

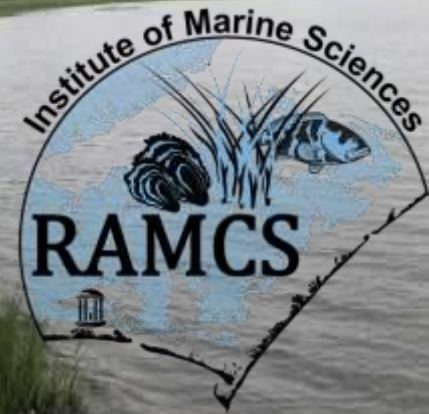
Examining saltmarsh transgression across upland-forest gradients to improve conservation


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 Jessamin Straub

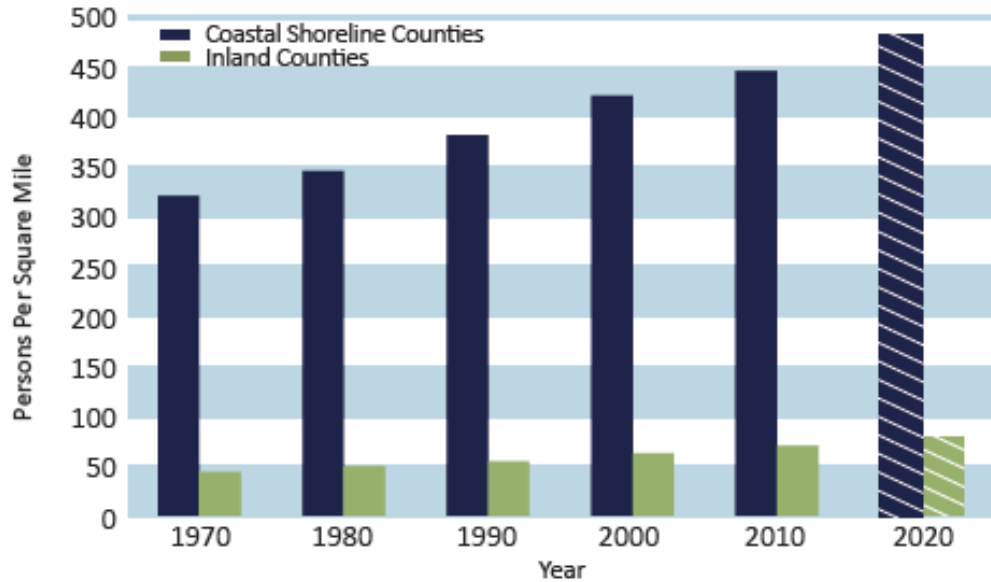
Ecosystem services provided by marshes:

- Water purification
- Recreation/Tourism
- Fish habitat
- Carbon sequestration
- Erosion control/Coastal protection

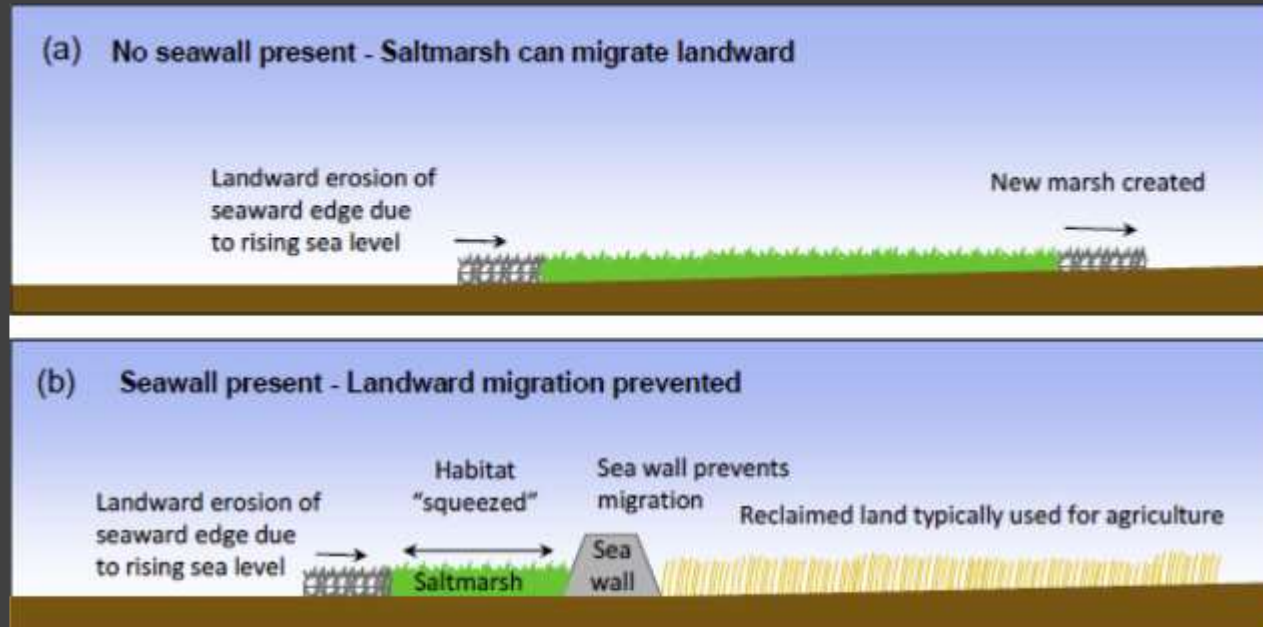
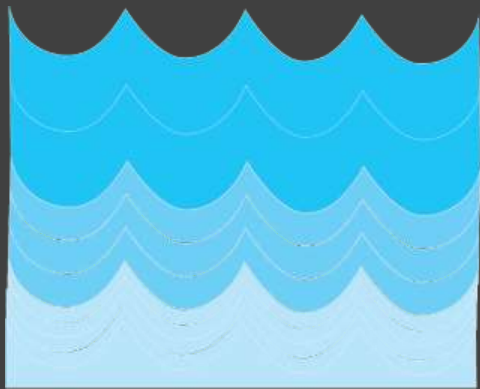


Saltmarsh area is declining globally

Figure 5 | Population Density Change in Coastal Shoreline Counties and Inland Counties from 1970 to 2020



Human & natural stressors to saltmarsh



Pontee, 2013

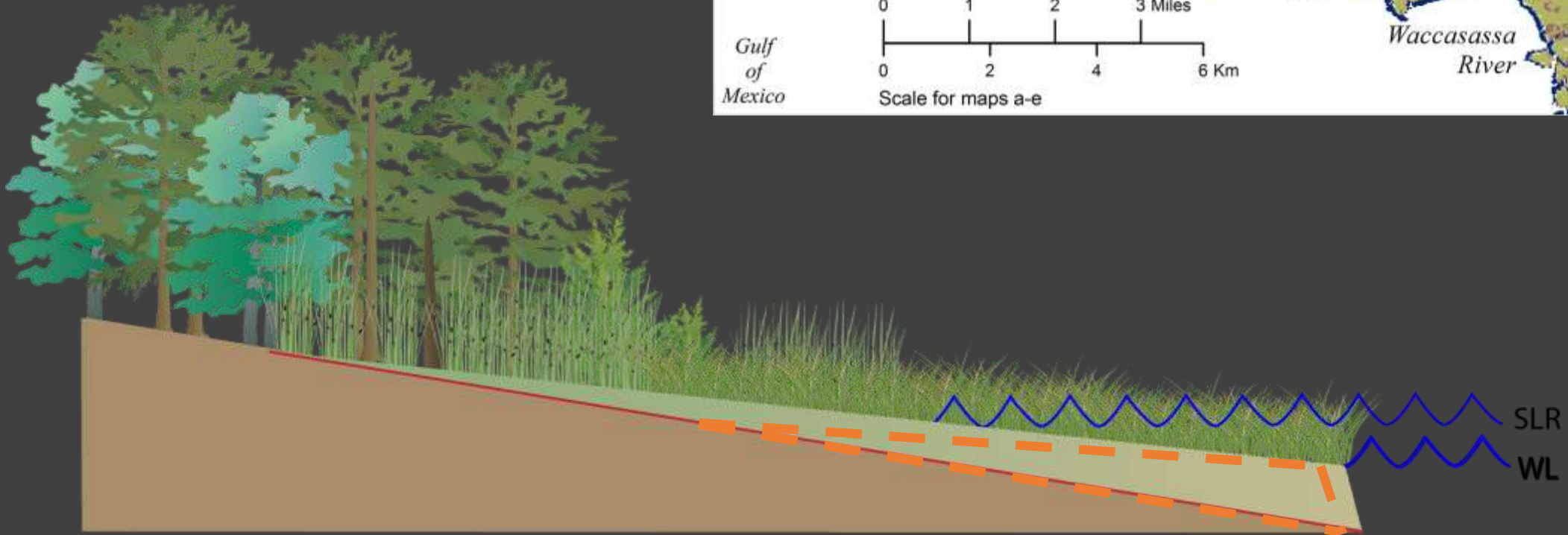
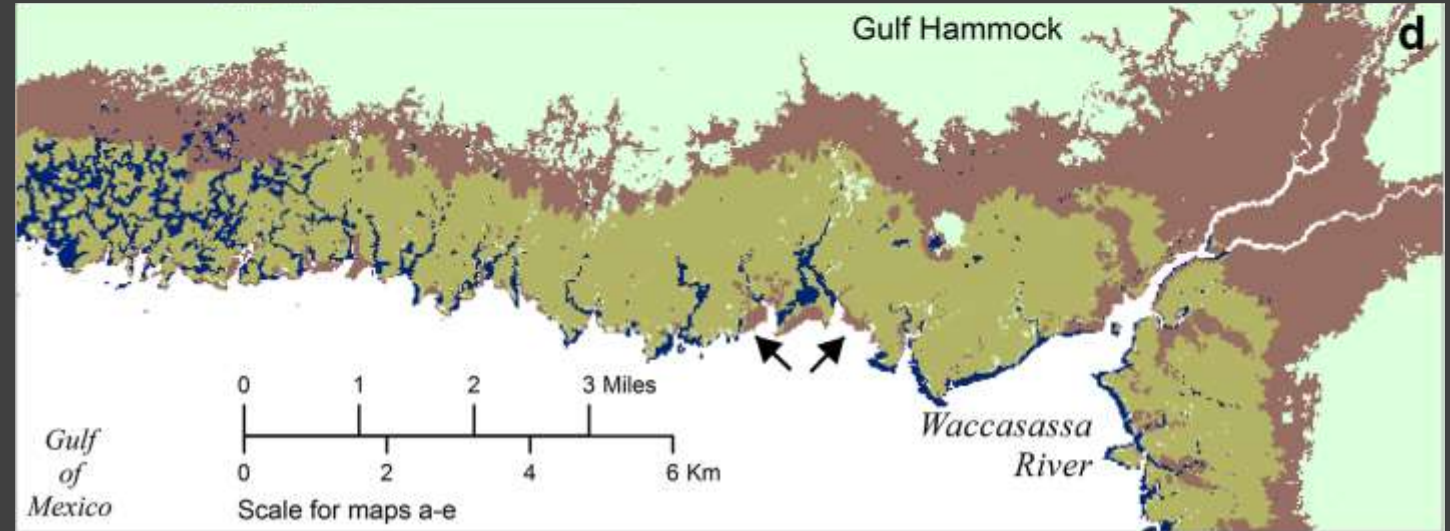


Saltmarsh offsets loss through upland migration (transgression)

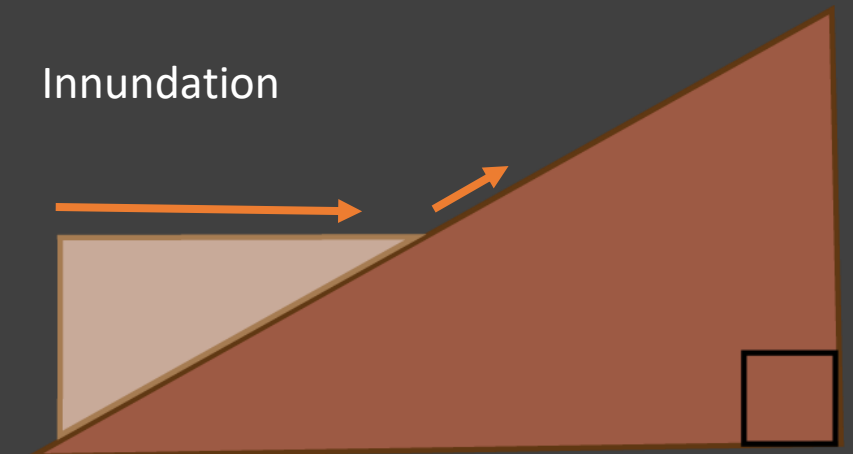
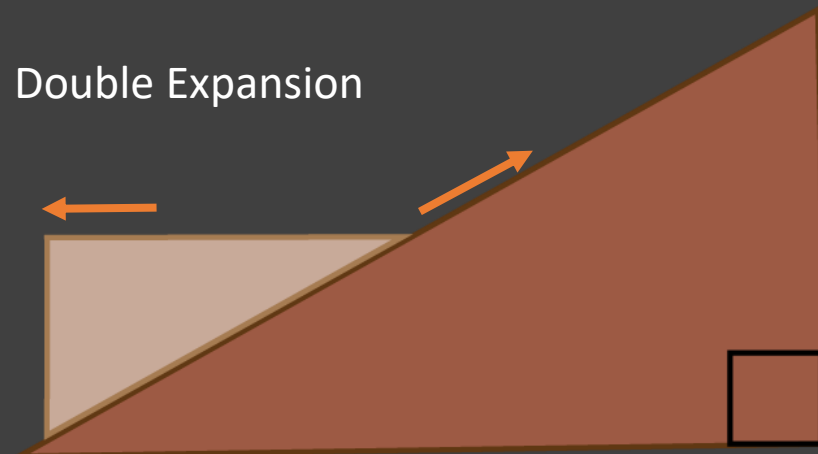
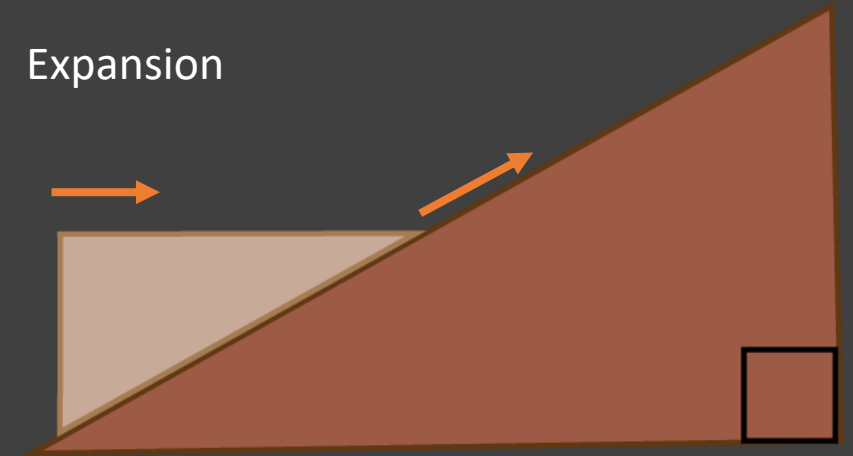
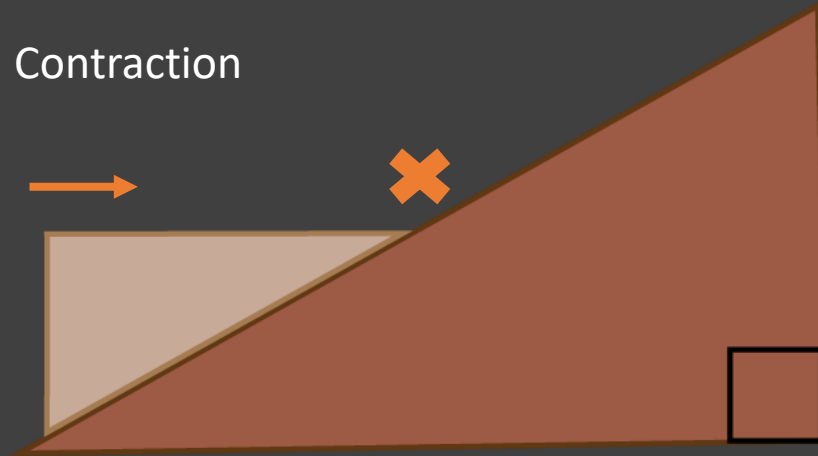
Raabe and Stumpf, 2016

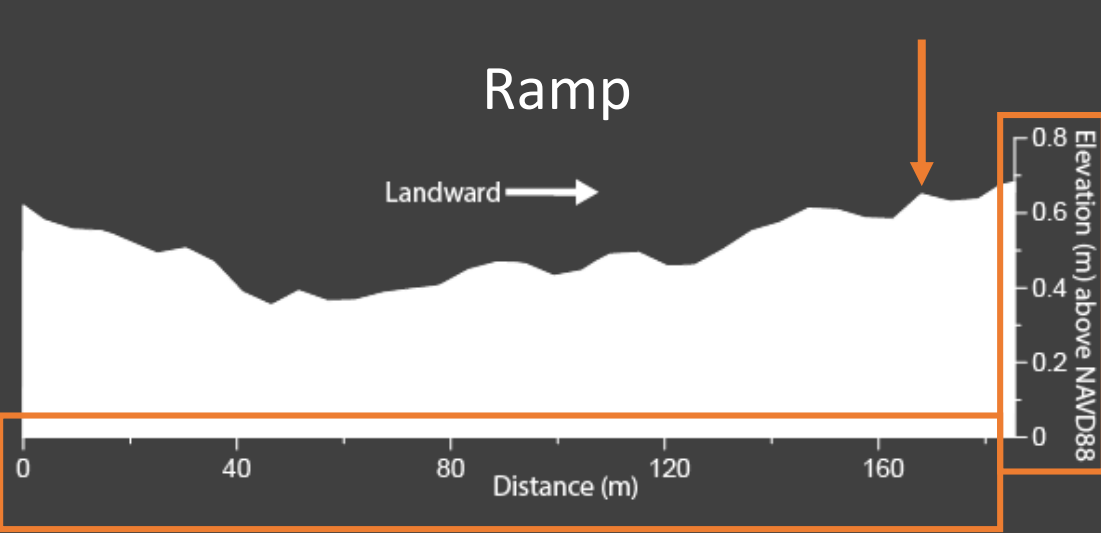


- Saltmarsh transgression could offset 78% loss from 1 m of SLR (Kirwan et al., 2016)

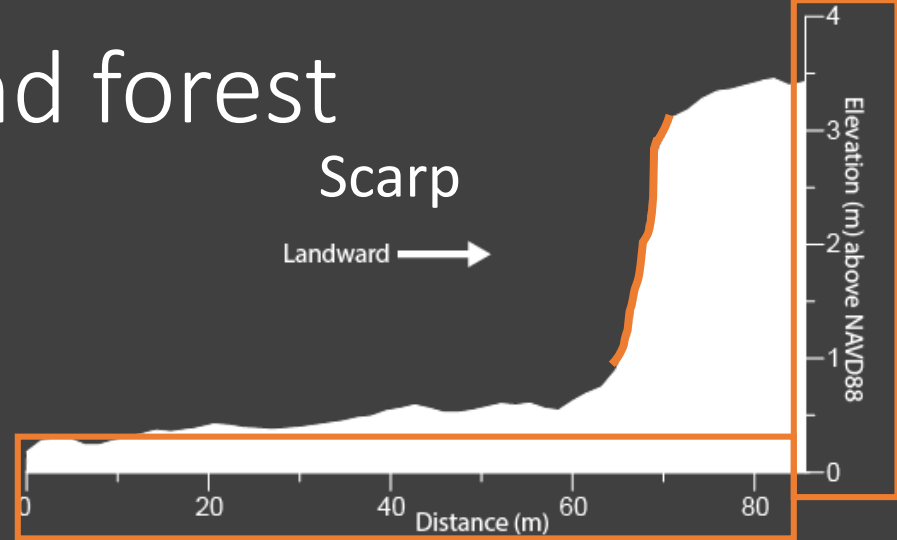


Current models of marsh transgression: Slope+SLR+SSC





The upland forest boundary

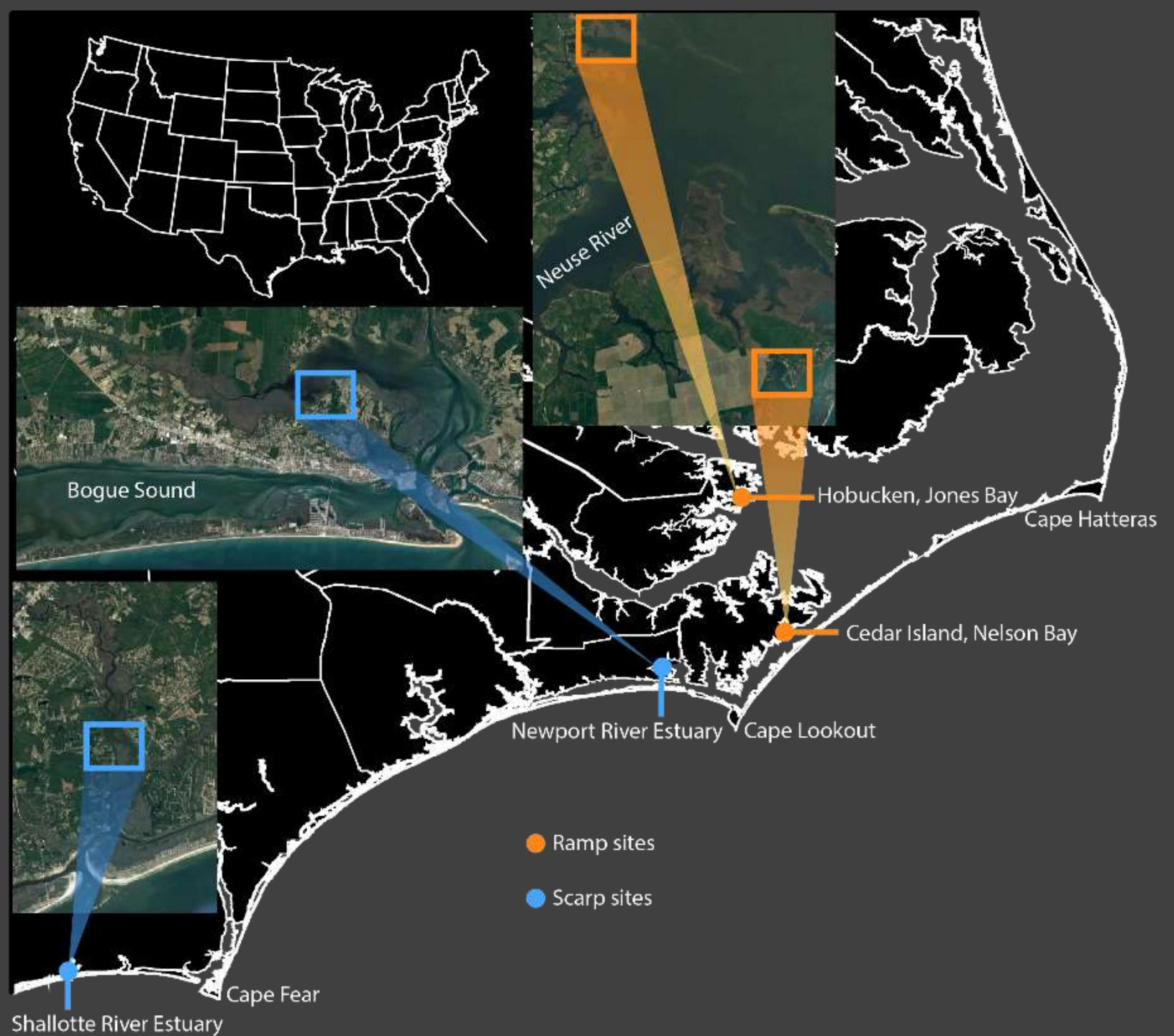


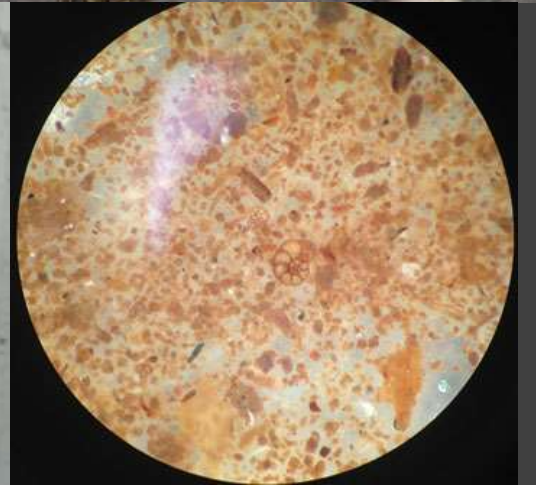
Research Questions

1. How does saltmarsh transgression differ between scarps and ramps?
 - What is driving transgression at these different morphologies?
2. Based on the differences between upland morphologies how can we best manage salt marshes in NC?

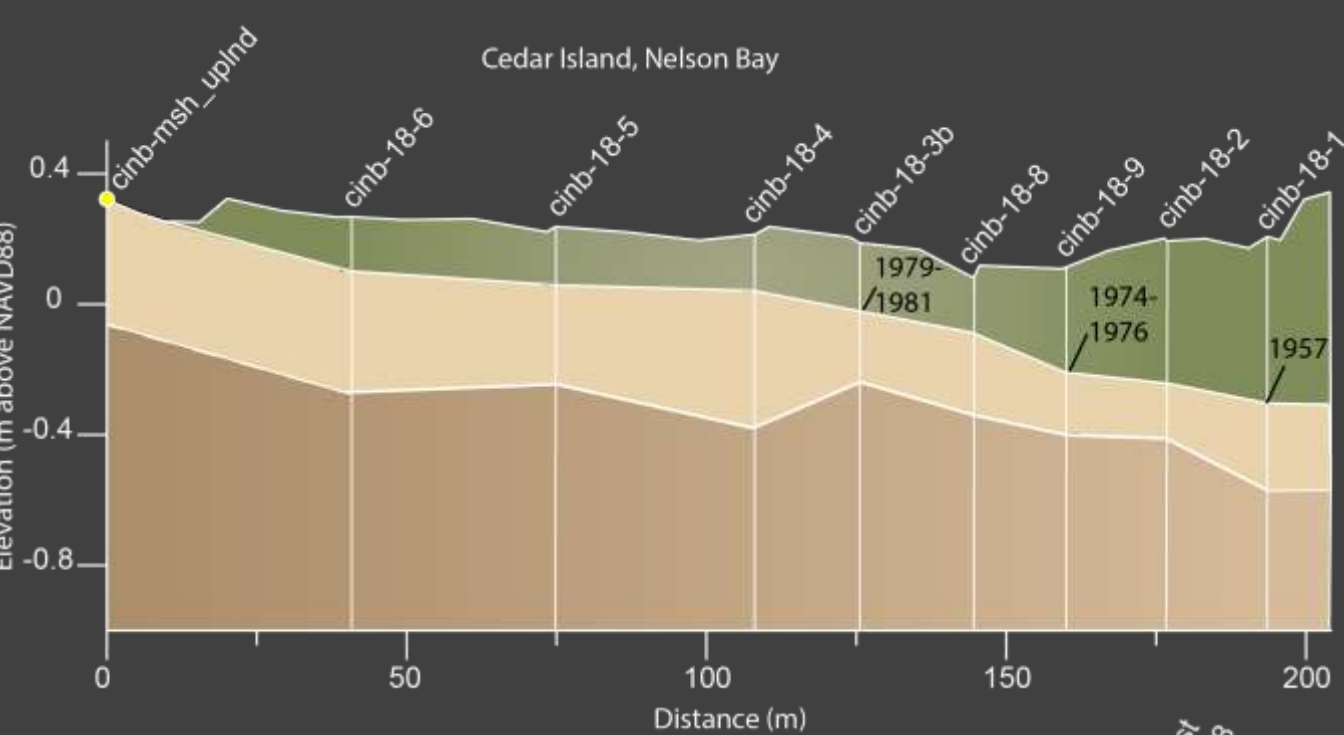


Sites



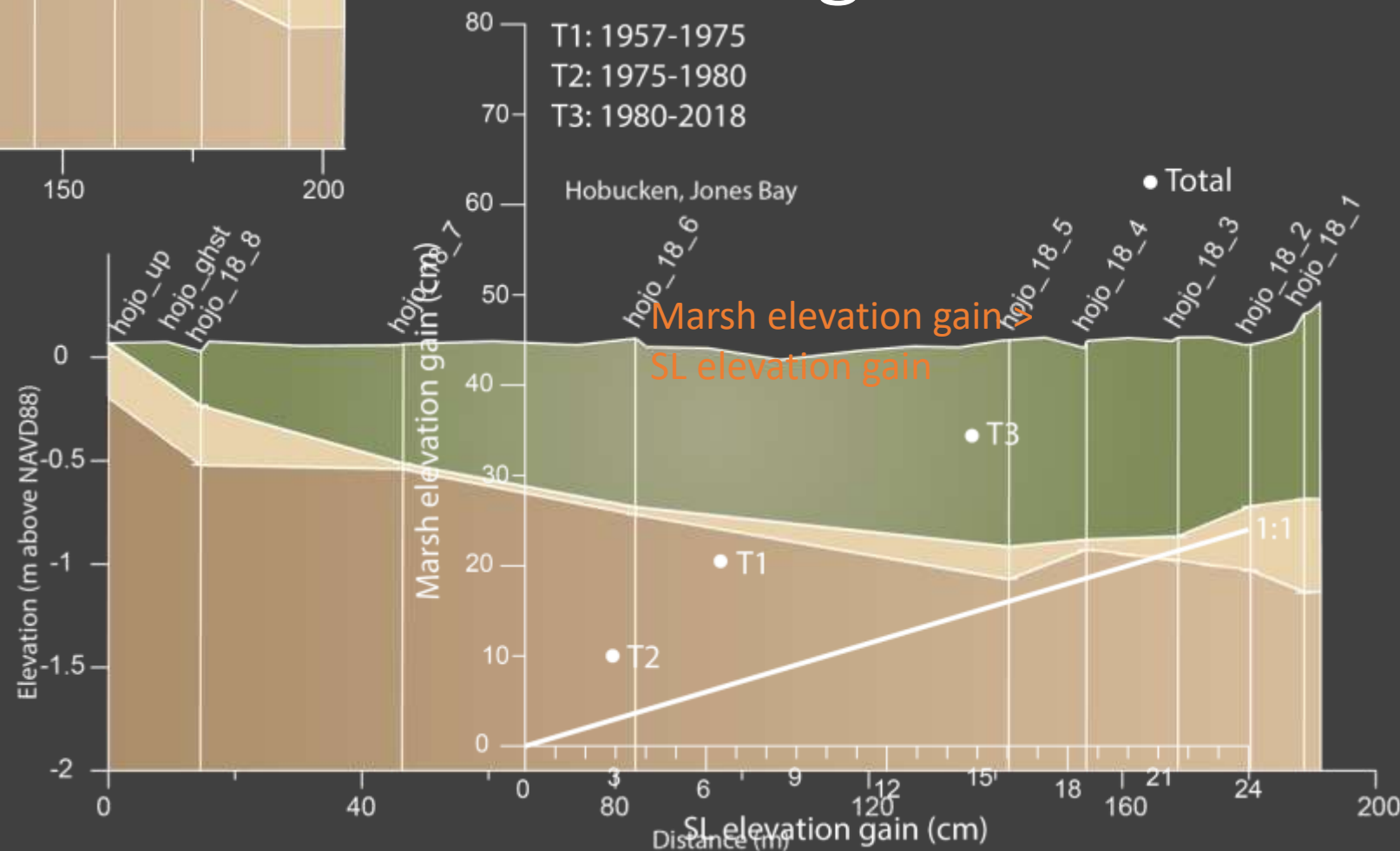


Methods



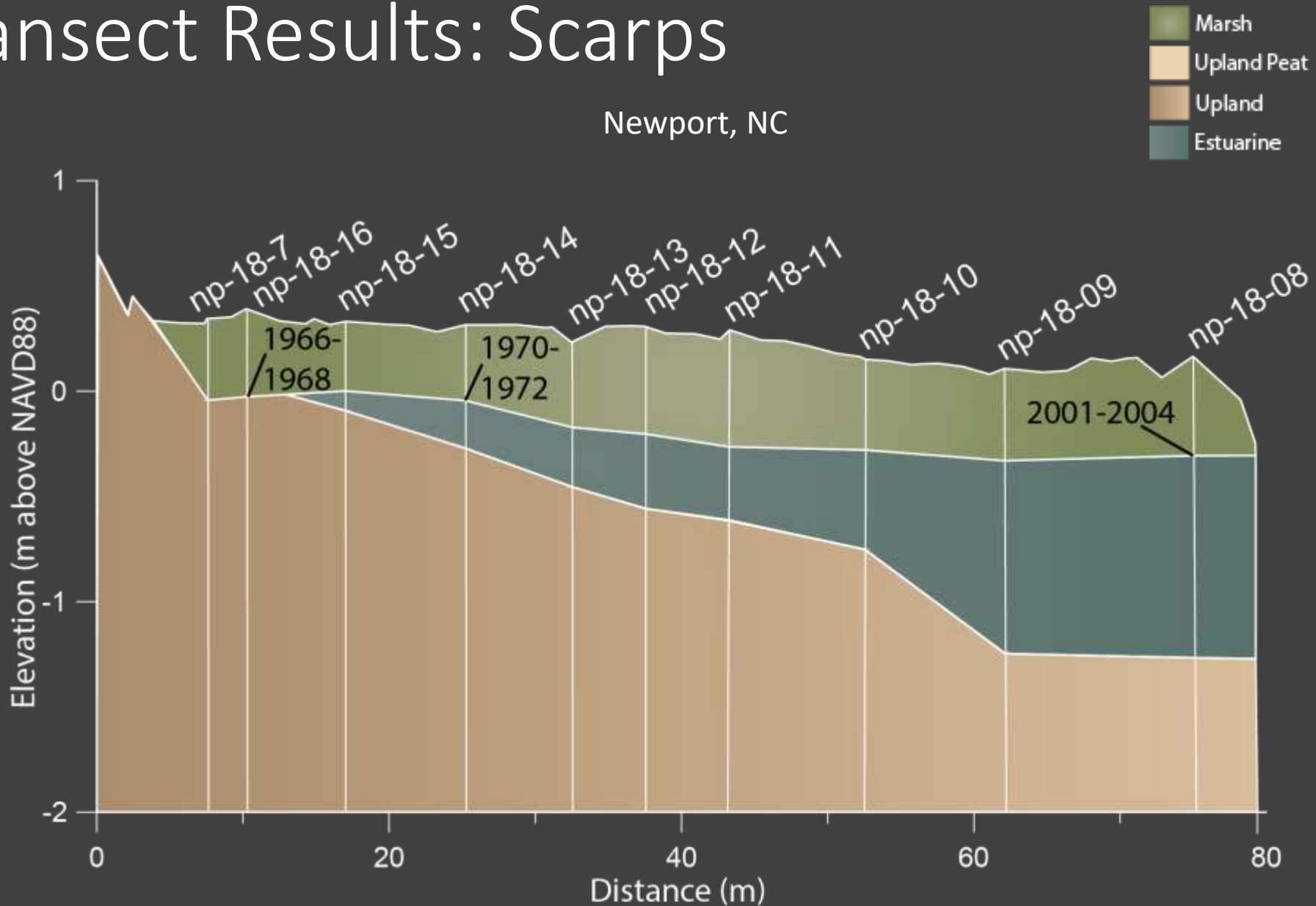
Ramp Results: SL drives transgression

- CI: Saltmarsh is thinning and younger as you move landward
- HOJO: Much thicker saltmarsh that is much older than CI



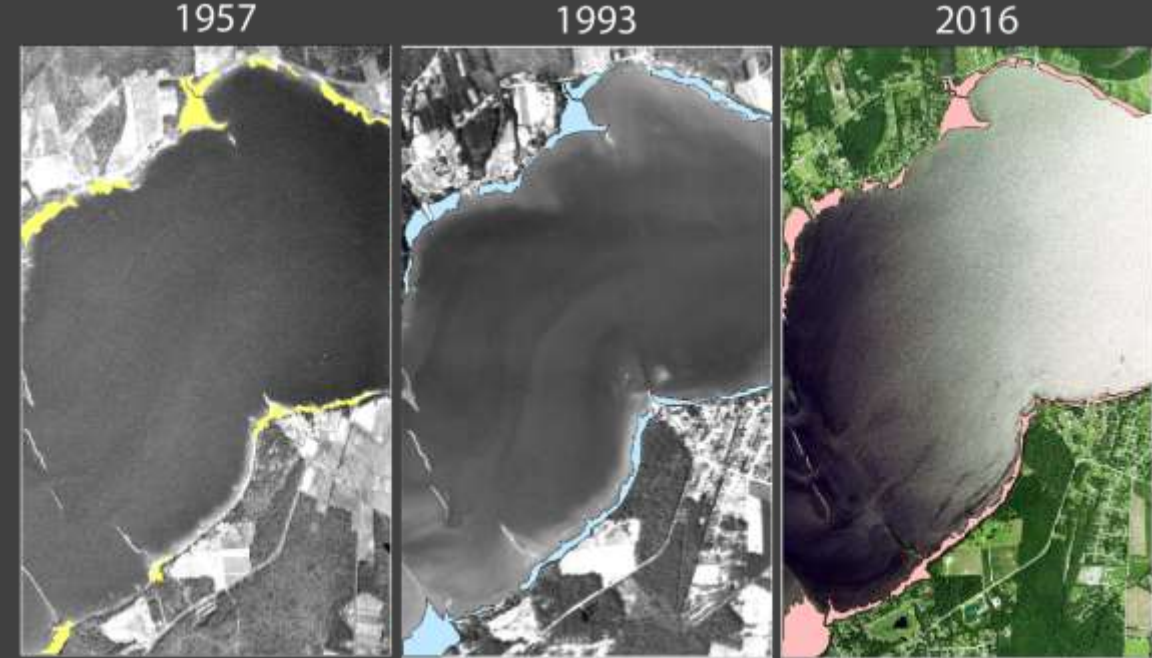
Transect Results: Scarps

Newport, NC

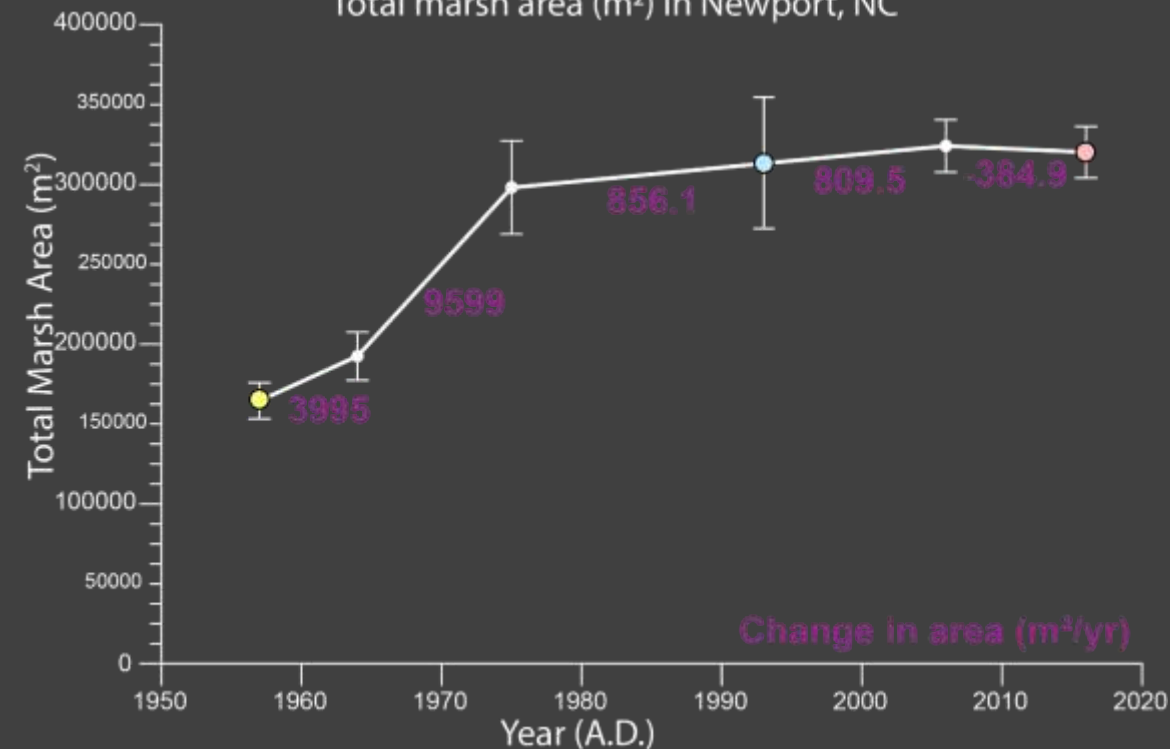


Areal Extent of Newport marshes: 1957-2016

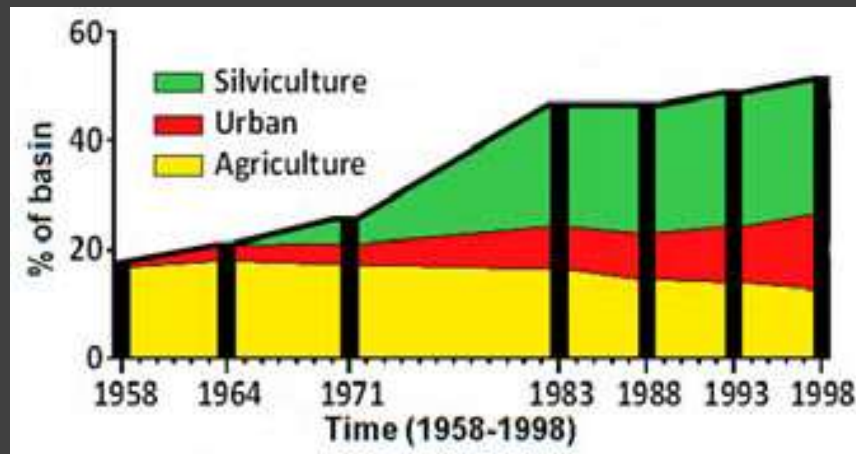
- Largest increase in saltmarsh occurred between 1964-1975
 - Silviculture project began in 1964
 - Change in sedimentation regime promoted marsh growth at the bay-head delta
- After 1975 saltmarsh areal extent increase slows and remains similar



Total marsh area (m²) in Newport, NC



(Mattheus et al., 2009)



Changes in marsh aerial extent

- Land use change in the watershed lead to higher SSC and marsh growth between 1964-1975



Marsh formation

1957

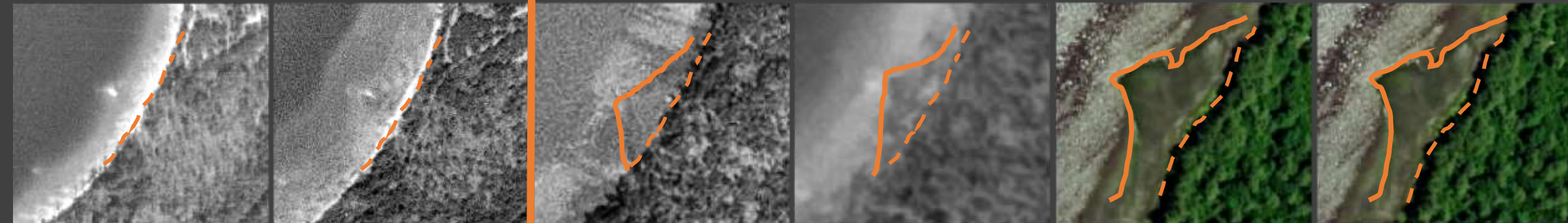
1964

1975

1993

2006

2016

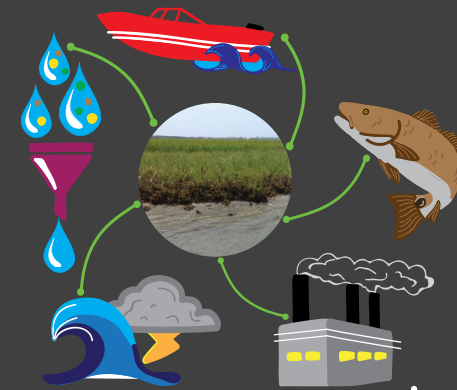


Conclusions: Differences between ramps and scarps

- SL drives saltmarsh transgression at ramped upland gradients
 - Shows marsh thinning and becoming younger landward
 - Ramps have the ability to offset edge erosion through transgression
- Scarps show little to no transgression
 - Marshes form when SSC increases and have formed since 1950
 - Marshes have vertically accrete with SLR to survive



How can we best manage saltmarshes to maintain aerial extent?



- Different upland gradients need different management strategies

- Along low-gradient upland topography:

The upland-saltmarsh boundary should not be developed

- Along high-gradient upland topography:

- Young, anthropogenic marshes

Requires an erosion-control structure to maintain areal extent



Thank you!



Sea Grant
North Carolina

NC Sea Grant
Tony Rodriguez
Molly Bost
Jessie Straub
Andrew McMains



Questions?

