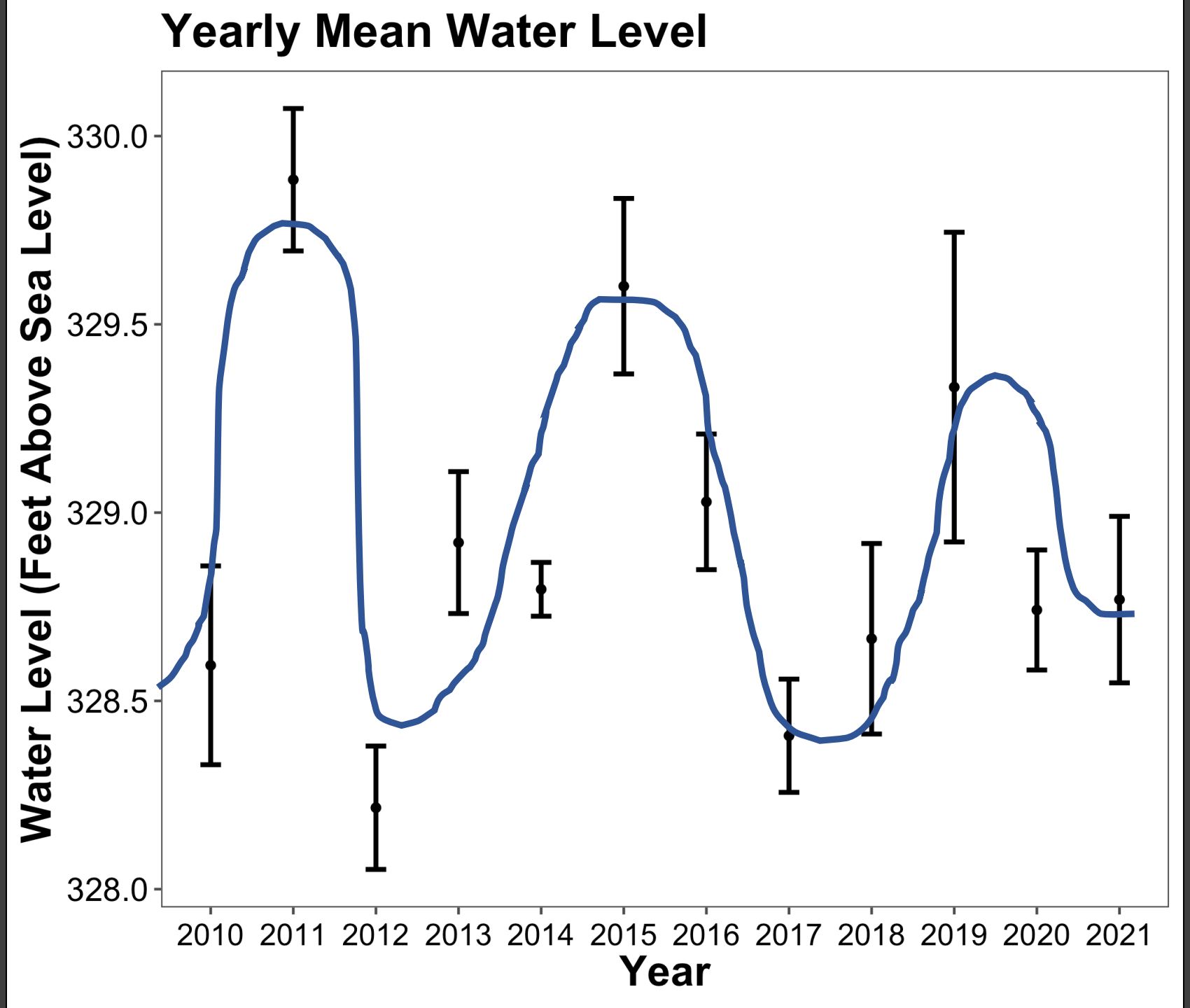


Map from Demissie et al. 2008

Made by Brian Metzke and Andrew Hulin


Yearly Mean Water Level
Water Level (Feet Above Sea Level)
330.0
329.5
329.0
328.5
328.0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year

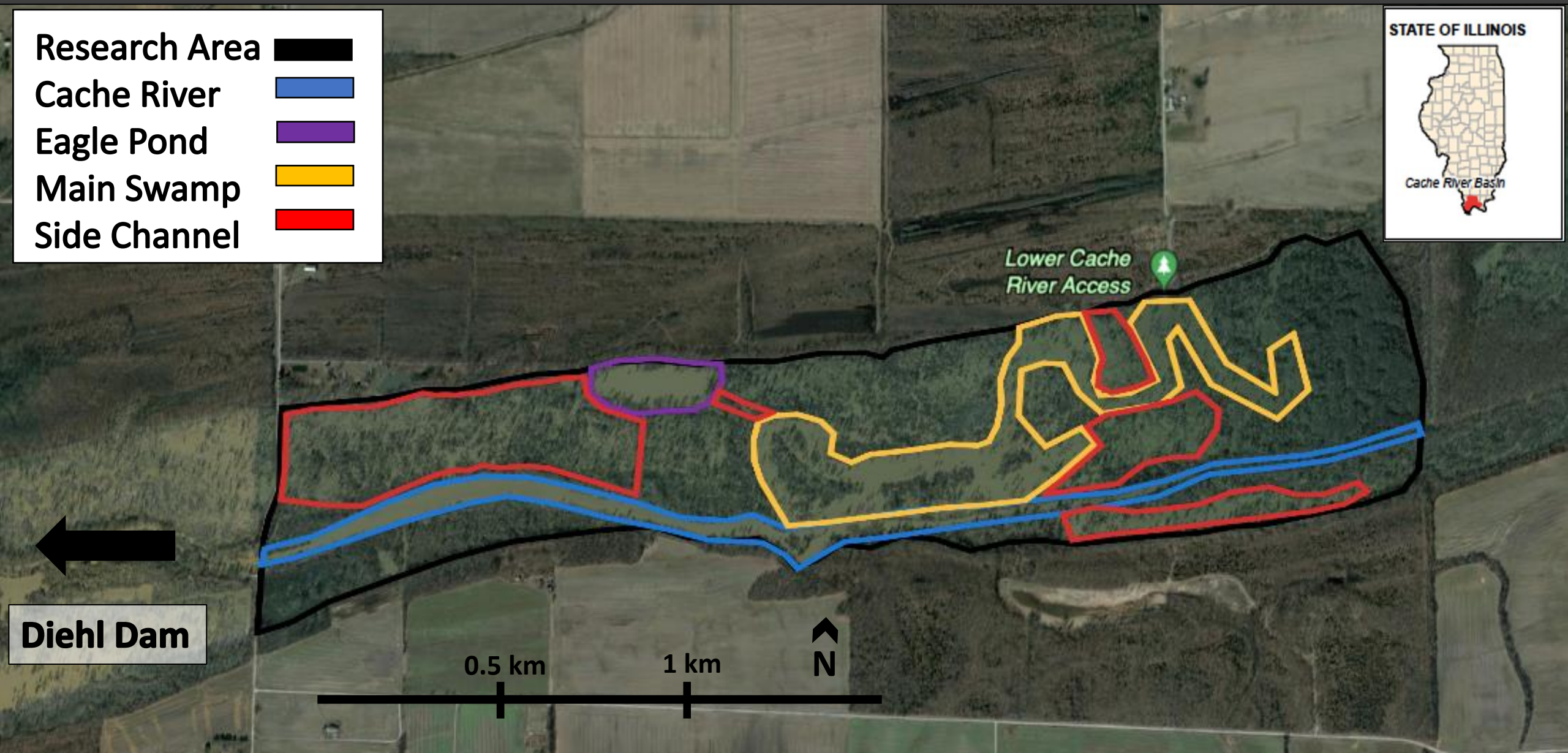
Management of Buttonland Swamp

- Hydrology managed by the Illinois Department of Natural Resources (IDNR)
- Inundated year-round
- Altered the hydrology
  - Influences fish movement and behavior
- Infrequent fish sampling since 1992 and limited habitat data

Objective

- Evaluate fish assemblage composition relative to habitat characteristics in Buttonland Swamp
- Evaluate the potential influence of water level management on fishes
- Compare fish assemblage composition between Buttonland Swamp and isolated ponds located northeast of the swamp

Buttonland Swamp Macrohabitats





Fish Sampling

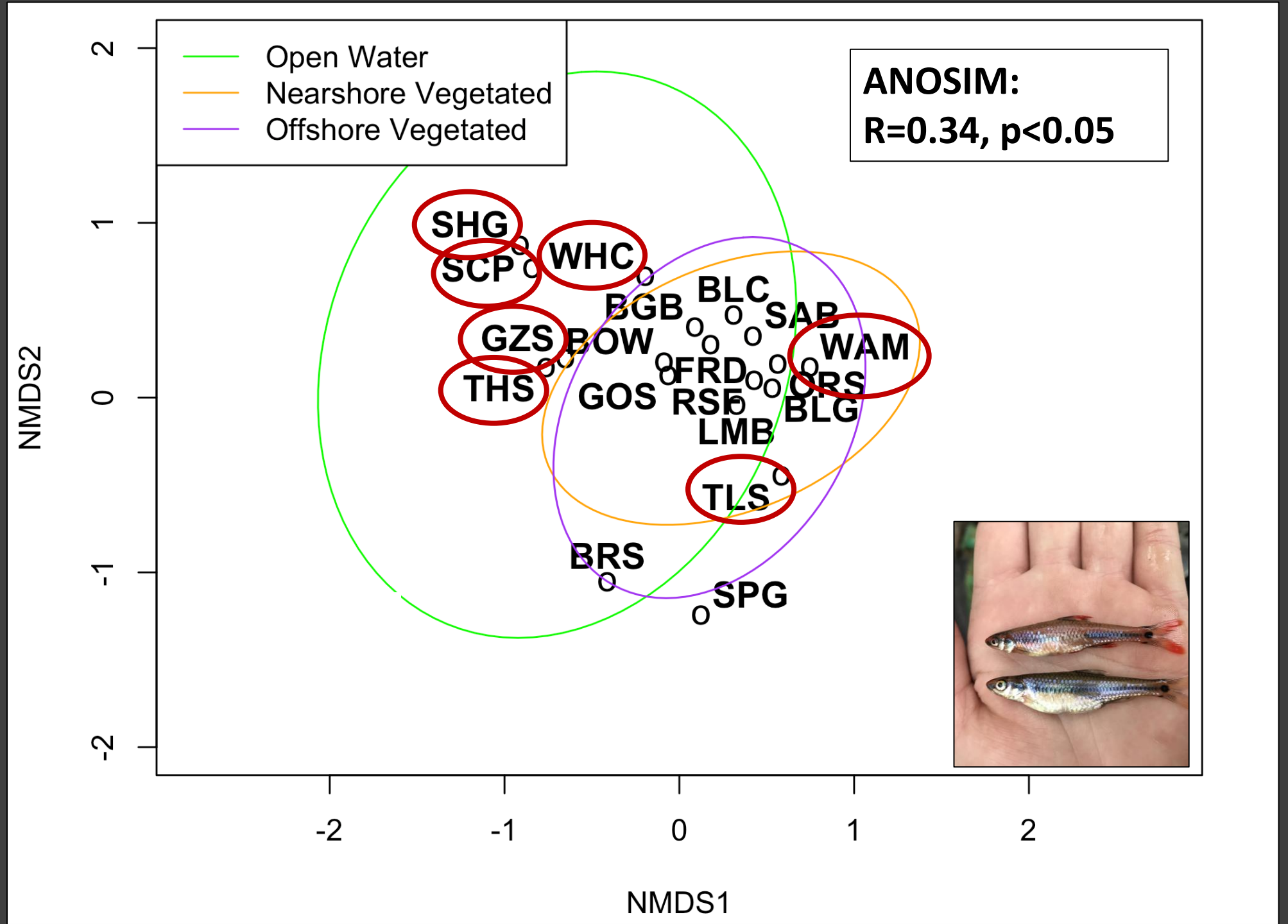
Habitat Sampling

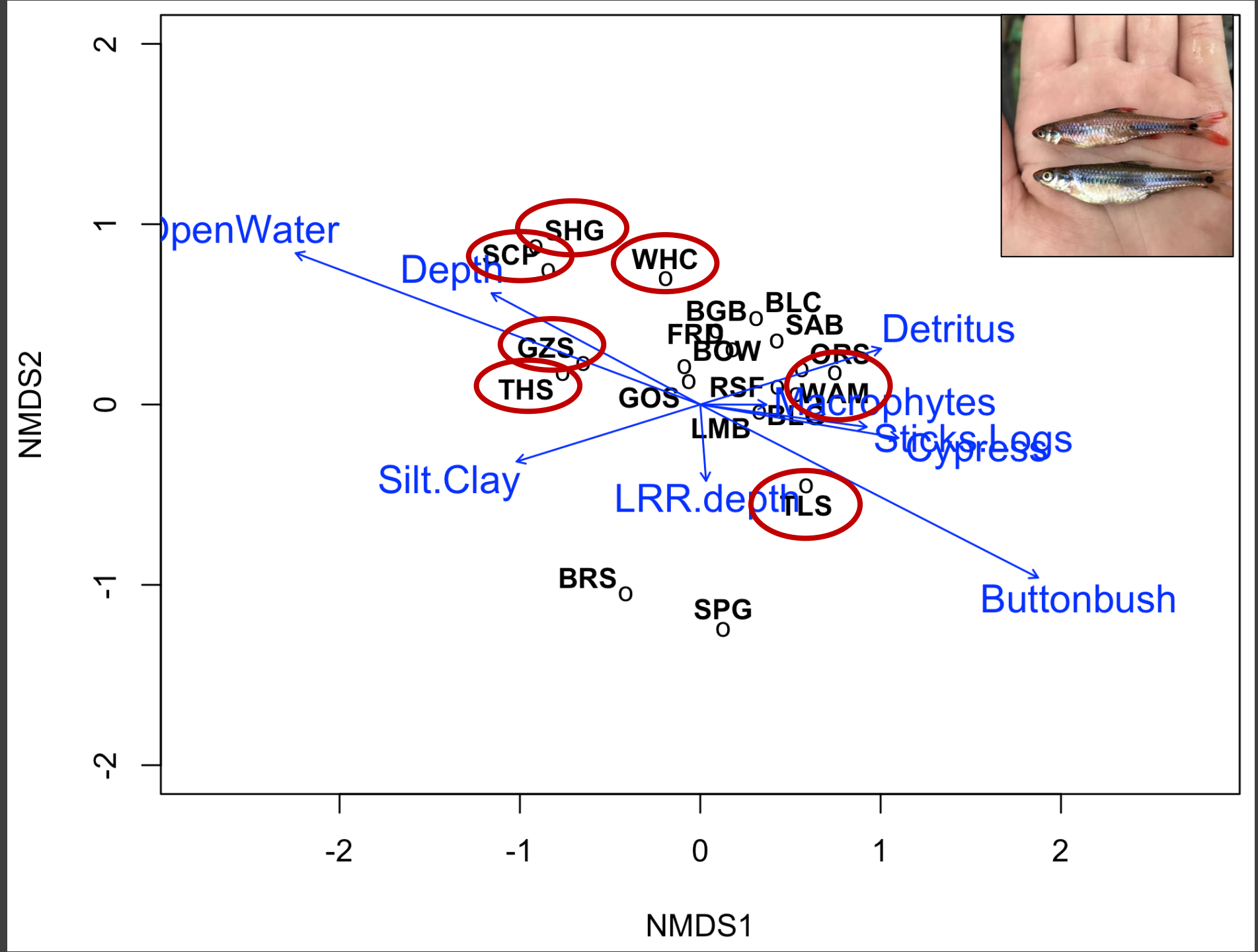
- Microhabitats:
  - Open Water
  - Nearshore Vegetated
  - Offshore Vegetated

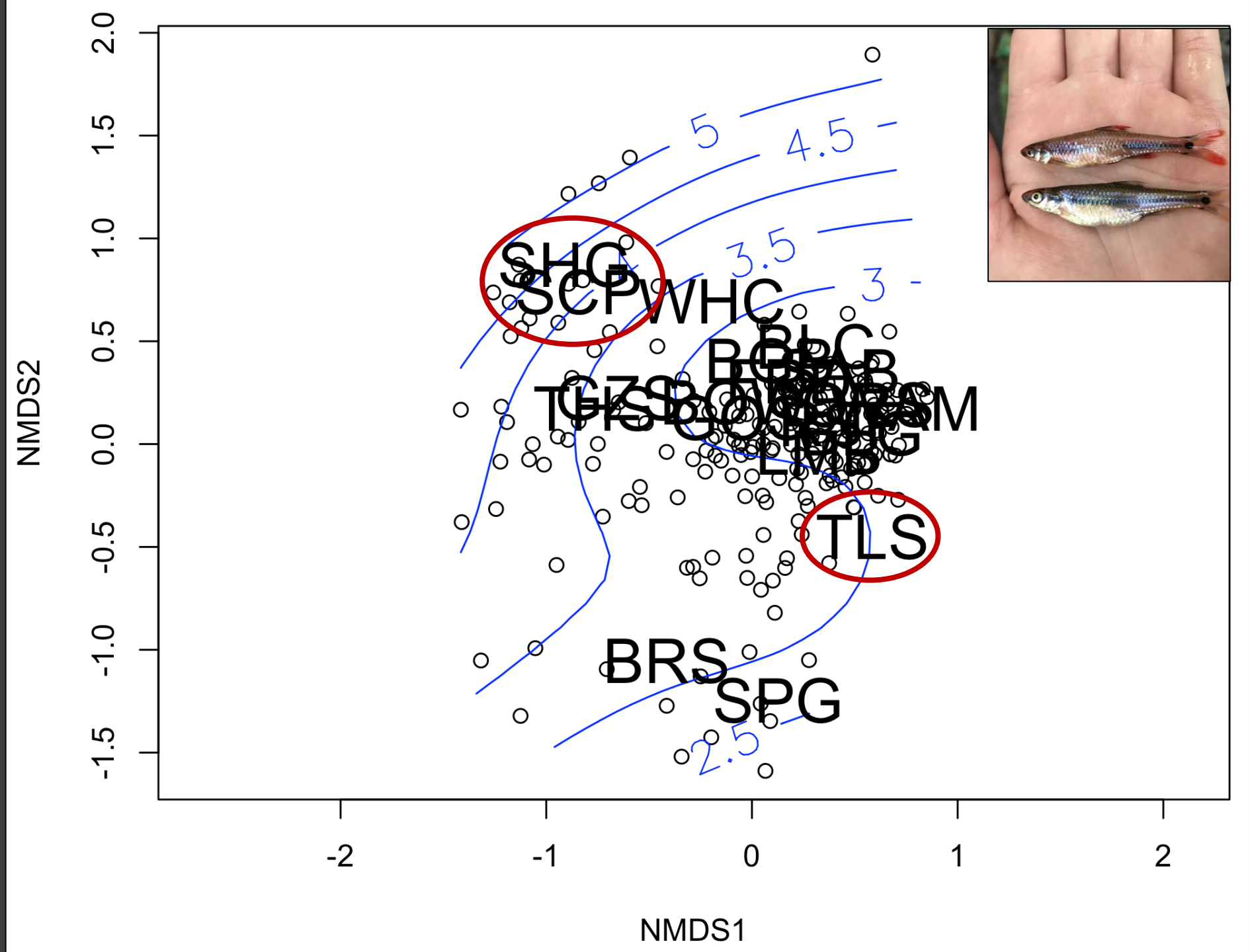
- Habitat Features:
  - Percent habitat composition at site
  - Vegetation type at site
  - Substrate

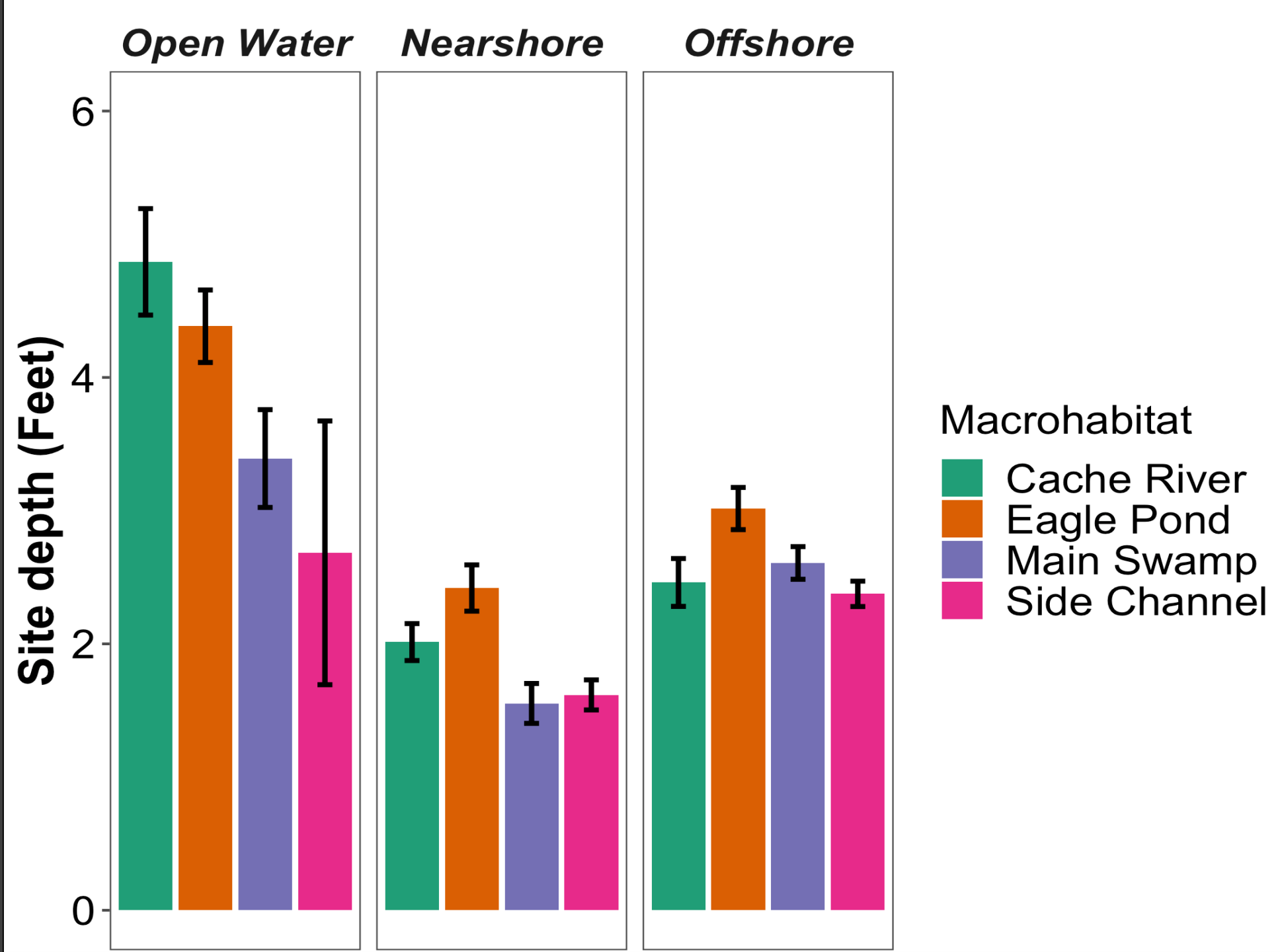
Data Analysis

- Non-metric multidimensional scaling (NMDS)
  - Evaluate changes in assemblage structure
  - Identify characteristics associated with assemblages
  - Identify depths associated with species
- Analysis of Similarities (ANOSIM)
  - Significant spatial trends


Open Water
Nearshore Vegetated
Offshore Vegetated
ANOSIM:
R=0.34, p<0.05
SHG
SCP
WHC
BLC
BGB
SAB
GZS
BOW
WAM
FRD
THS
GOS
RSF
BLG
LMB
TLS
BRS
SPG
NMDS1
NMDS2
-2
-1
0
1
2


NMDS1
NMDS2
-2
-1
0
1
2
OpenWater
Depth
Silt.Clay
LRR.depth
Detritus
Macrophytes
Sticks.Logs
Cypress
Buttonbush
SHG
SCP
WHC
GZS
THS
BGB
BLC
SAB
FRD
BOW
ORS
RSF
WAM
GOS
LMB
TLS
BRS
SPG


NMDS2
NMDS1
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2
-1
0
1
2
5
4.5
4
3.5
3
2.5
SHG
SCP
WHC
TLS
BRS
SPG


Open Water
Nearshore
Offshore
Site depth (Feet)
6
4
2
0
Macrohabitat
Cache River
Eagle Pond
Main Swamp
Side Channel

Conclusion

- Differences in abundance of Silver Carp, Shortnose Gar, Shad, White Crappie, Warmouth, and Taillight Shiner
- Species associated with shallow vegetated areas may be more impacted by water level fluctuations

Objective

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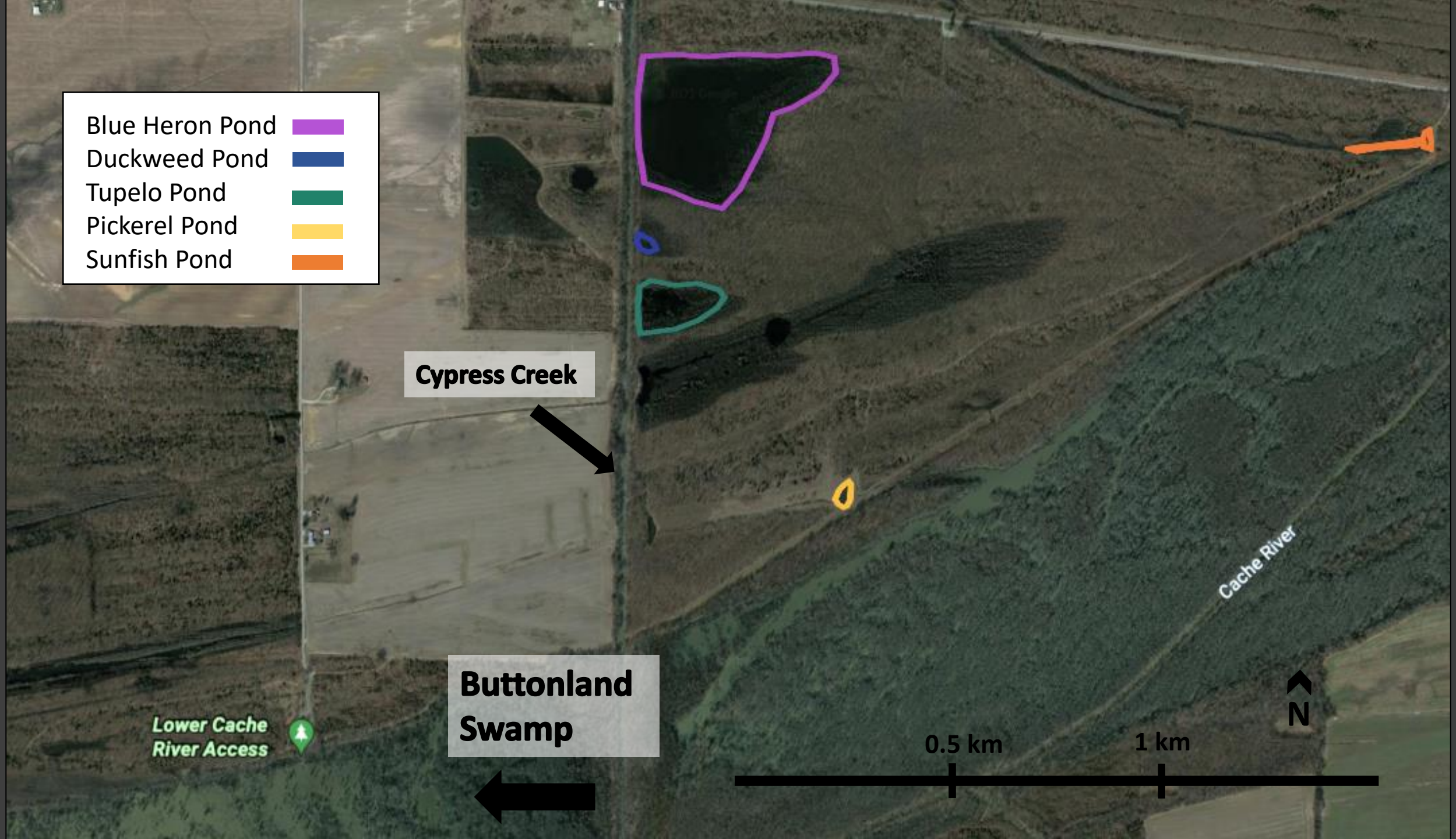
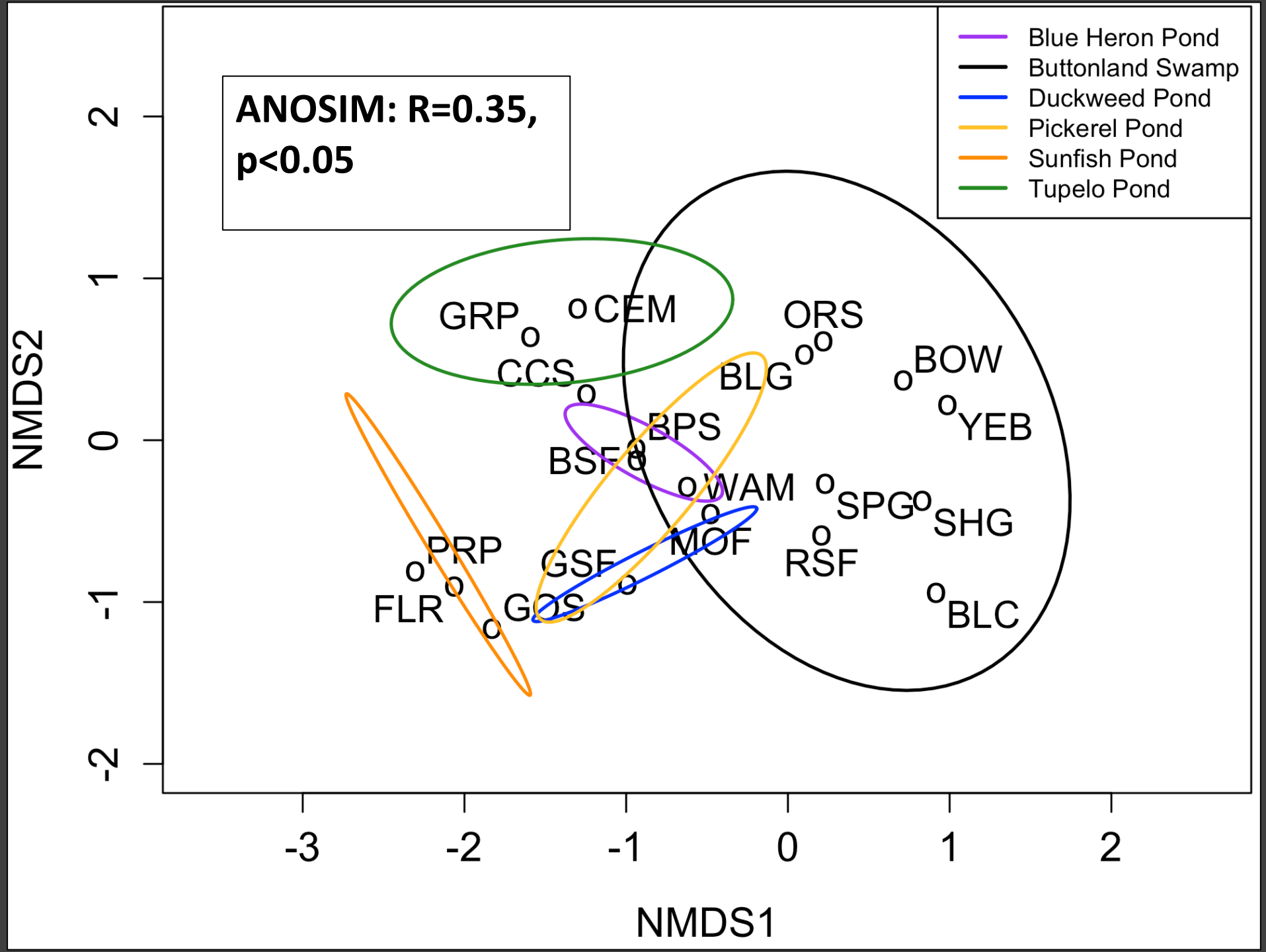
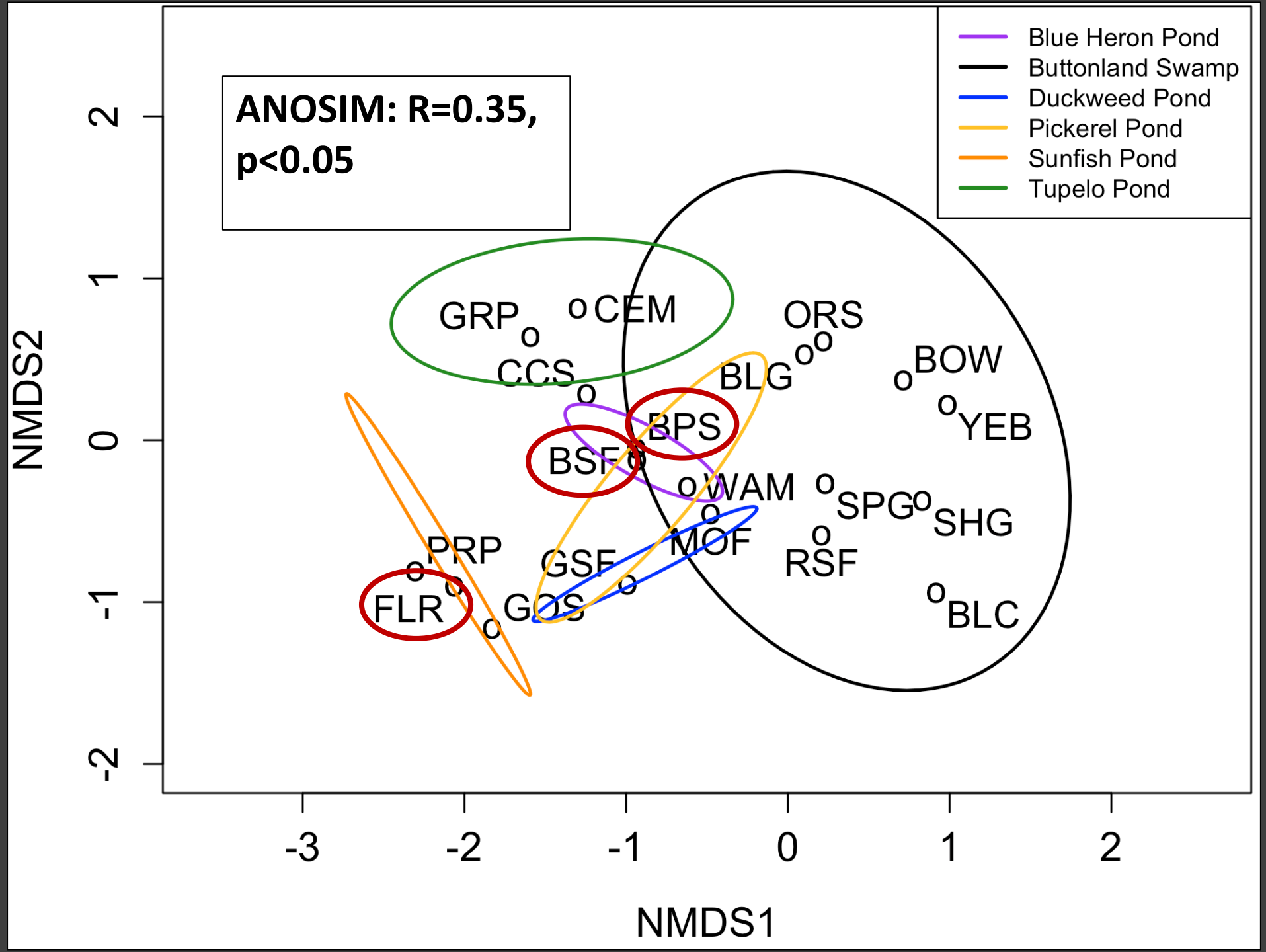
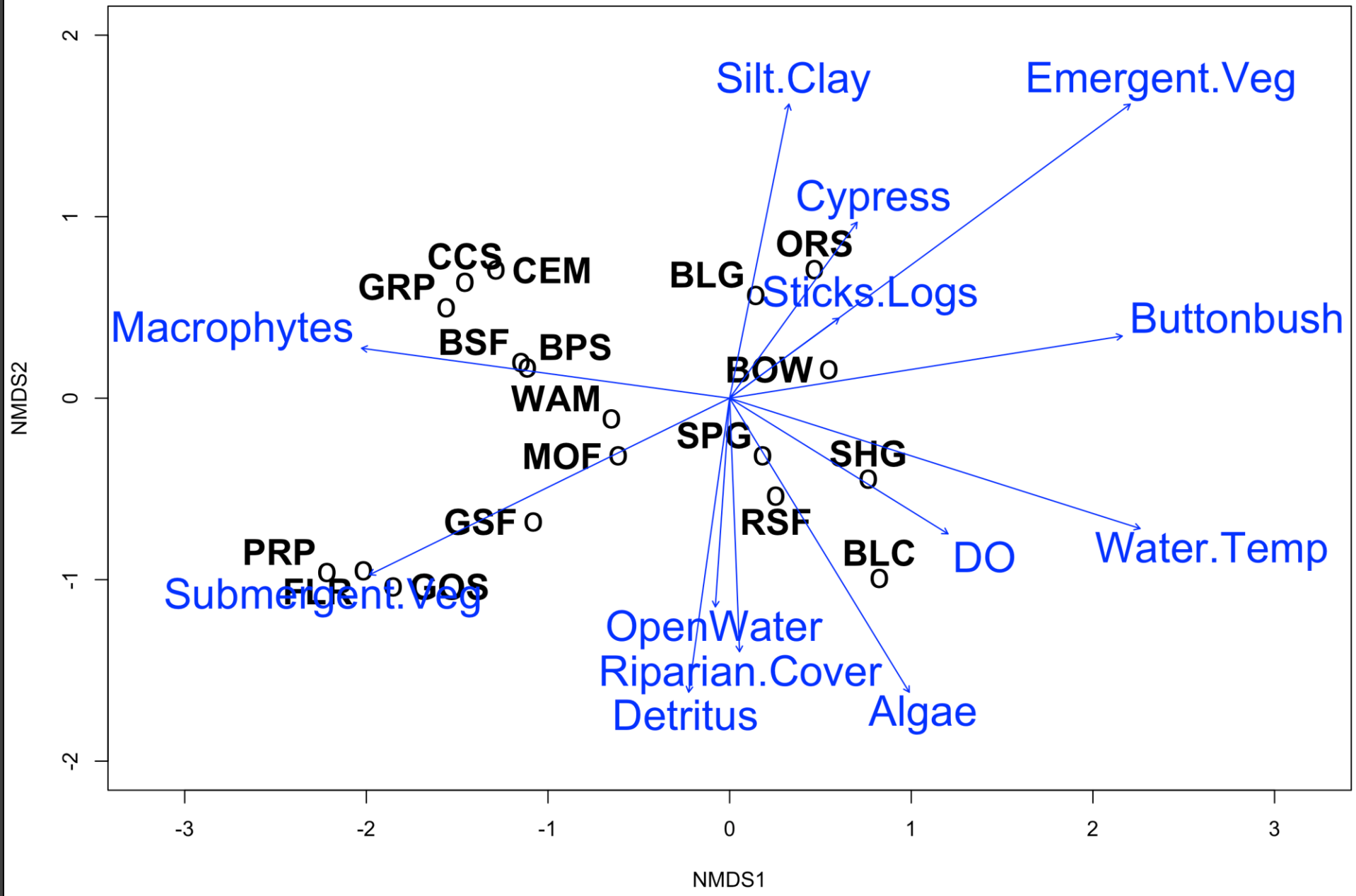
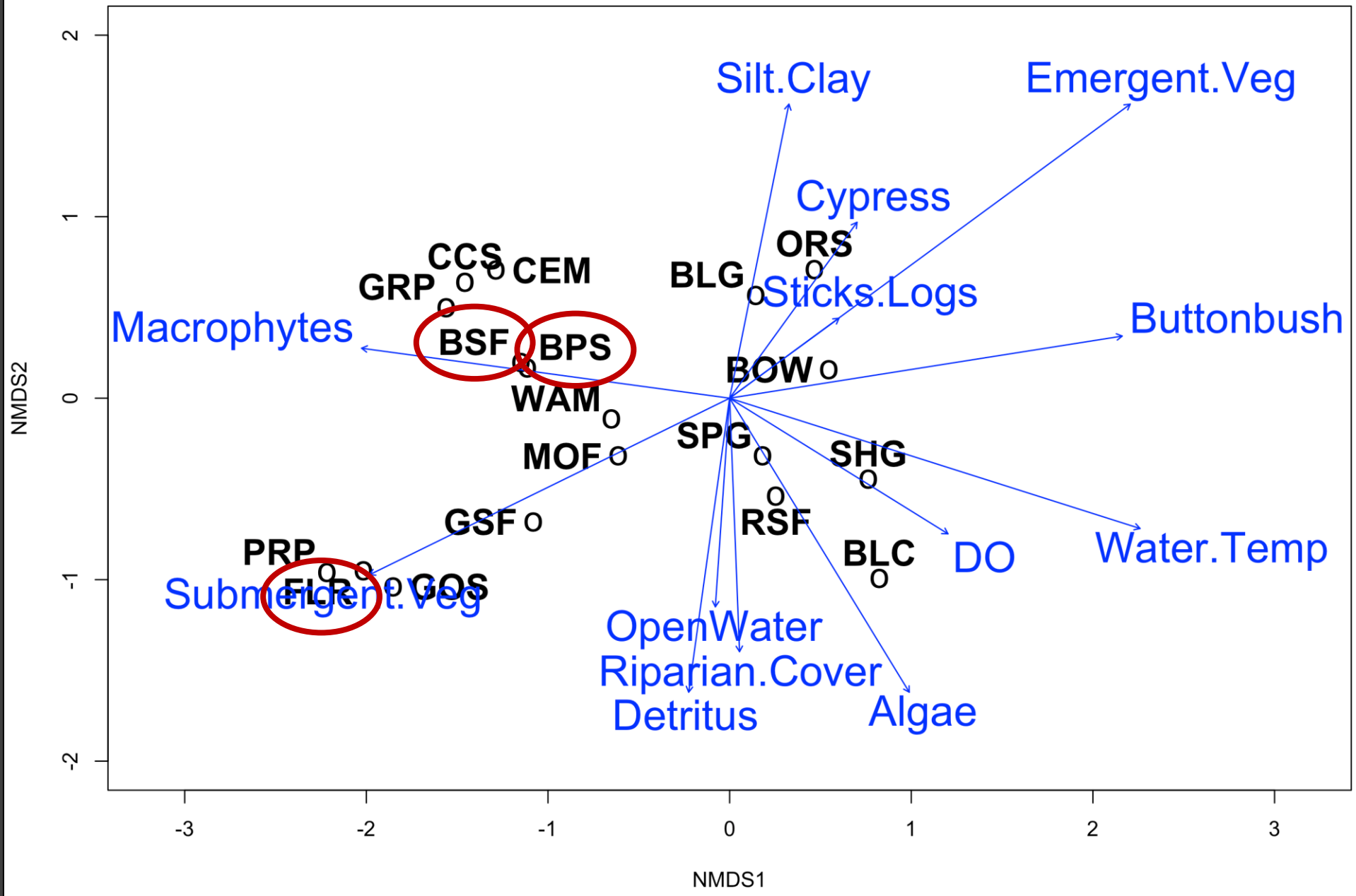

Blue Heron Pond
Duckweed Pond
Tupelo Pond
Pickerel Pond
Sunfish Pond
Cypress Creek
Cache River
Buttonland Swamp
Lower Cache River Access
0.5 km
1 km
N


ANOSIM: R=0.35,
p<0.05
Blue Heron Pond
Buttonland Swamp
Duckweed Pond
Pickerel Pond
Sunfish Pond
Tupelo Pond
GRP
CEM
CCS
ORS
BLG
BOW
YEB
BPS
BSF
WAM
SPG
SHG
MOF
RSF
PRP
GSF
FLR
GOS
BLC
NMDS1
NMDS2
-3
-2
-1
0
1
2


ANOSIM: R=0.35,
p<0.05
Blue Heron Pond
Buttonland Swamp
Duckweed Pond
Pickerel Pond
Sunfish Pond
Tupelo Pond
GRP
CEM
CCS
ORS
BLG
BOW
YEB
BPS
BSF
WAM
SPG
SHG
MOF
RSF
PRP
GSF
FLR
GOS
BLC
NMDS1
NMDS2
-3
-2
-1
0
1
2


Silt.Clay
Emergent.Veg
Cypress
ORS
CCS
CEM
GRP
BLG
Sticks.Logs
Macrophytes
Buttonbush
BSF
BPS
BOW
WAM
SPG
SHG
MOF
RSF
GSF
BLC
DO
Water.Temp
PRP
COS
Submergent.Veg
OpenWater
Riparian.Cover
Detritus
Algae
NMDS1
NMDS2
-3
-2
-1
0
1
2
3


Silt.Clay
Emergent.Veg
Cypress
ORS
CCS
CEM
BLG
GRP
Sticks.Logs
Macrophytes
Buttonbush
BSF
BPS
BOW
WAM
SPG
MOF
SHG
GSF
RSF
PRP
BLC
DO
Water.Temp
Submergent.Veg
COS
OpenWater
Riparian.Cover
Detritus
Algae
NMDS1
NMDS2
-3
-2
-1
0
1
2
3

Conclusion

- Isolated ponds have unique community structure
- Susceptible to water level drawdowns
  - Maintain minimum water level for fish to persist

Acknowledgements



Thank you to…

- My technicians (George McGoldrick, Frances Whalen, Kelsey Bowe) and others who have helped along the way (Jared Bilak, Joe Rector, Shaley Valentine, Morgan Winstead)

- Funded by: IDNR, Project: T-130 (special thanks to Jana Hirst and Brian Metzke)
    - U.S Fish and Wildlife (special thanks to Karen Mangan)

- Dr. Beth Middleton (United States Geological Survey)

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Thank you for listening!

Questions?

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