

Saltwater intrusion in agricultural fields in eastern North Carolina: Potential drivers and responses

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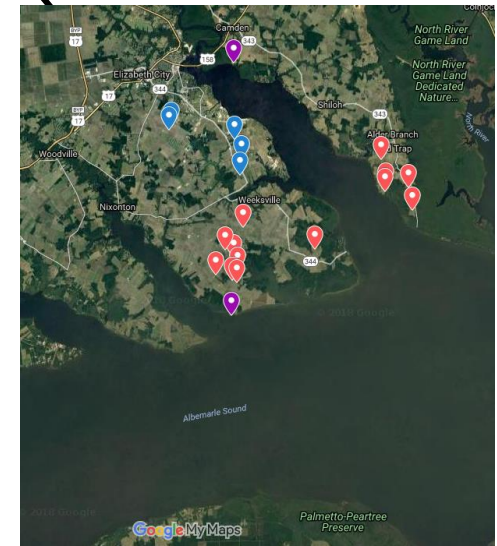
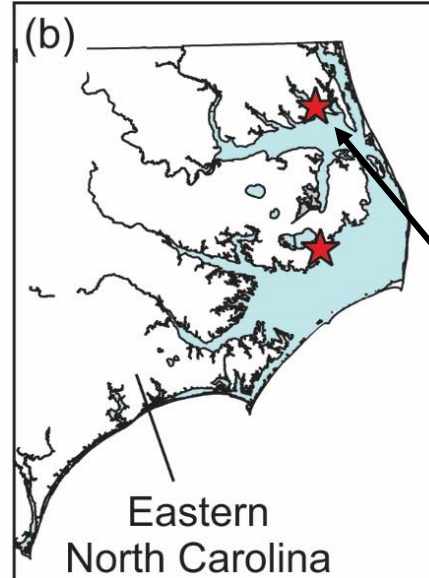
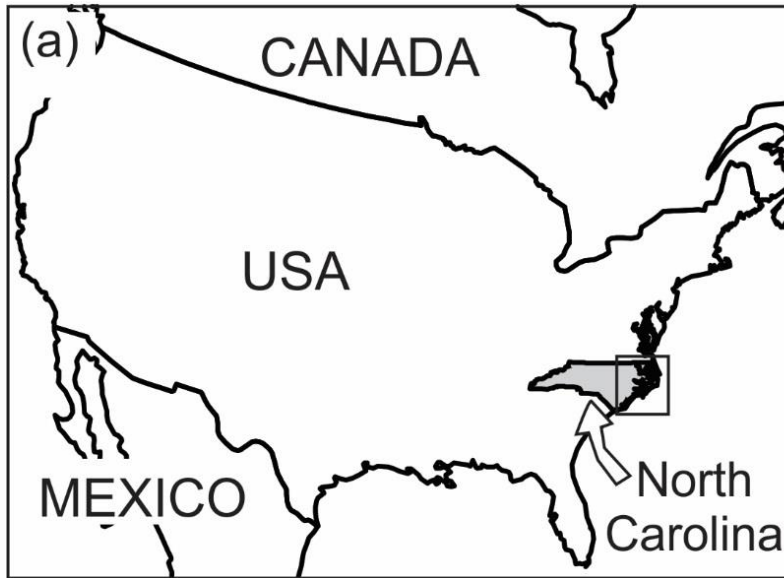


Occurrence of saltwater intrusion in eastern North Carolina



Photo: Al Wood

Occurrence



Courtesy Al Wood

Soil tests

- Sodium concentrations
- Exchangeable Sodium Percentage
- Soluble Salts Index

Water levels

- Groundwater
- Surface water

Salinity

- Groundwater
- Surface water

Soil sensors

- Soil Moisture
- Soil Conductivity
- Soil temperature

Surface Geophysics

- Direct current electrical resistivity
- Ground penetrating radar
- Capacitively Coupled Resistivity

Sediment cores

- Sedimentology
- Stratigraphy

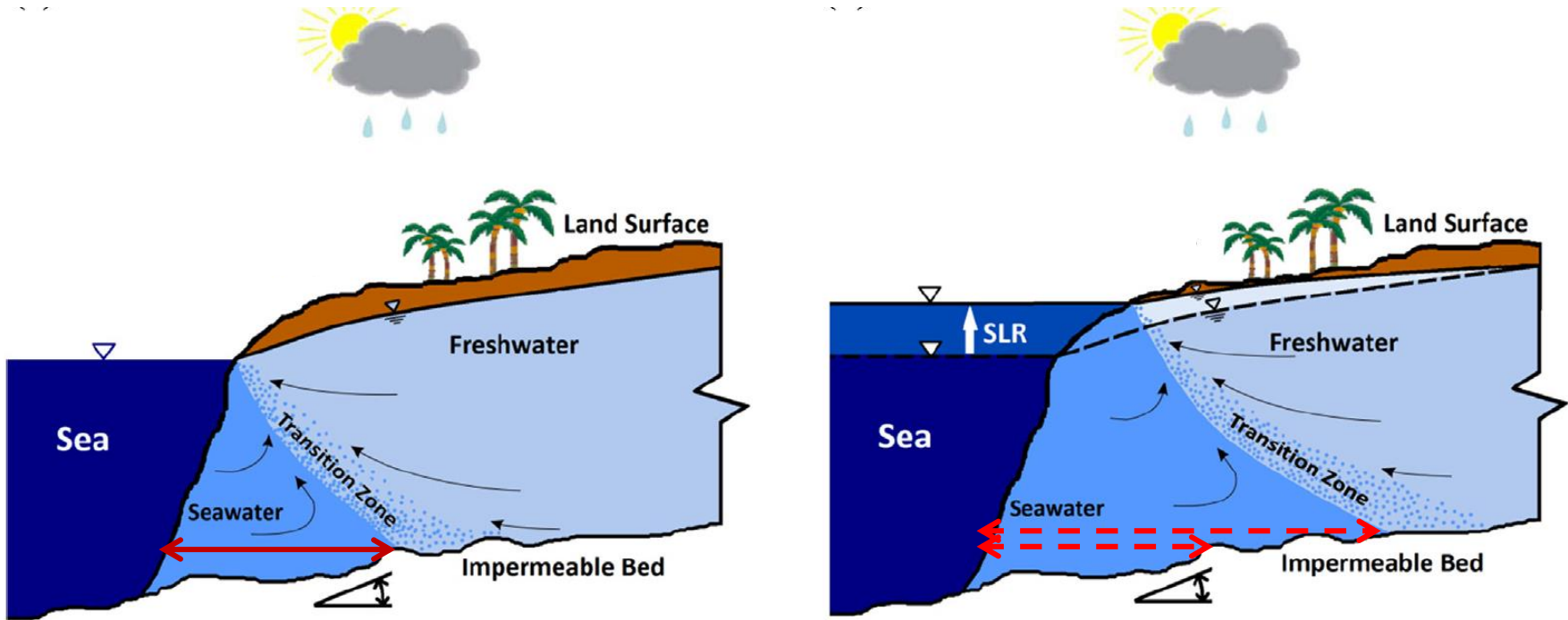
What may be causing elevated levels of salts in agricultural fields?

Overwash from storm surge



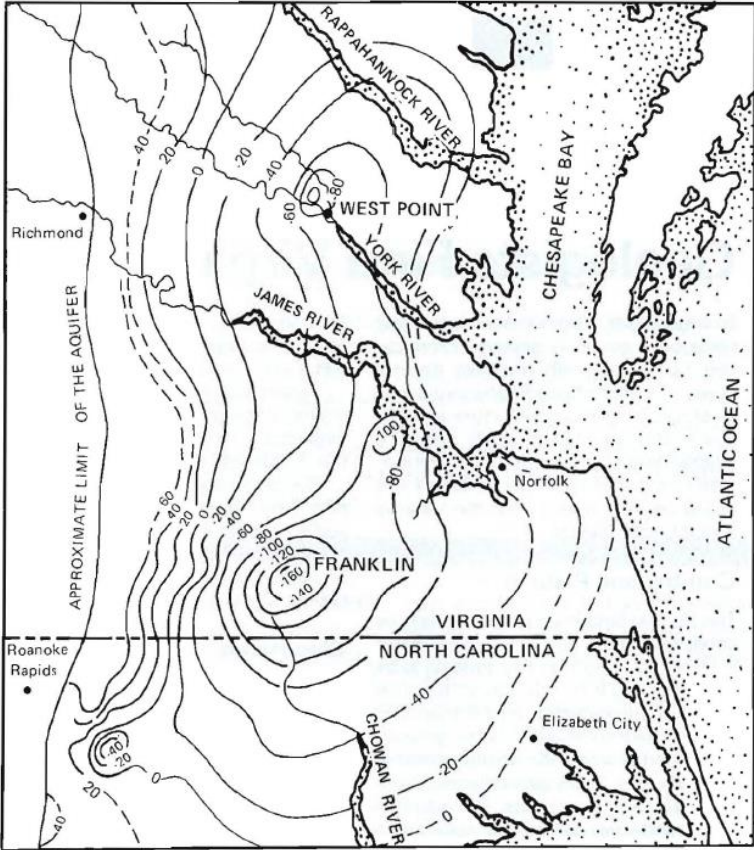
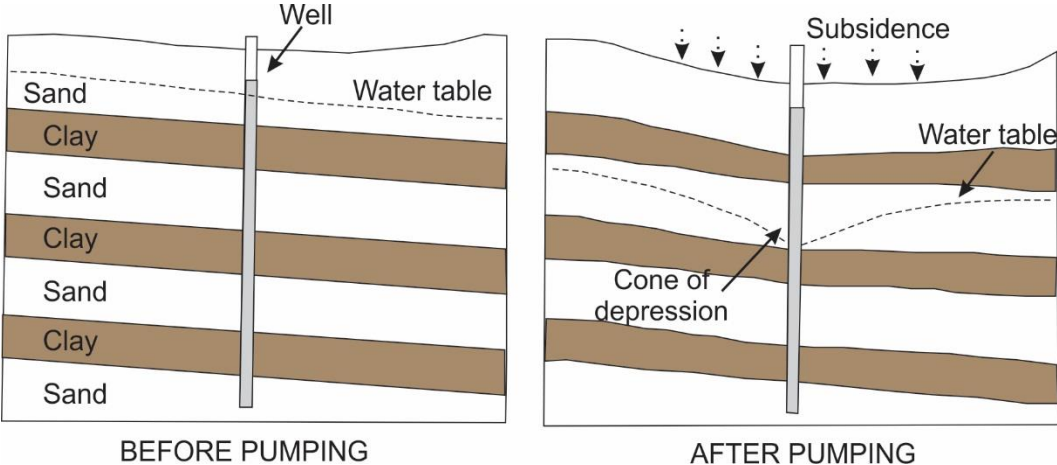
Photos: Andrea Gibbs

Sea-level rise



Ketabchi et al. 2016, Sea-level rise impacts on seawater intrusion in coastal aquifers: Review and integration, Journal of Hydrology, 535, 235-255

Subsidence and relative sea-level rise



Source: U.S. Geological Survey

EXPLANATION
 Water levels are in feet
 NATIONAL GEODETIC VERTICAL DATUM 1929

Wind-induced tides in ditches and canals



Agricultural field

Ditch

Agricultural field

Water from ditch

Lowering of water table

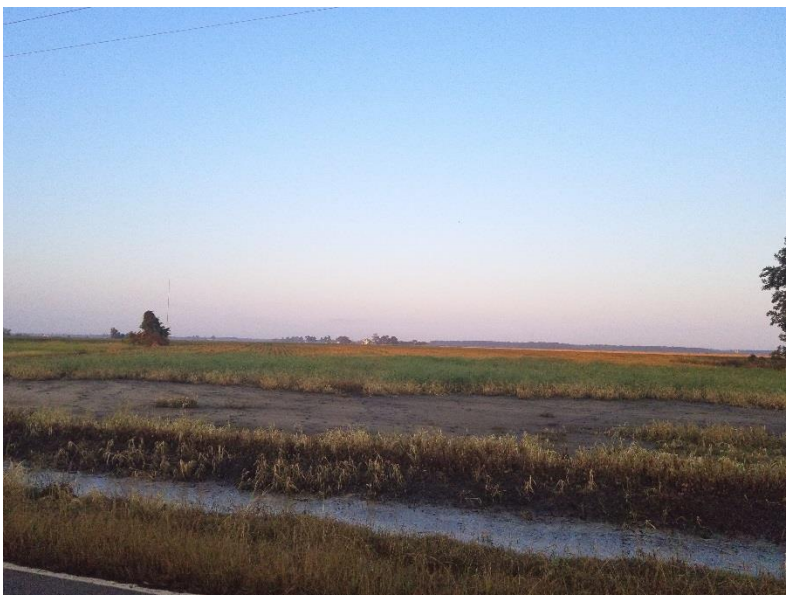
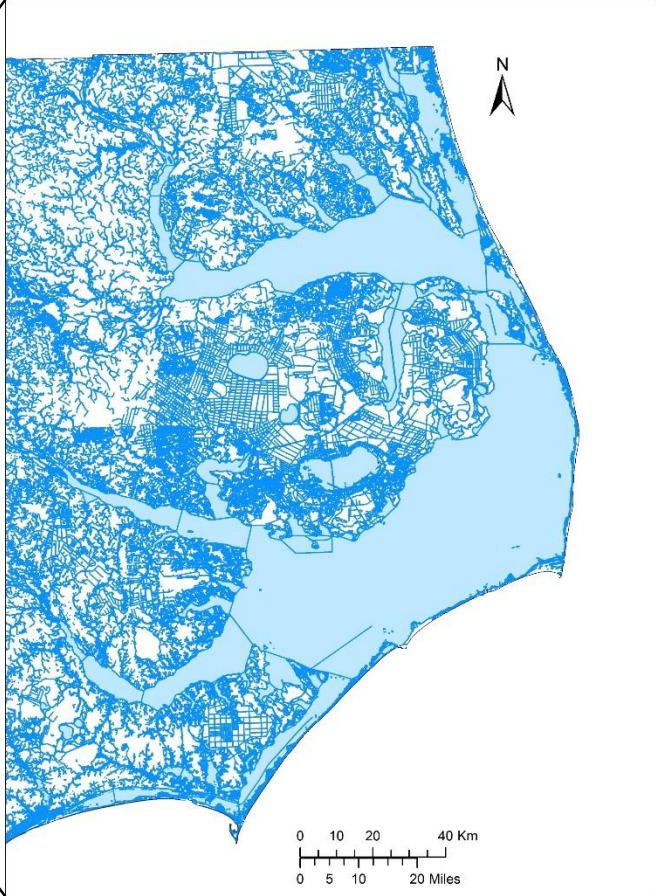
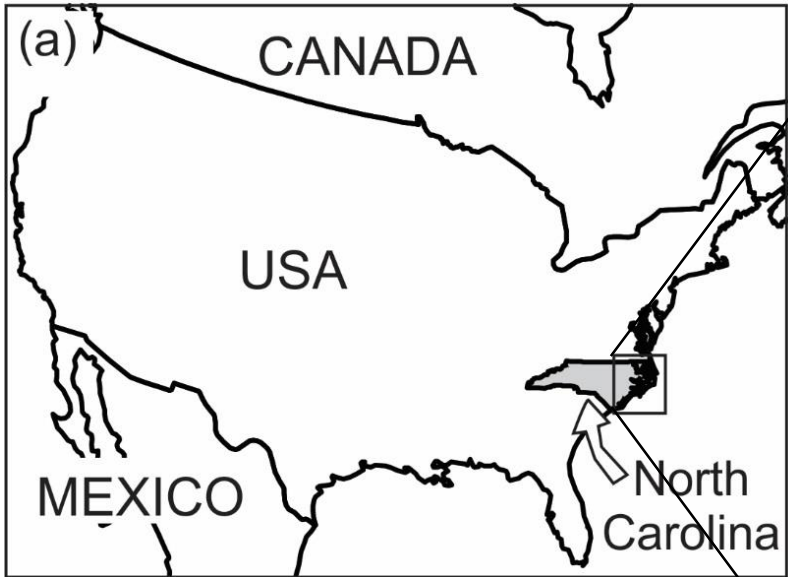
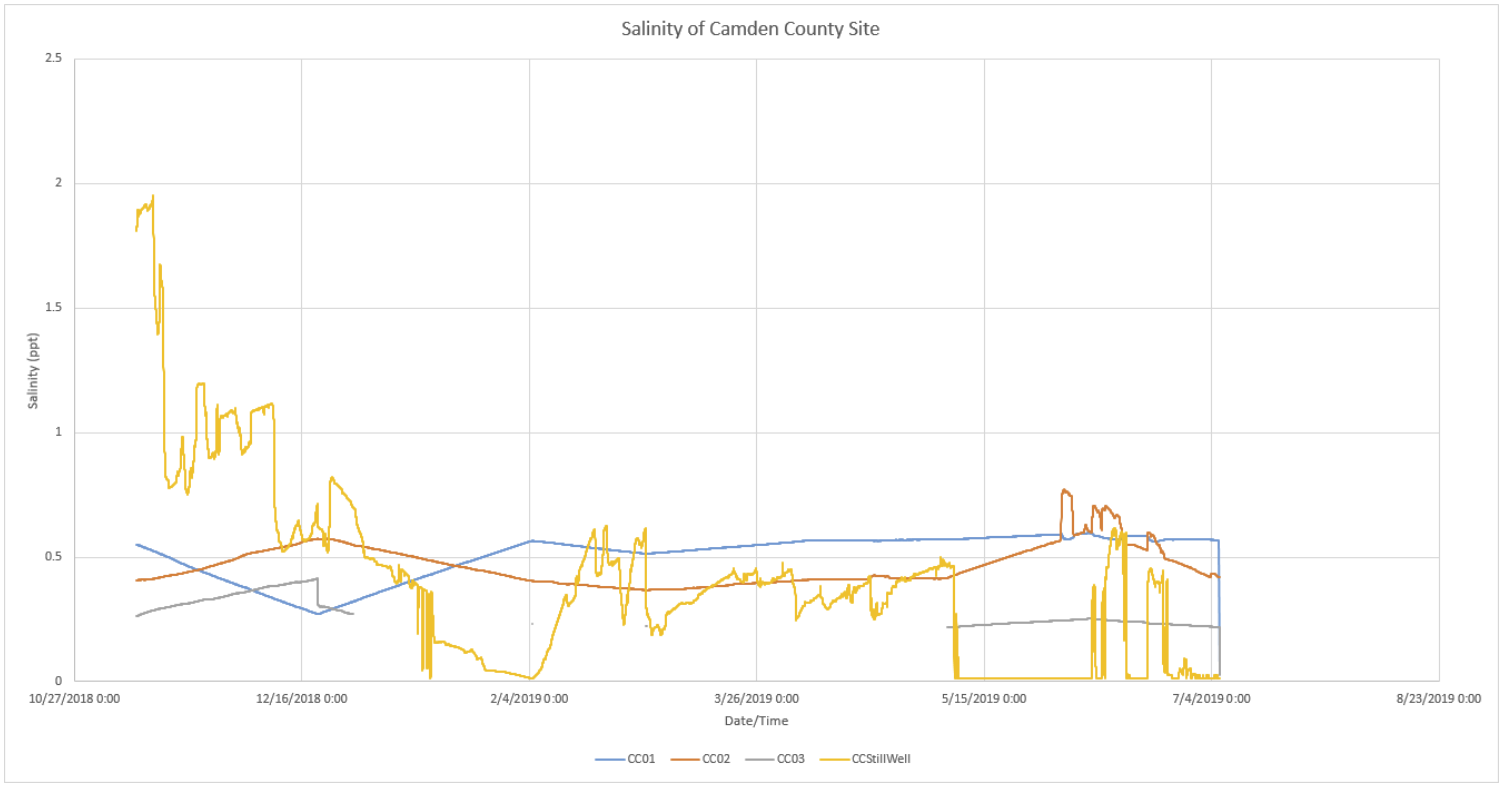


Photo: Andrea Gibbs

Occurrence of artificial channels in Eastern NC



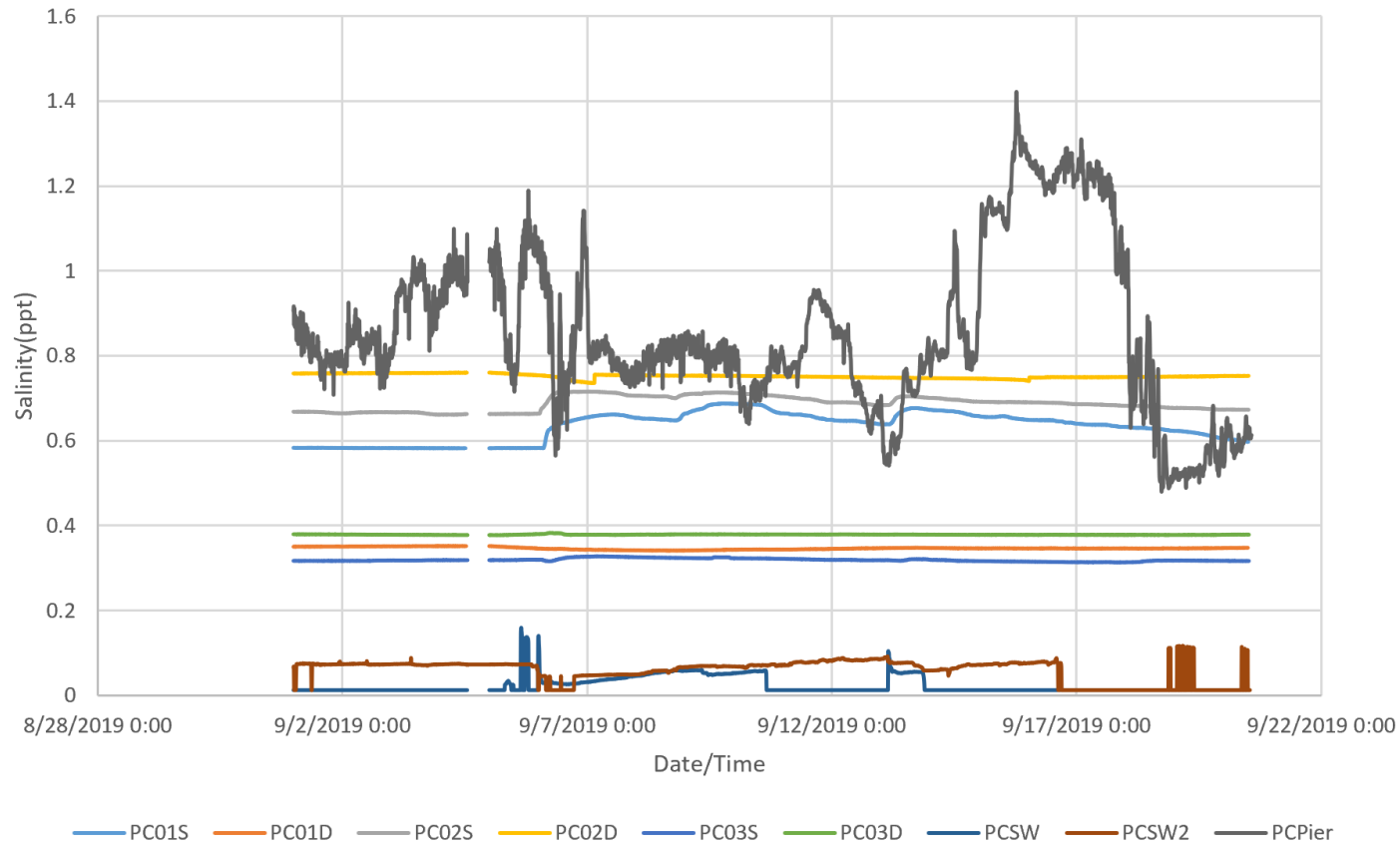
Salinity: Camden County



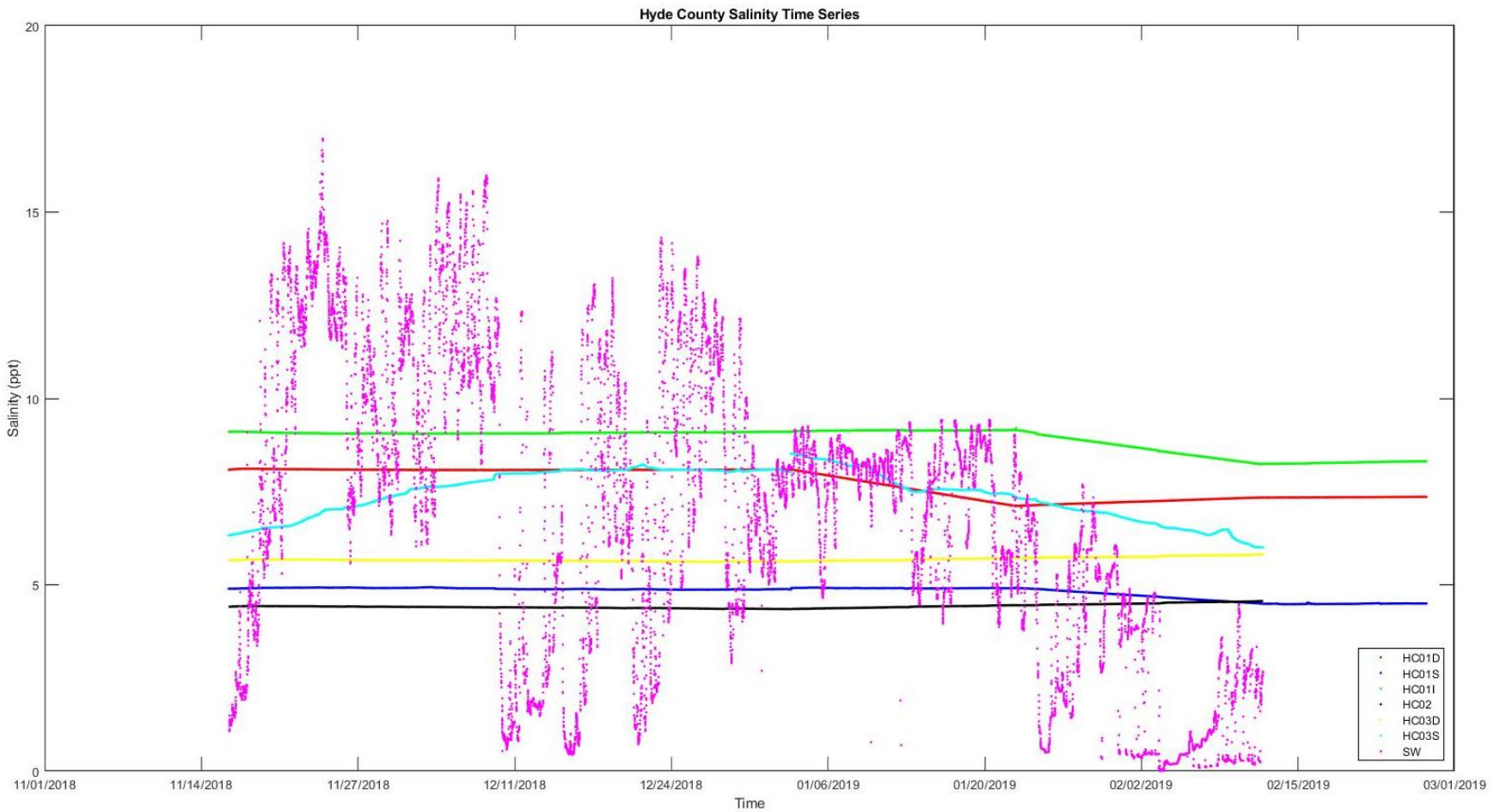
Salinity: Pasquotank County



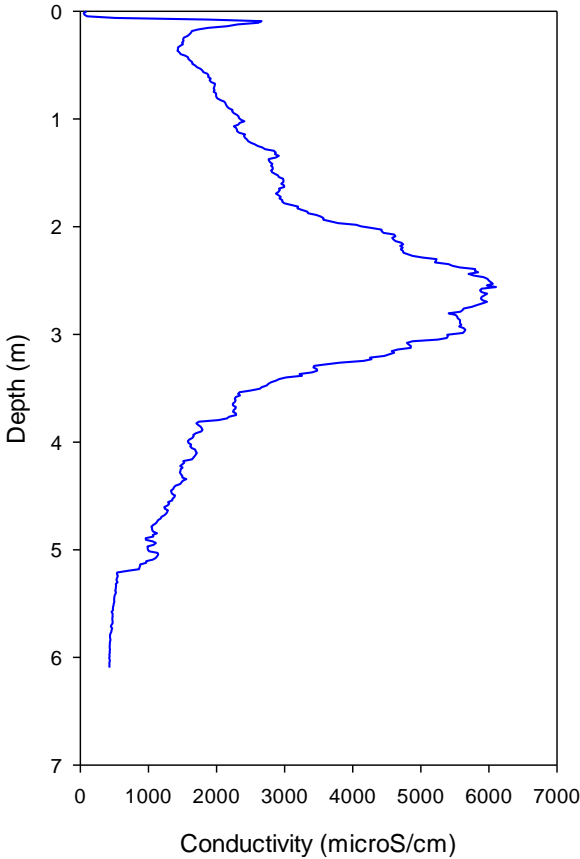
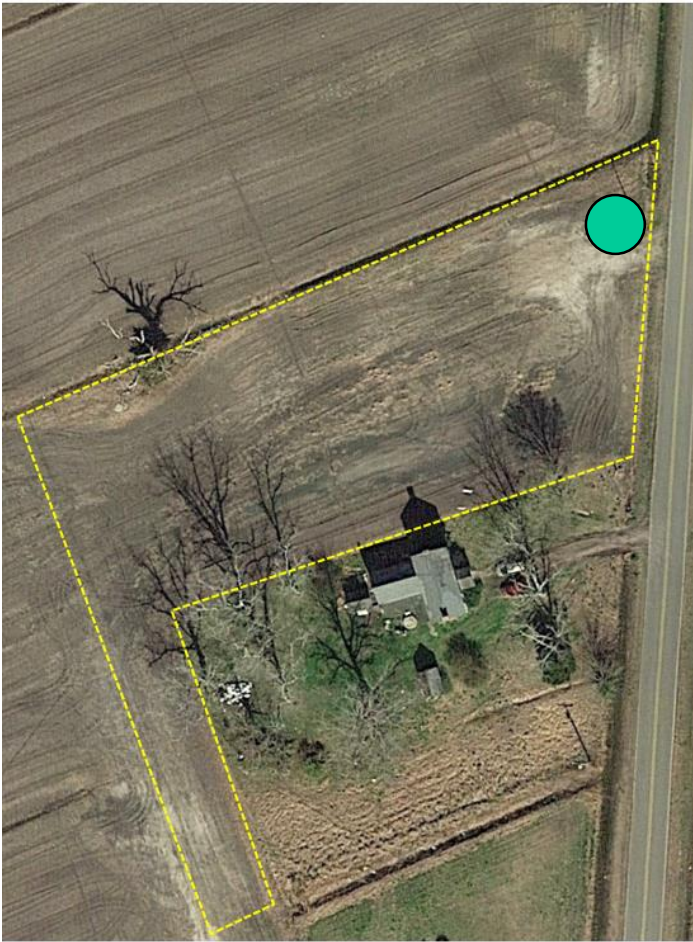
Salinity: Hurricane Dorian



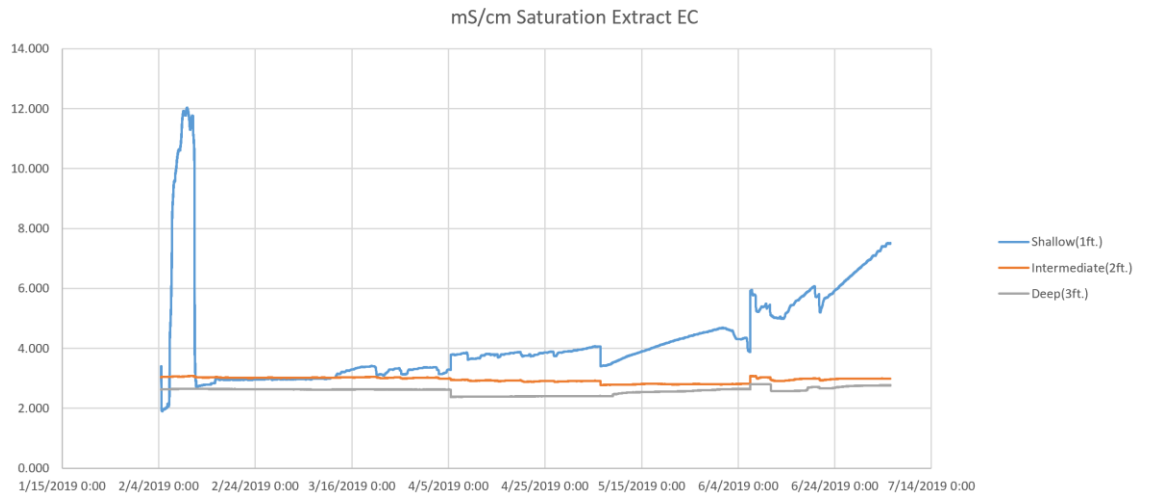
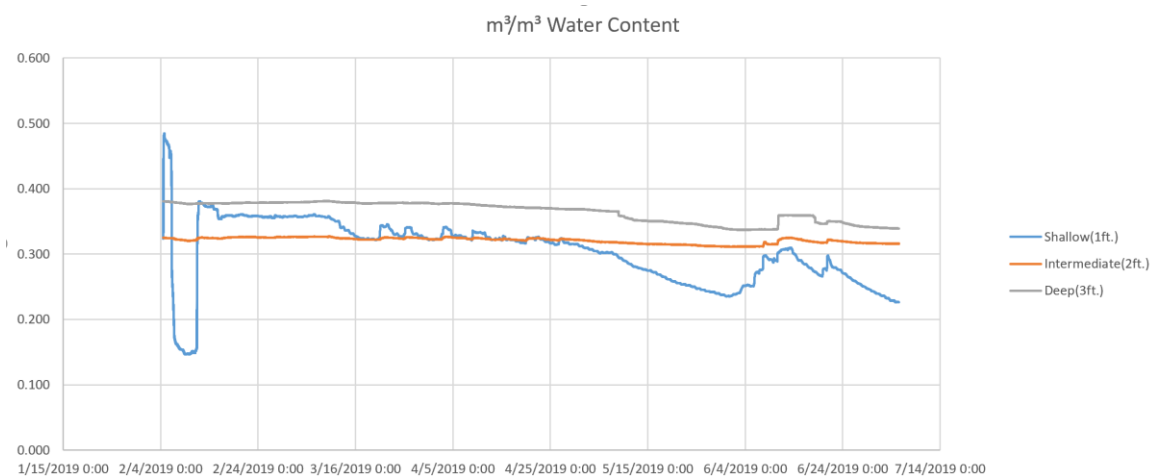
Salinity: Hyde County



Direct current electrical resistivity



Soil sensors



- Leach salts from soils – add water
- Install tide gates on canals
- Application of gypsum
- Other?
 - Adoption of climate-smart agricultural practices?
 - Abandonment?
 - Convert to aquaculture?
 - Plant salt tolerant crops

- The National Science Foundation
- 2018 North Carolina State University Gore Grant
- East Carolina University Students:
 - Jon Gullet, Tyler Palochak
- North Carolina Cooperative Extension, North Carolina State University :
 - Carl Crozier, Diana Rashash, Andrea Gibbs, Al Wood, Austin Brown
- Soil and Water Conservation, Camden County:
 - Brian Lannon

QUESTIONS

