Assessing Change in NC's Outer Coastal Plain Wetlands

A Sneak-Peek at the Results

Kristie Gianopulos, M.S.
NC Division of Water Resources

Steve Anderson, M.S.
Albemarle-Pamlico National Estuary Program

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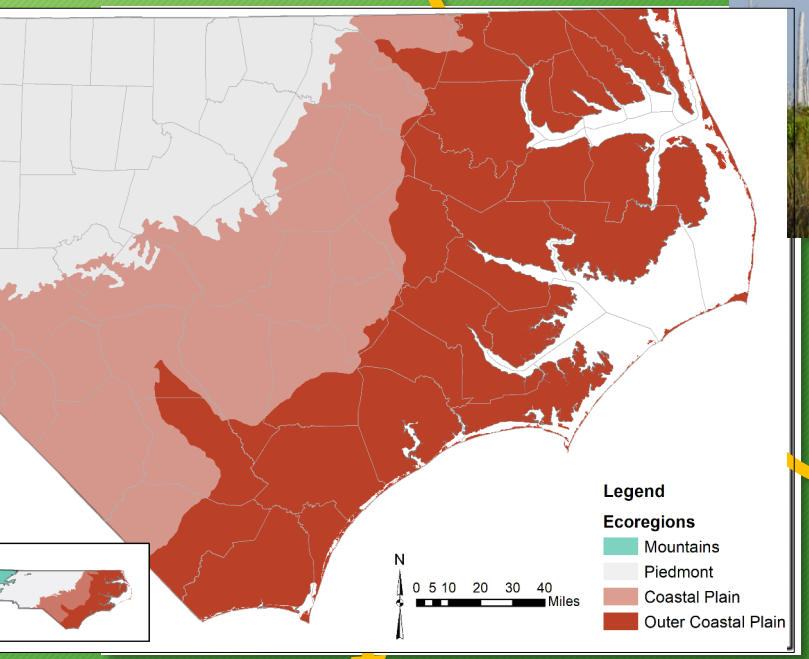
NC WRRI Meeting
Raleigh, NC March 2024

NORTH CAROLINA
Department of Environmental Quality

Coastal Plain Wetlands are Vulnerable Wetlands

Albemarle Sound

Albemarle-Pamlico Peninsula Sound



Outer Banks

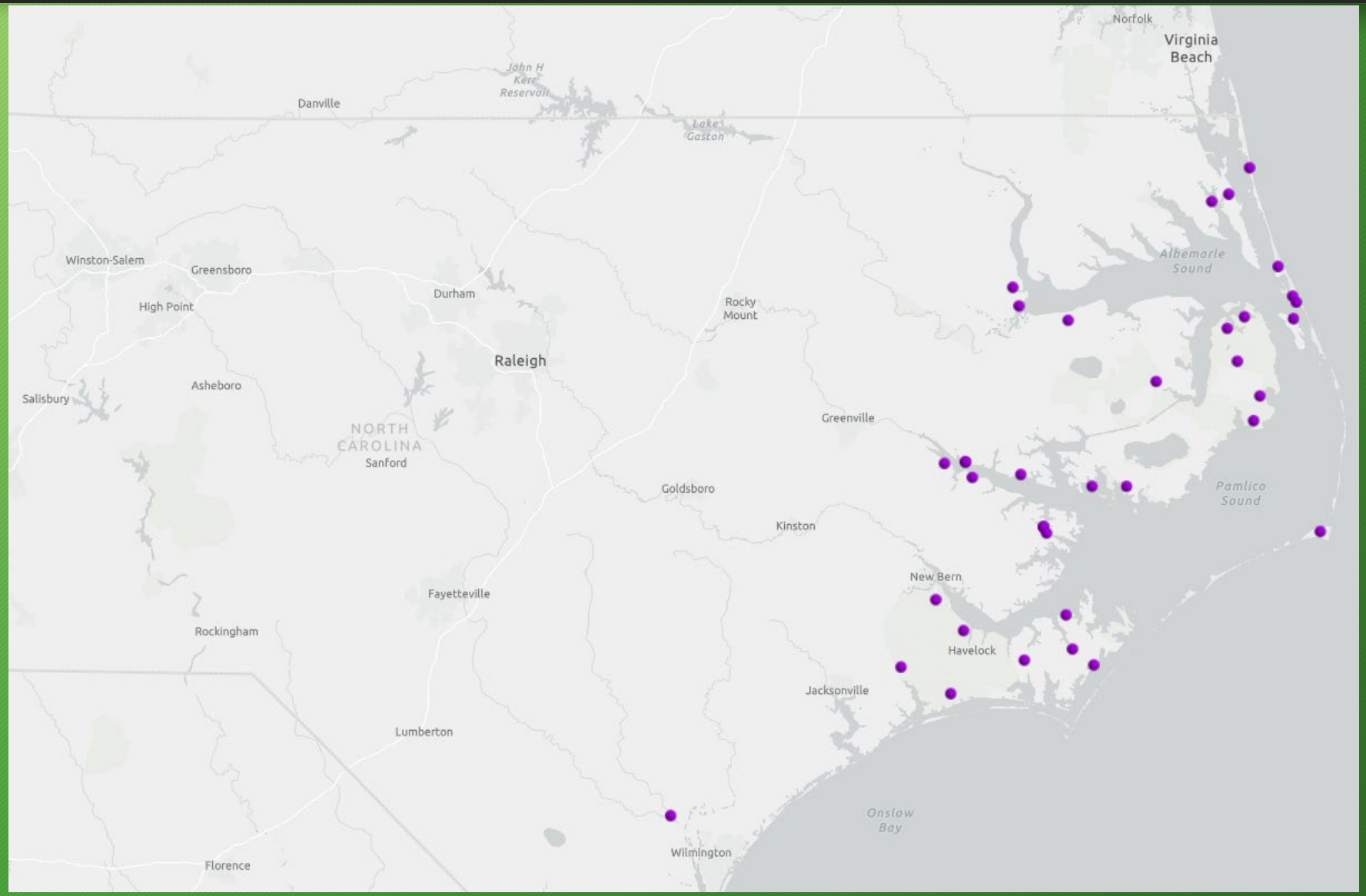
Cape Fear River

Low land: 1,730 square miles are ≤1 m above sea level

- Extensively ditched/connected
- Rising sea levels
- Increased storm intensity

- Saltwater intrusion, increased inundation ---> ghost forests, plant community shifts

(Re-)Sampling Sites - NCDWR



Site Selection

(Carolina Vegetation Survey and EPA's NWCA locations)

- Historically freshwater (or transitional salinity)
- Proximity to open brackish/salt water
- Sampled between 5 and 34 yrs prior; median 12 years
- 33 sites total

Parameters Sampled

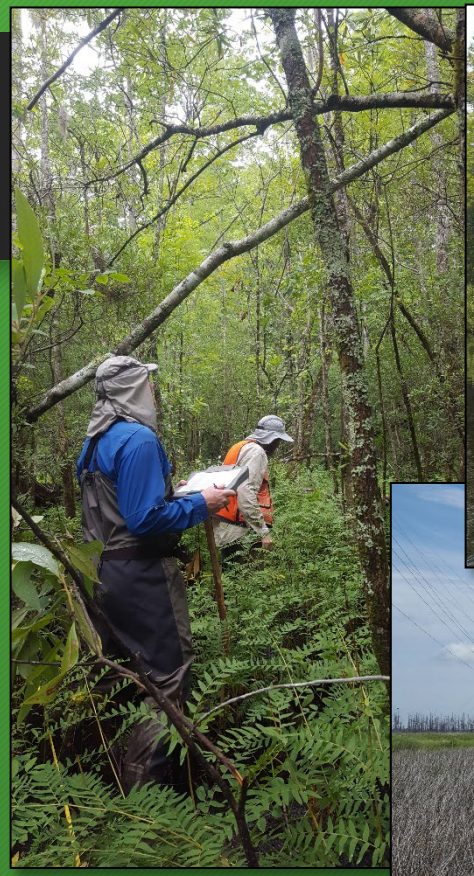
(using protocols of original sampling)

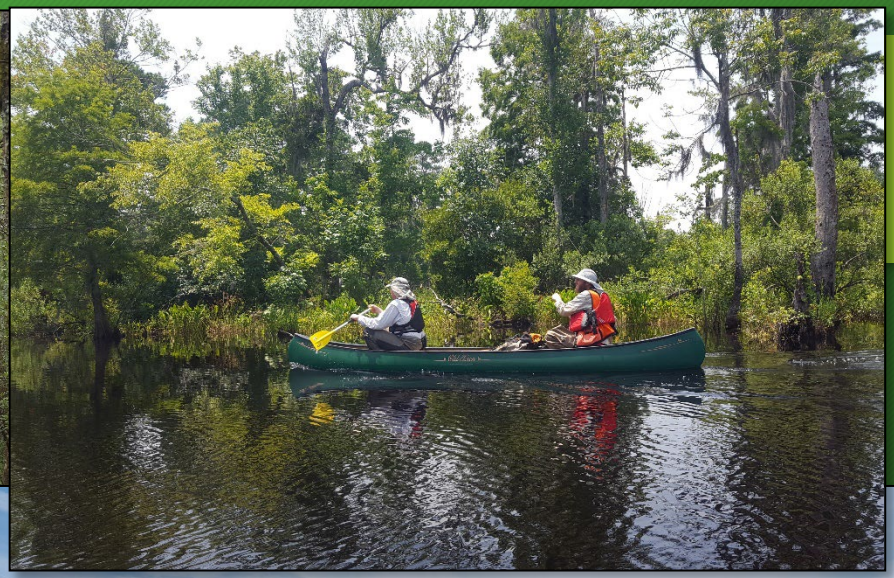
VEGETATION: (plots) plant species identity, percent cover, woody basal area, woody stem counts

SOILS: (1 m pit, each horizon) - soil pH, ammonium (NH4), sulfate (HSO_4), Ca, Cl, K, Na, Mg, electrical conductivity (EC), and total cation exchange capacity (total CEC)

WATER: (surface water + shallow groundwater) - salinity, pH, specific conductivity, ammonia, sulfate, Br, Ca, Cl, K, Na, Mg

This is Very Difficult Work



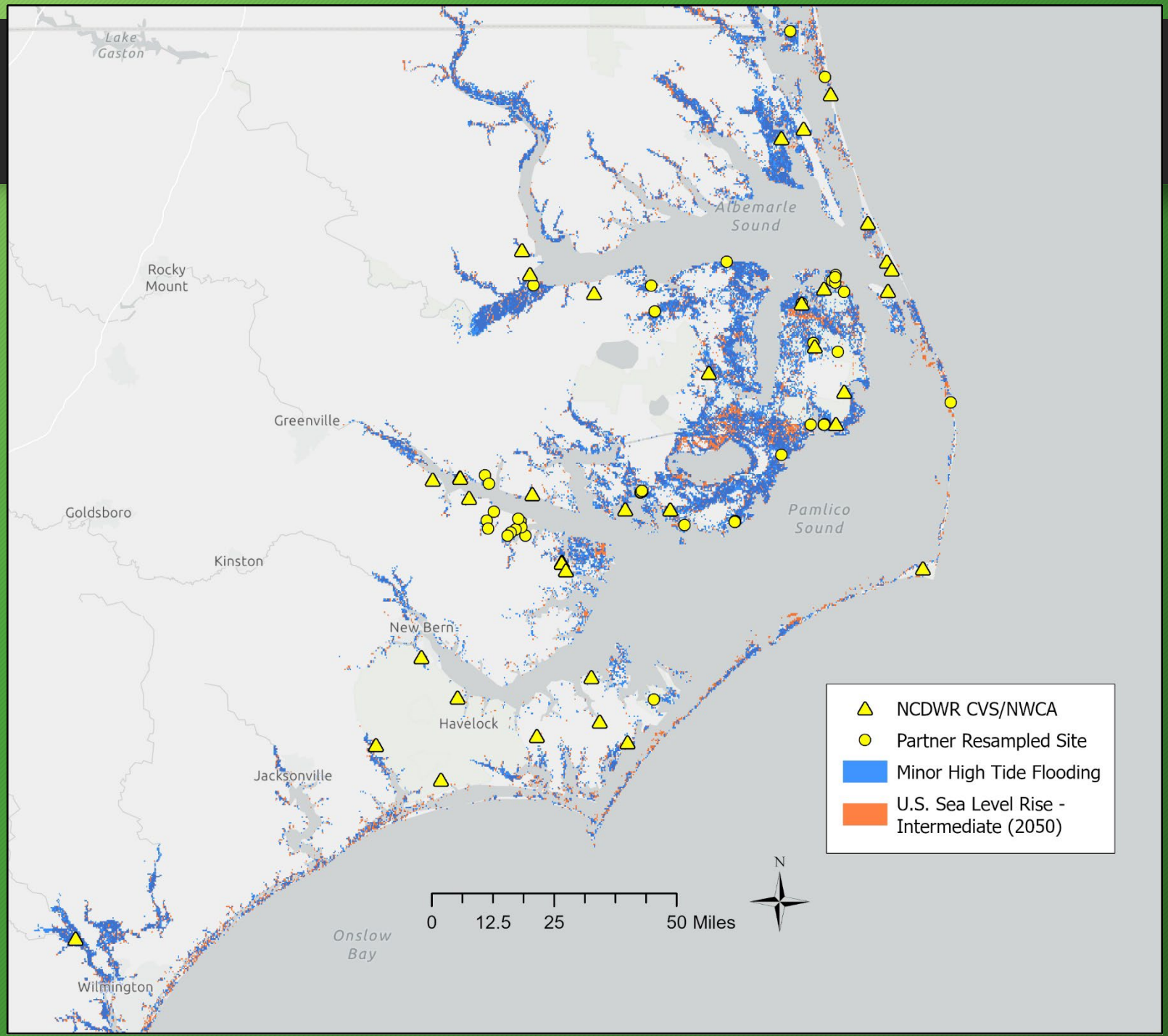


Field Team Lead: Greg Rubino

Botanists: Eric Ungberg, Tracy Feldman

Technicians: Skadi Kylander, Robert Ramsey

Sites



92% sites vulnerable to Category 1 hurricane storm surge

78 sites

Other resample data from:

Duke Univ.

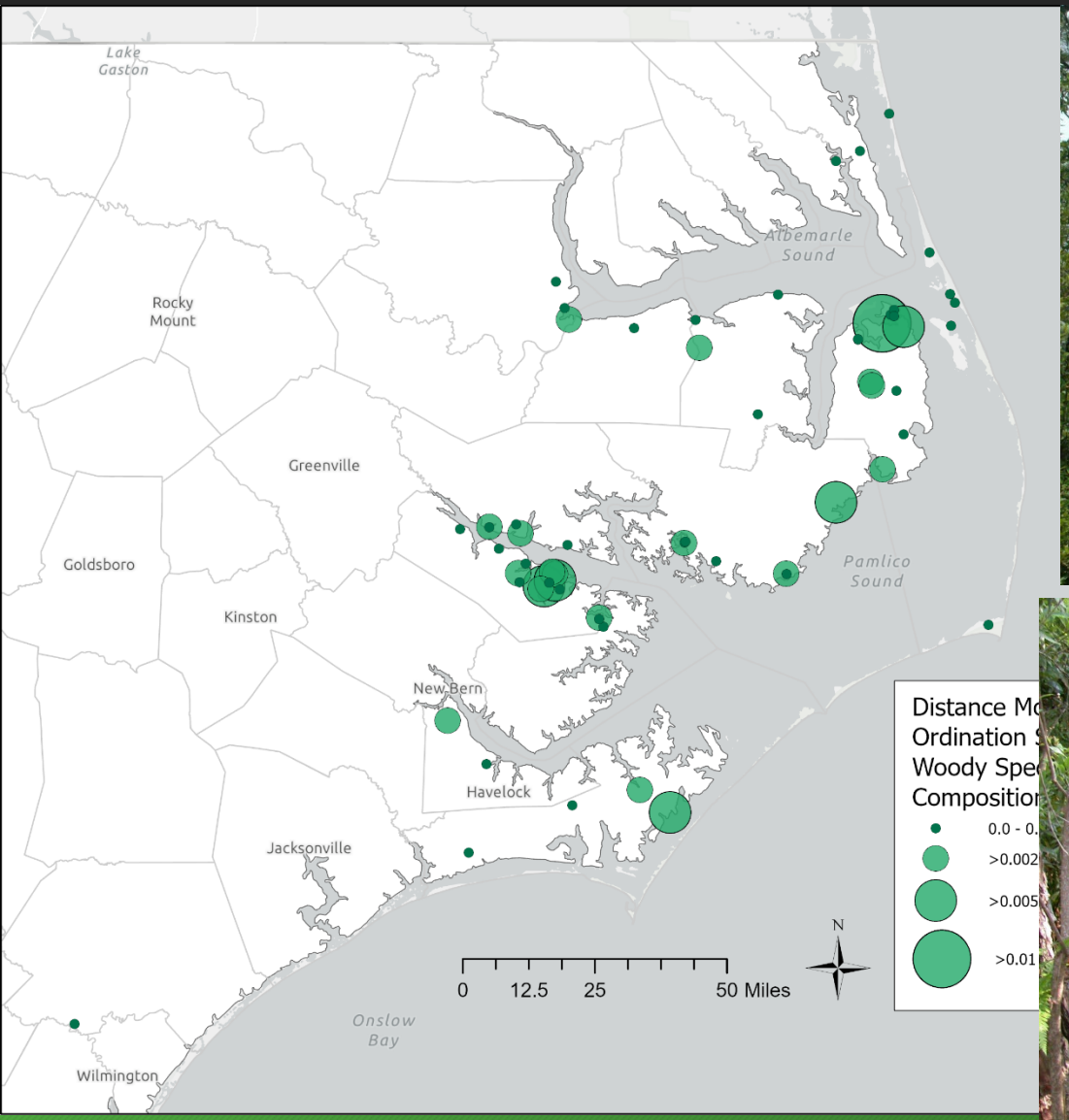
NC State Univ.

Nutrien Phosphate

USFWS

EPA's NWCA

Sites with Most Change in Woody Community/Cover



Change in woody species (presence/absence)

Sites with Most Change in Woody Community/Cover

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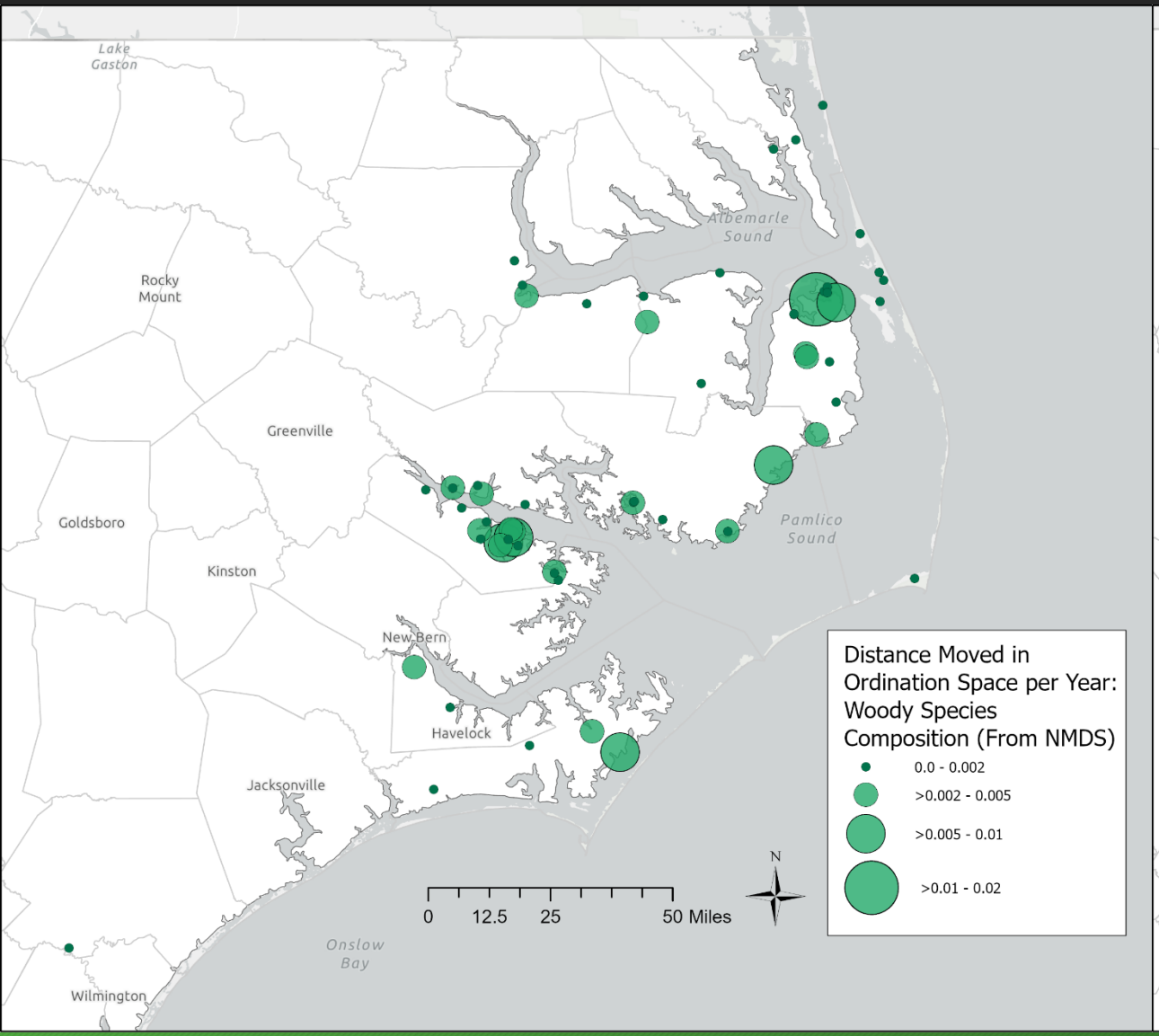

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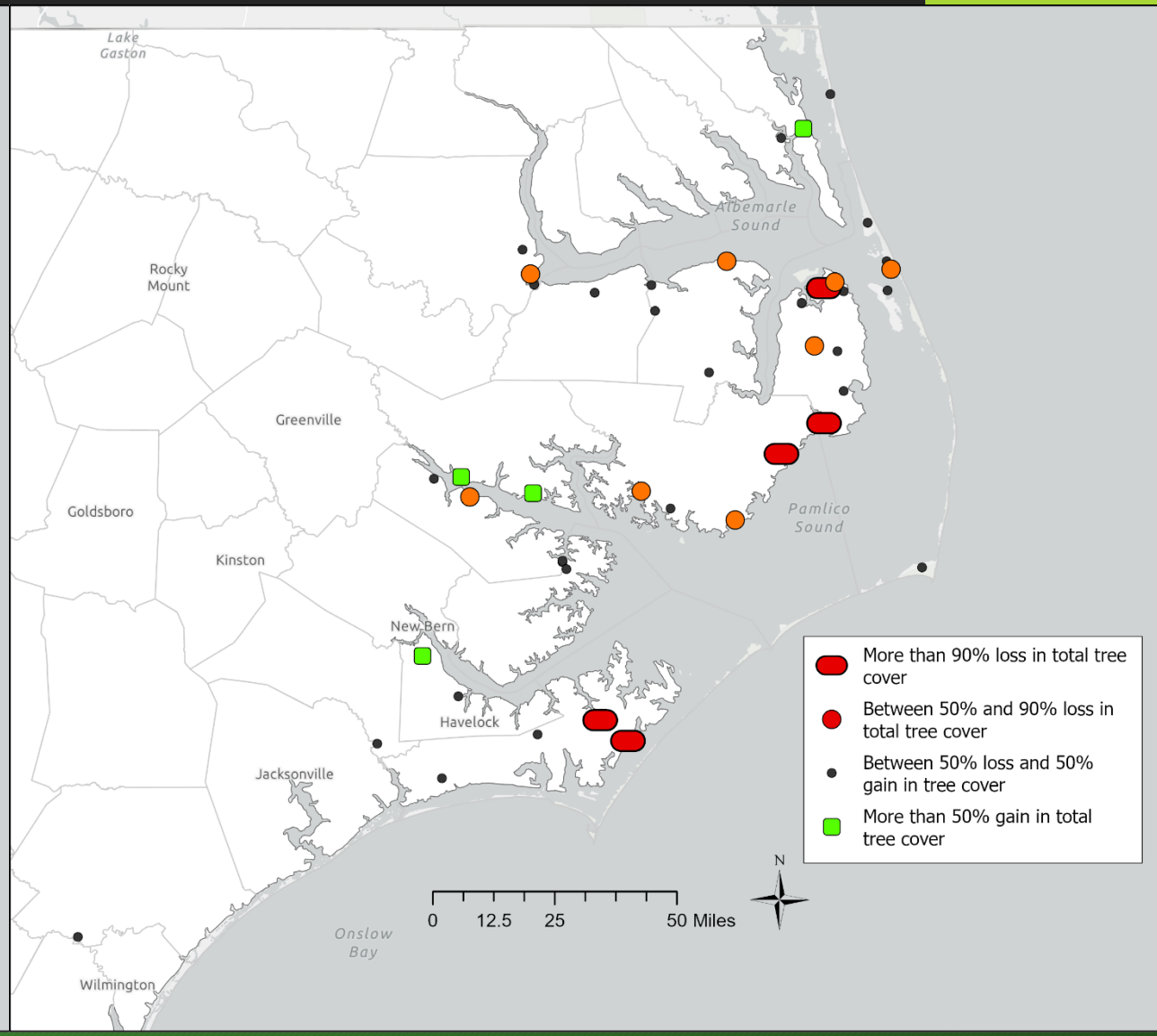


Loss/gain in cover by tree taxa

Threshold Analysis

"Sensitive" (Decreasers)

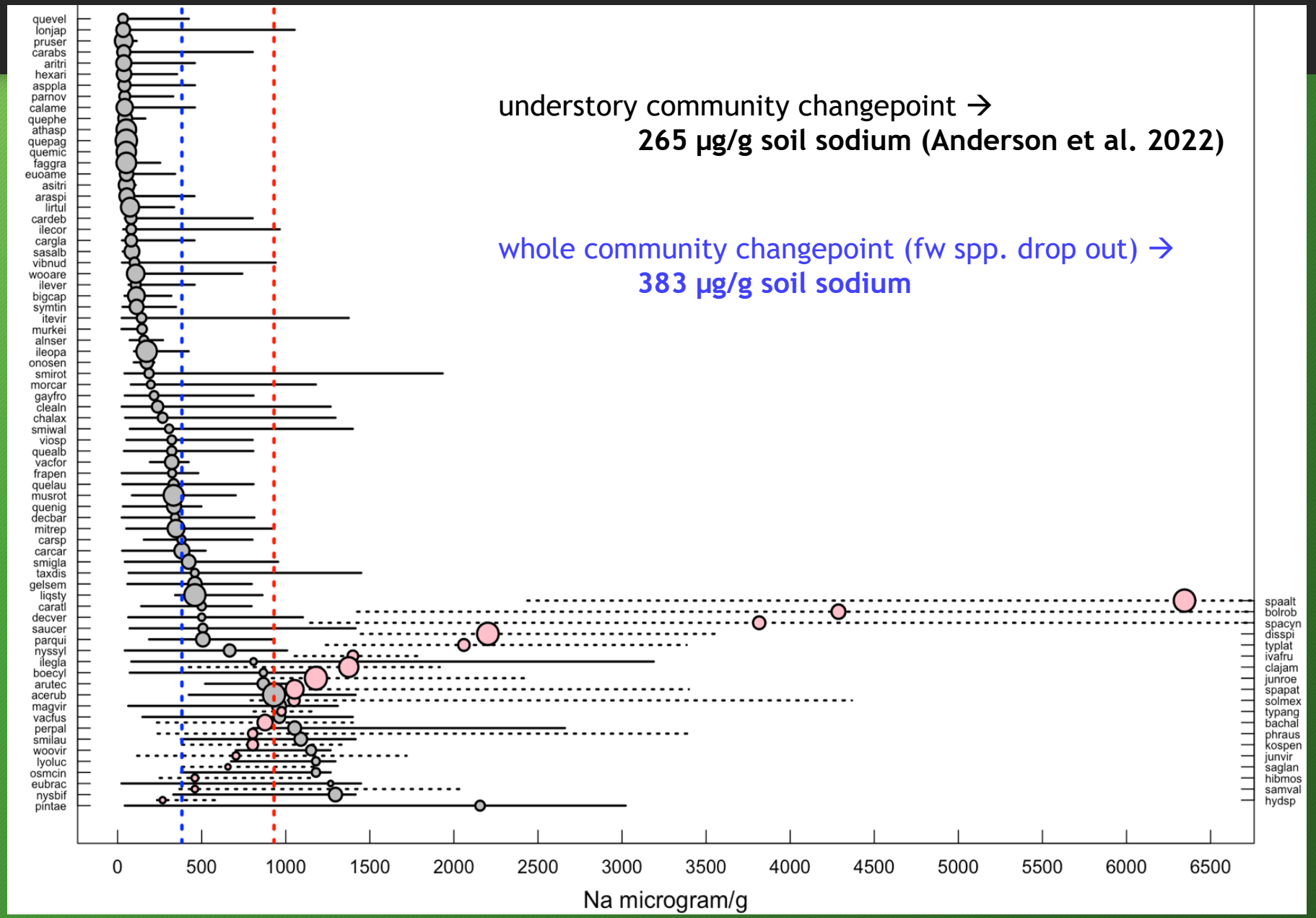
LIRTUL

WOOARE

QUENI

LIGSTY

ACERUB



understory community changepoint →
265 µg/g soil sodium (Anderson et al. 2022)

whole community changepoint (fw spp. drop out) →
383 µg/g soil sodium

TITAN (Threshold Indicator Taxa ANalysis)

Baker and King 2010

"Tolerant" (Increasers)

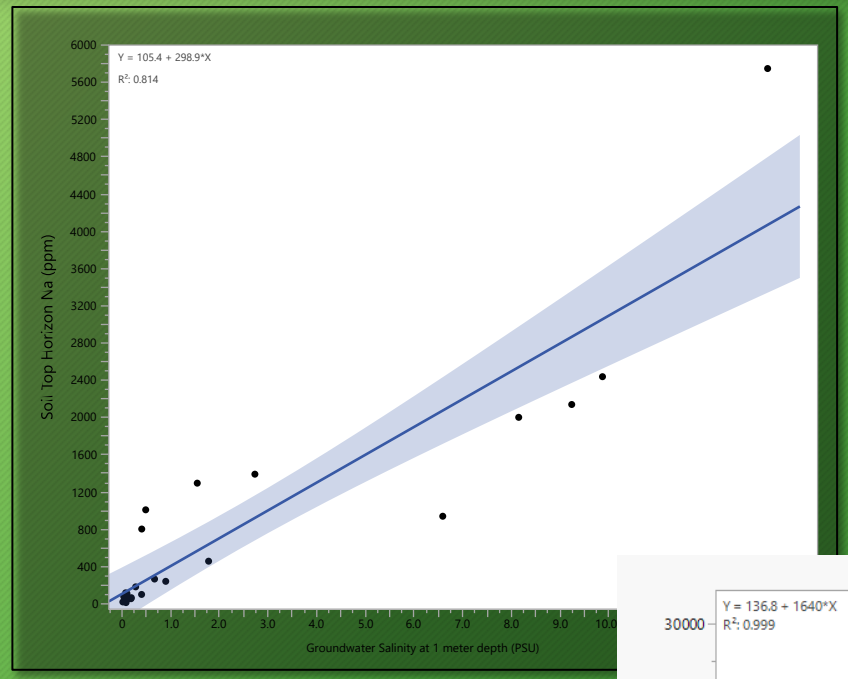
SPAALT

JUNROE

SPAPAT

BACHAL

Threshold Analysis



Understory Community Changepoint

265 µg/g top horizon soil sodium

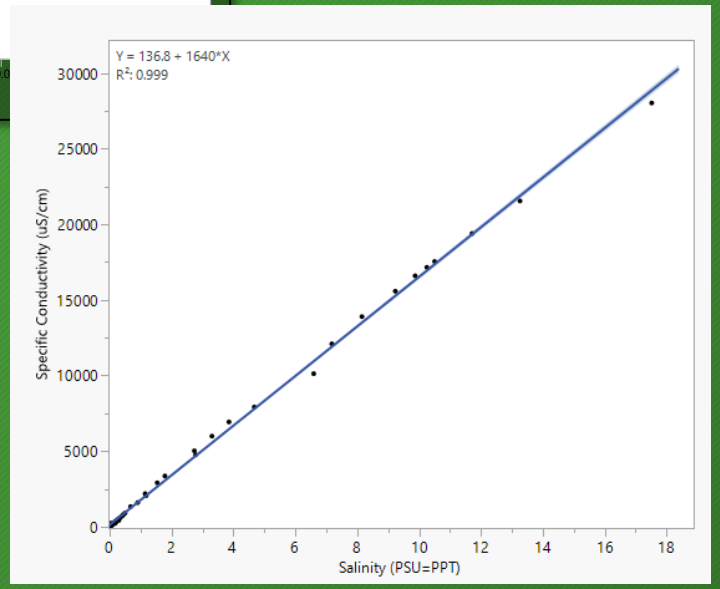
or

0.54 ppt shallow groundwater (1 m) salinity

or

1022 µS/cm shallow groundwater specific conductivity

Need more data on these relationships



Whole Community Changepoint

383 µg/g top horizon soil sodium

or

0.93 ppt shallow groundwater (1 m) salinity

or

1666 µS/cm shallow groundwater specific conductivity

Take Aways

Variation in amount and direction of change

“Tipping point” may be chronic exposure to salinities as low as 0.5ppt, or soil sodium of 265 ug/g, in freshwater forested wetlands.

Thank you

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Contact:

Kristie Gianopulos, NC Division of Water Resources

kristie.gianopulos@deq.nc.gov / 919-743-8409

NCwetlands.org/research