



Coastal Salinization and Saltwater Intrusion Overview

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Saltwater intrusion project

- ▶ Help landowners understand how water is interacting with the landscape so that they can make informed decisions about the future
 - ▶ Factors impacting soil salinity
 - ▶ Impacts to forestry and agriculture
 - ▶ Adaptation options
 - ▶ Current state of knowledge on these topics

Major types of soil salinity

- ▶ Groundwater associated salinity – where fluctuations in shallow groundwater levels lead to salt discharge into root zone layers
- ▶ Non-groundwater associated salinity - caused by poor leaching due to restricting hydraulic properties of some soil layers
- ▶ Irrigation associated salinity – which is due to the input of salts in the irrigation water and their accumulation in the root zone due to inadequate drainage

Drivers of upland salinization

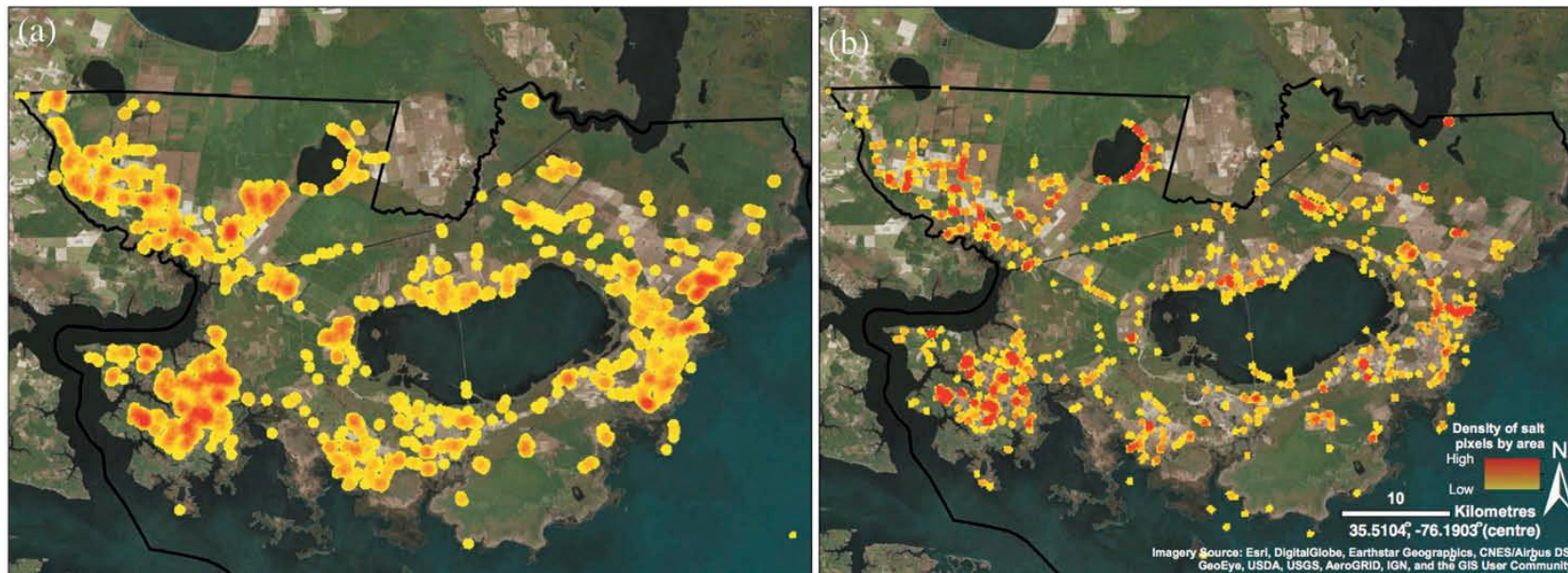
- ▶ Sea level rise – rise relative to land and water table elevation
- ▶ Storms and tides – frequency and intensity can push saltwater far inland
- ▶ Drought – frequency and duration can lead to saltwater intrusion
- ▶ Water management – ground and surface water extraction for human use
- ▶ Connectivity – water control structures, tide gates, canals, ditches

Drivers of saltwater intrusion

- ▶ Natural drivers
 - ▶ Storm surges, hurricanes, climatic fluctuations, sea level rise, subsidence
- ▶ Anthropogenic drivers
 - ▶ Land drainage, pumping of coastal freshwater aquifers, reduction in freshwater discharge from dam construction, water withdrawals, water diversions, hydrological structures and land use changes

Mapping soil salinity

- ▶ Davis et al. 2019 used Landsat 8 Operational Land Imager and Sentinel-2 Multispectral Instrument to identify soil salinity in Hyde County, North Carolina



Heat map of the identified saline soils in Hyde County, NC in (a) OLI and (b) MSI. The color gradient is from low to high density by area of identified pixels.

Davis et al 2019

Projected future salinity

- ▶ Amatya, Trettin, Panda delineating tidally influenced creeks along the Cooper River in South Carolina
- ▶ Predicted sea level rise can be used to estimate inundation and intrusion
- ▶ We would like to create a map of the possible future extent of salt water intrusion and soil salinity – in the next 20 to 40 years
- ▶ Any feedback/collaboration on this topic is welcome

Long-term monitoring

- ▶ Assessing and monitoring saltwater intrusion impacts on agricultural and forest land:
- ▶ Forest: transects - marsh to upland forest
- ▶ Agriculture: transects - distance from ditches and lower elevation points
- ▶ Quantifying changes in aboveground biomass (crops, trees, shrubs, grasses)
- ▶ Quantifying/monitoring changes in foliar and soil chemistry and salinity

Summary

- ▶ We want to help landowners be more resilient to saltwater intrusion by understanding:
 - ▶ Drivers of salinization
 - ▶ Impacts to working lands
 - ▶ Adaptation options and management strategies
 - ▶ The current extent of saltwater issues and the projected extent in the near future



Questions?