# Using Time-series Water Budgets to Assess Tidal Influence on Fluid Composition in Urbanized Swashes


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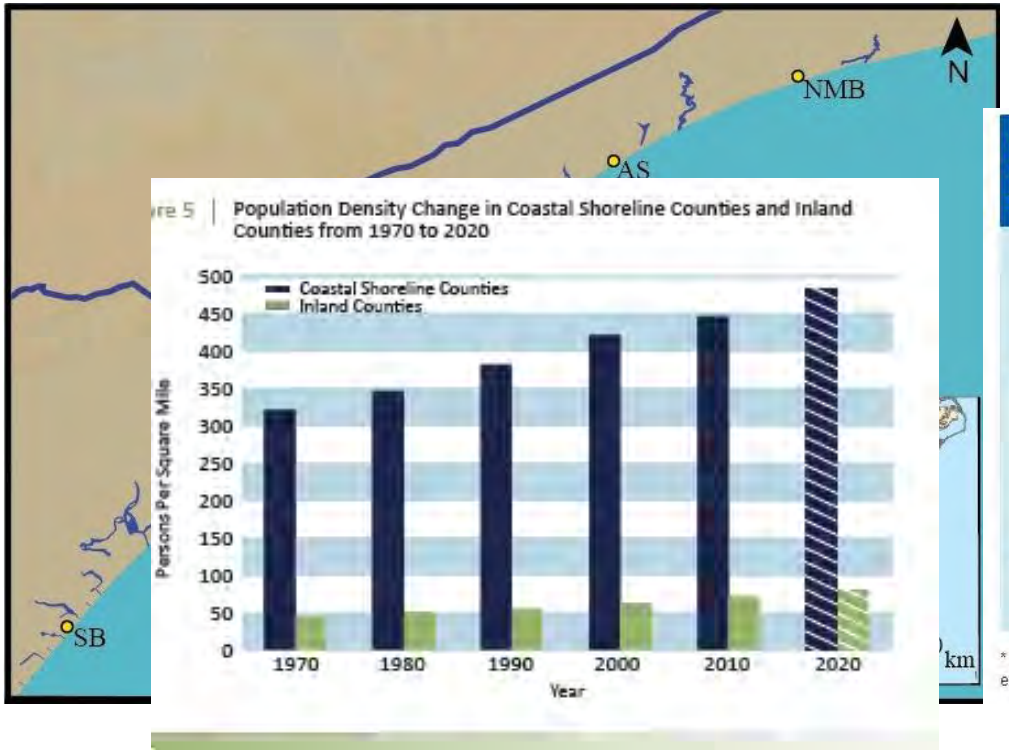
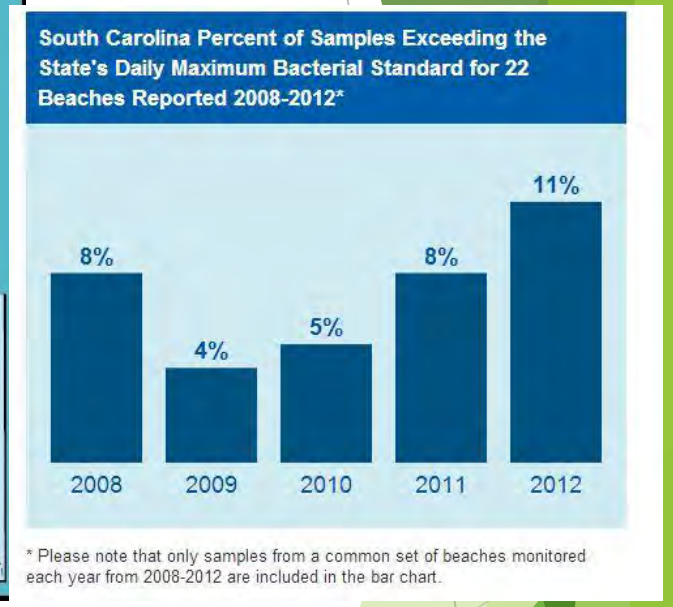
# Introduction







http://stateofthecoast.noaa.gov




www.NRDC.org

- Within Horry County, storm water funneled into swashes

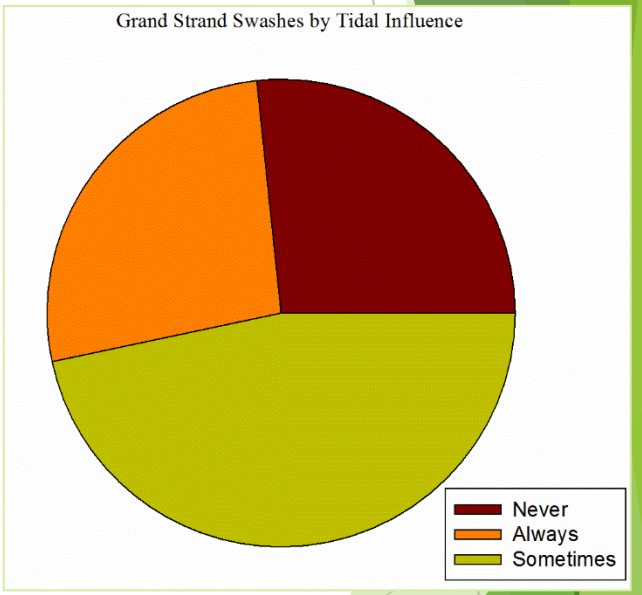
# Research Motivation

- In 6 years the number of swashes 303(d) listed more than doubled

- Over 90% of local swashes 303(d) listed/recognized

# Research Questions

- 1. **What are the relative contributions from each source?**
  - **Surface vs. subsurface contributions**
- 2. **Are respective source water ratios temporally stable?**
  - How representative of the system might a weekly sampling be?
- 3. **Do fluid compositions differ between an 'estuarine' type and 'lacustrine' type swash?**
  - Are those chosen for monitoring representative of the many Grand Strand swashes?

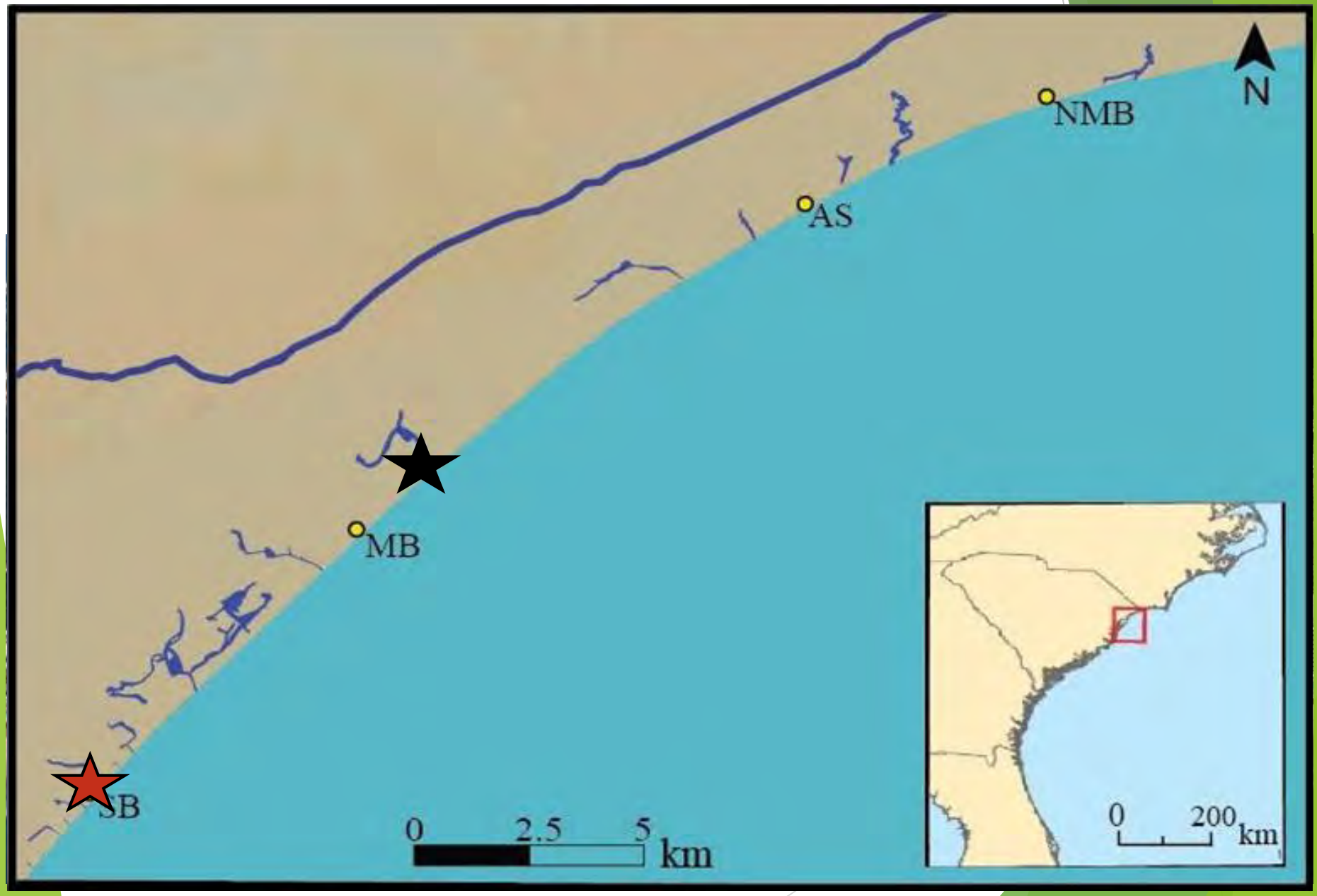


# Approach

- 1. Quantify total flow
- 2. Determine groundwater composition within each swash
  - Using $^{222}Rn$

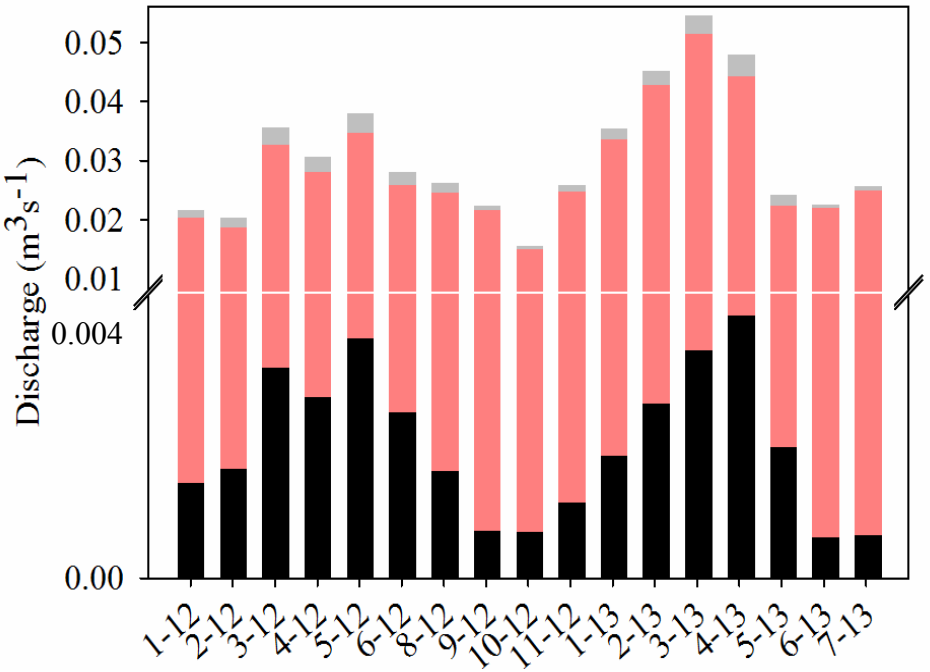
- 3. Calculate direct precipitation inputs
  - Rainfall * Area of open water
- 4. Resolve surface water runoff
  - Total = groundwater + precipitation + surface water
  - Surface = total – groundwater - precipitation

# Study Sites

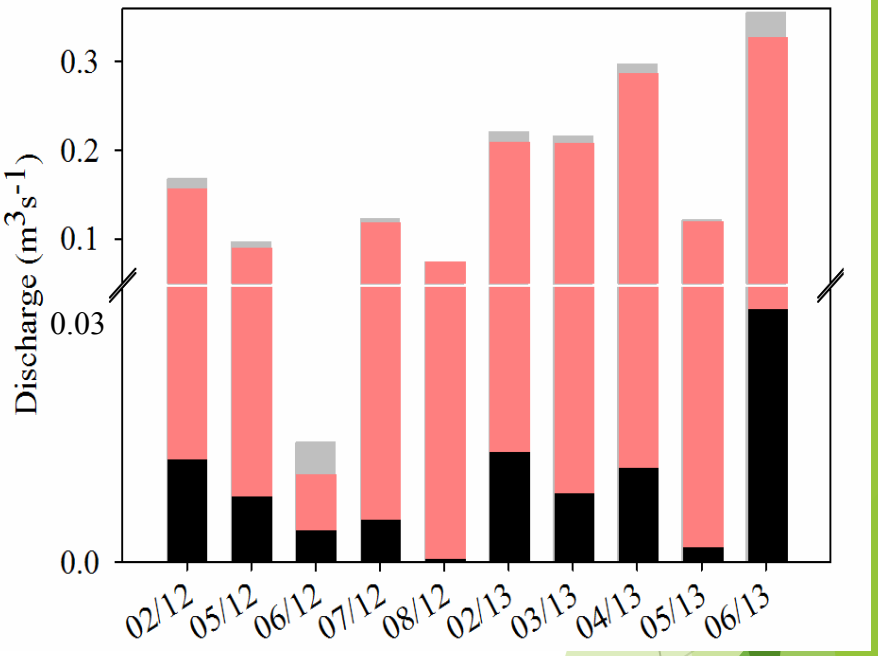


# Swash Water Sources

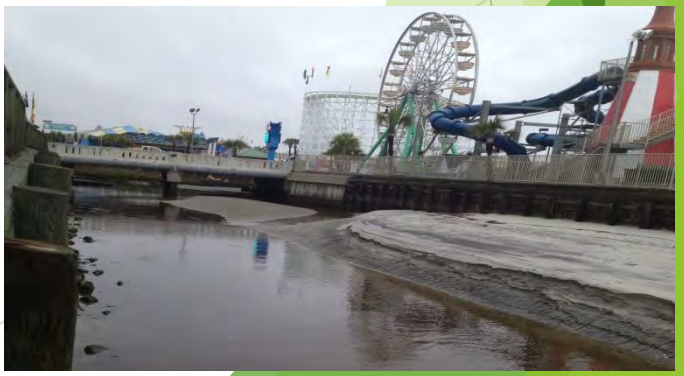
## Dogwood Swash




## Withers Swash

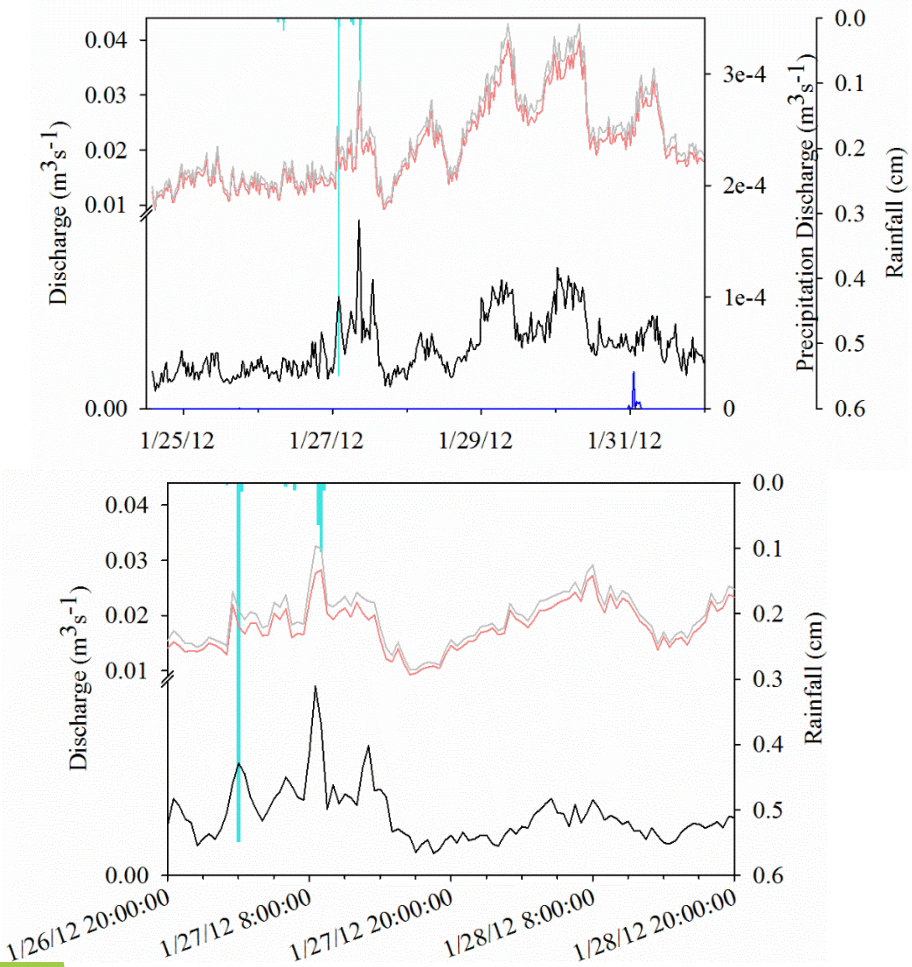



total
surface
groundwater

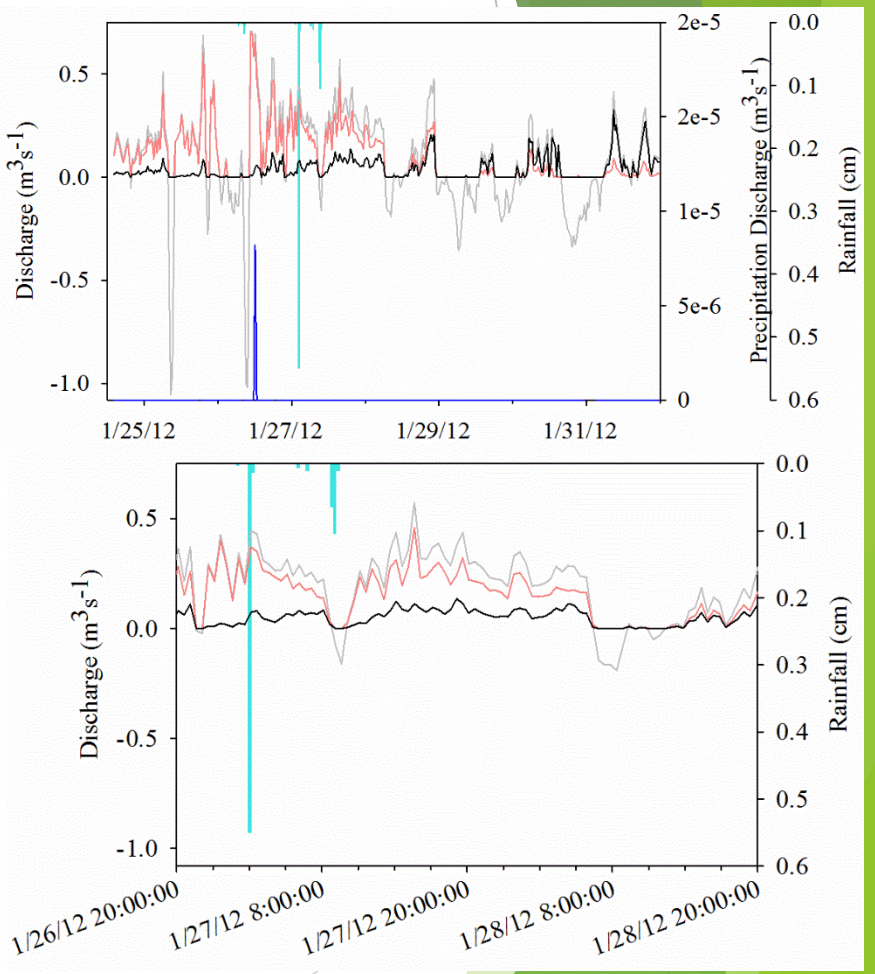


# Temporally Stable?

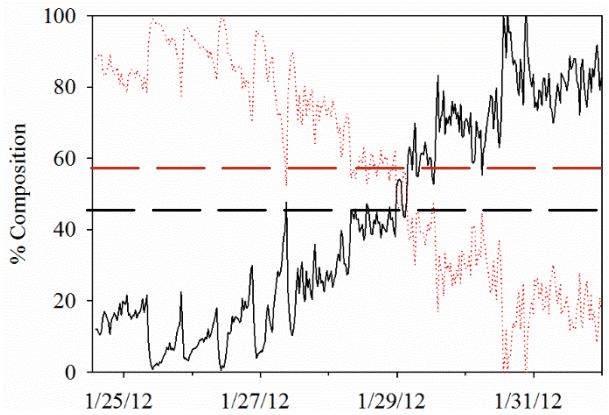
## Dogwood Swash

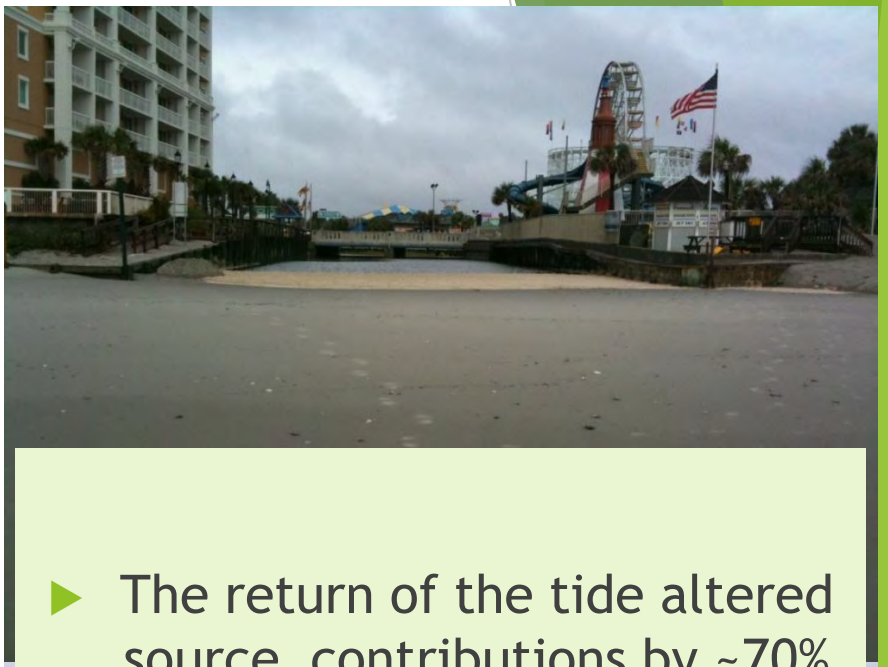



## Withers Swash



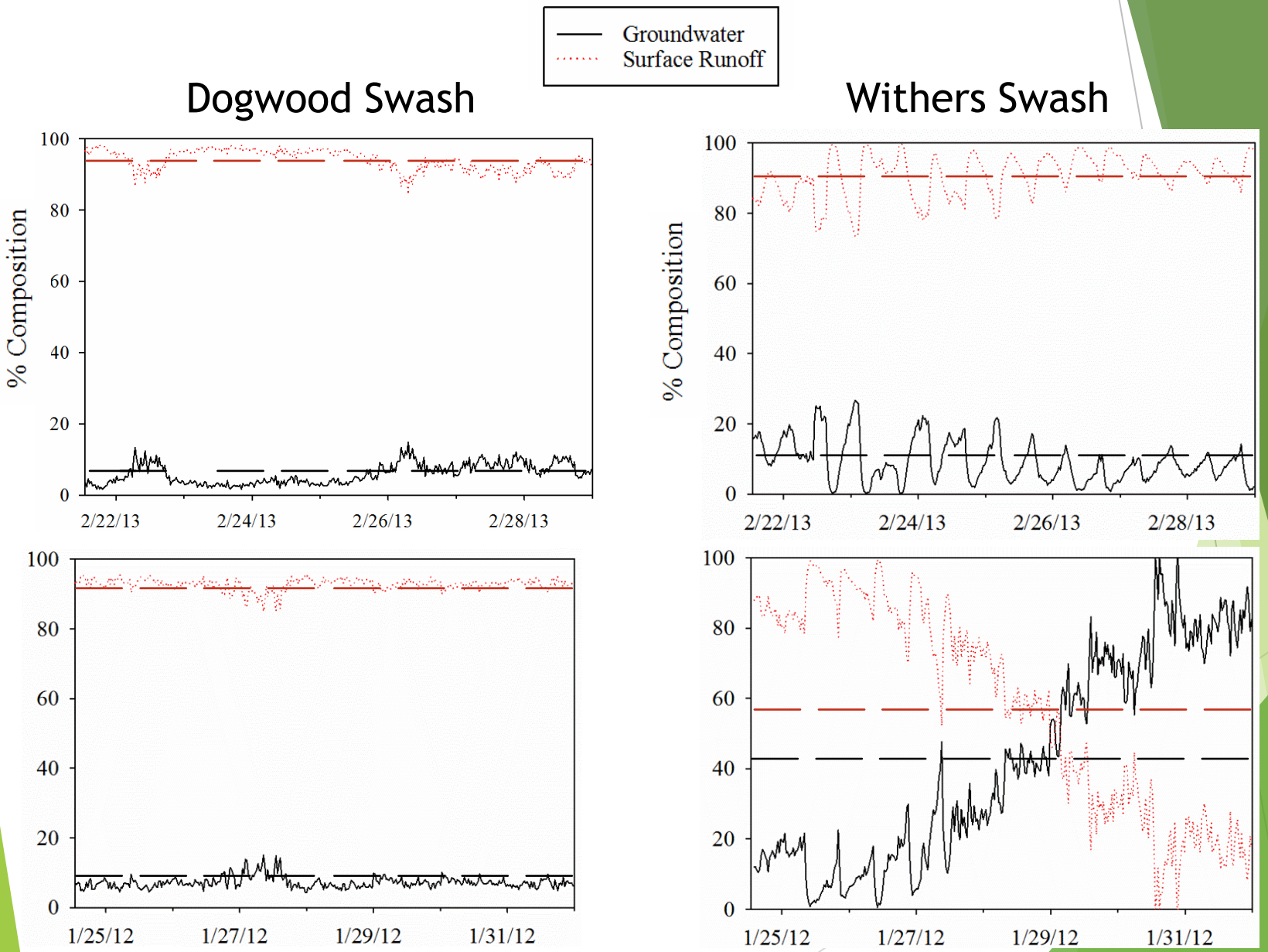
# Role of the tides



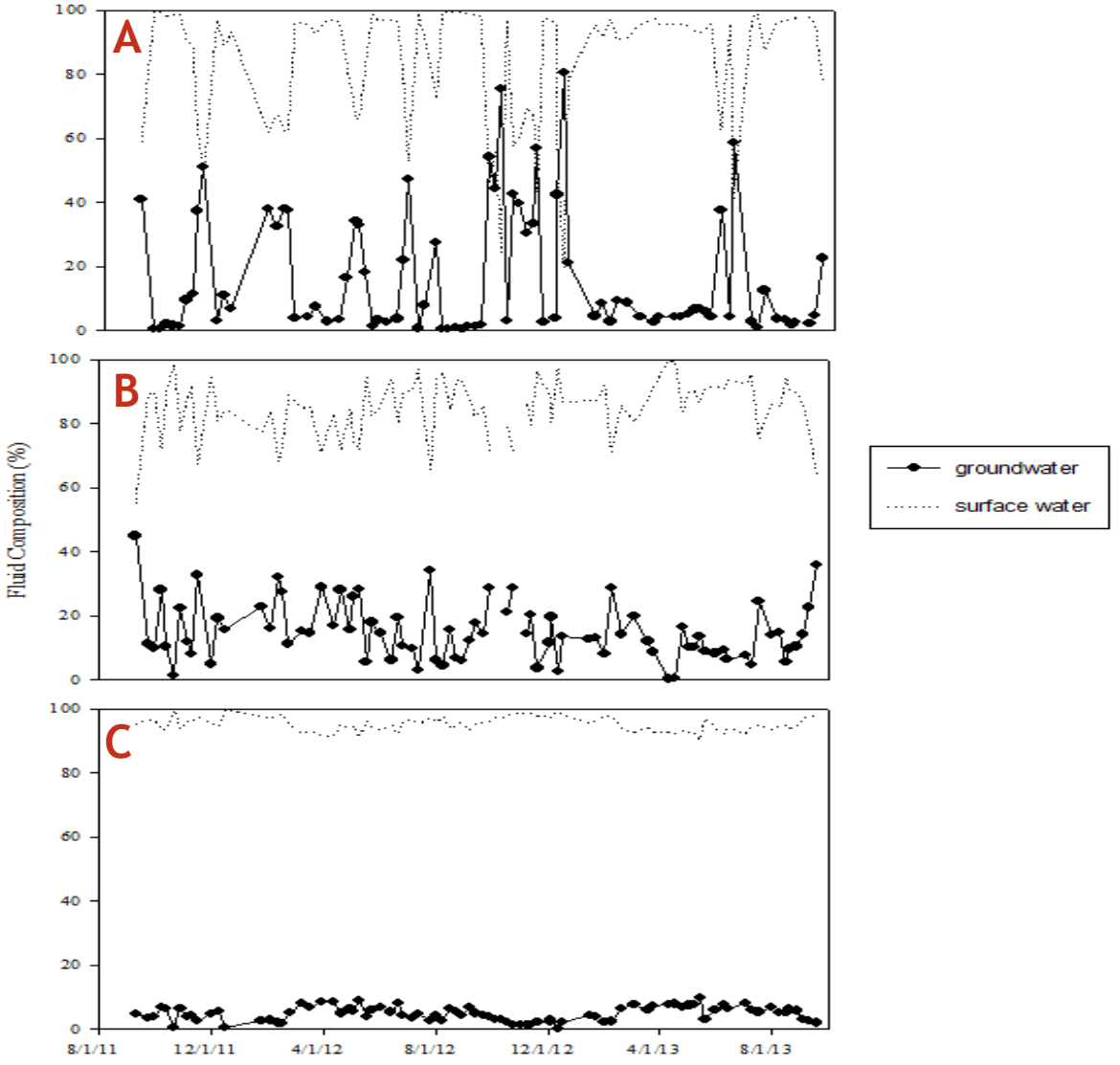



- The return of the tide altered source contributions by ~70%

# Considerations: Basin Size



# Considerations: Development



# Summary

- Groundwater constitutes a significant portion of the water budget regardless of tidal influence
- Substantial changes in fluid composition occur on shorter time scales than current sampling practices may capture
- When considering a single event, the area of open water within a basin may influence the magnitude of change experienced therein
- The degree of impervious cover may serve as a reliable indicator for source water ratio stability

# Thank you!

- **Funding agencies**
  - NOAA/NERRS collaborative, M.K. Pentecost, Slocum-Lunz Foundation Inc., CCU's URC
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- **Coastal Carolina University & CCU faculty**
- **USGS partners**
- **Student help**
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Questions?