

# APNEP Nutrients Workgroup: SAV status and trends in the Albemarle Sound

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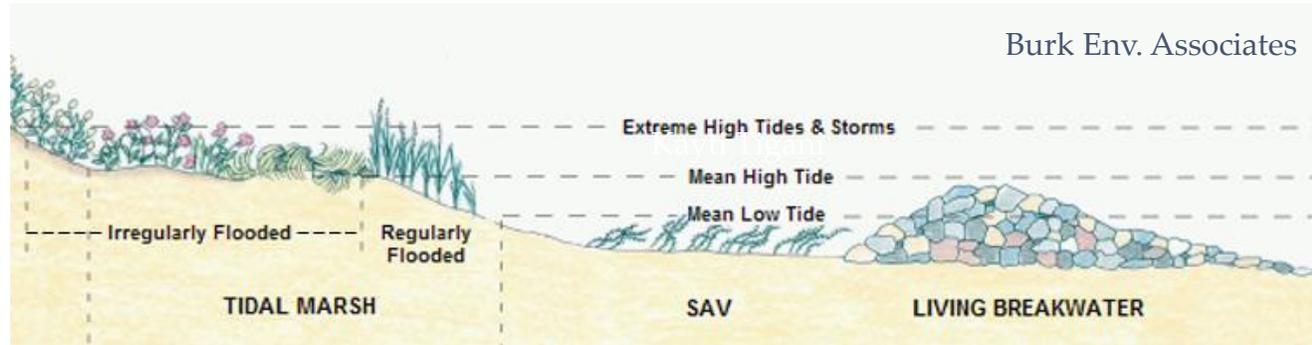
East Carolina University

Greenville, NC

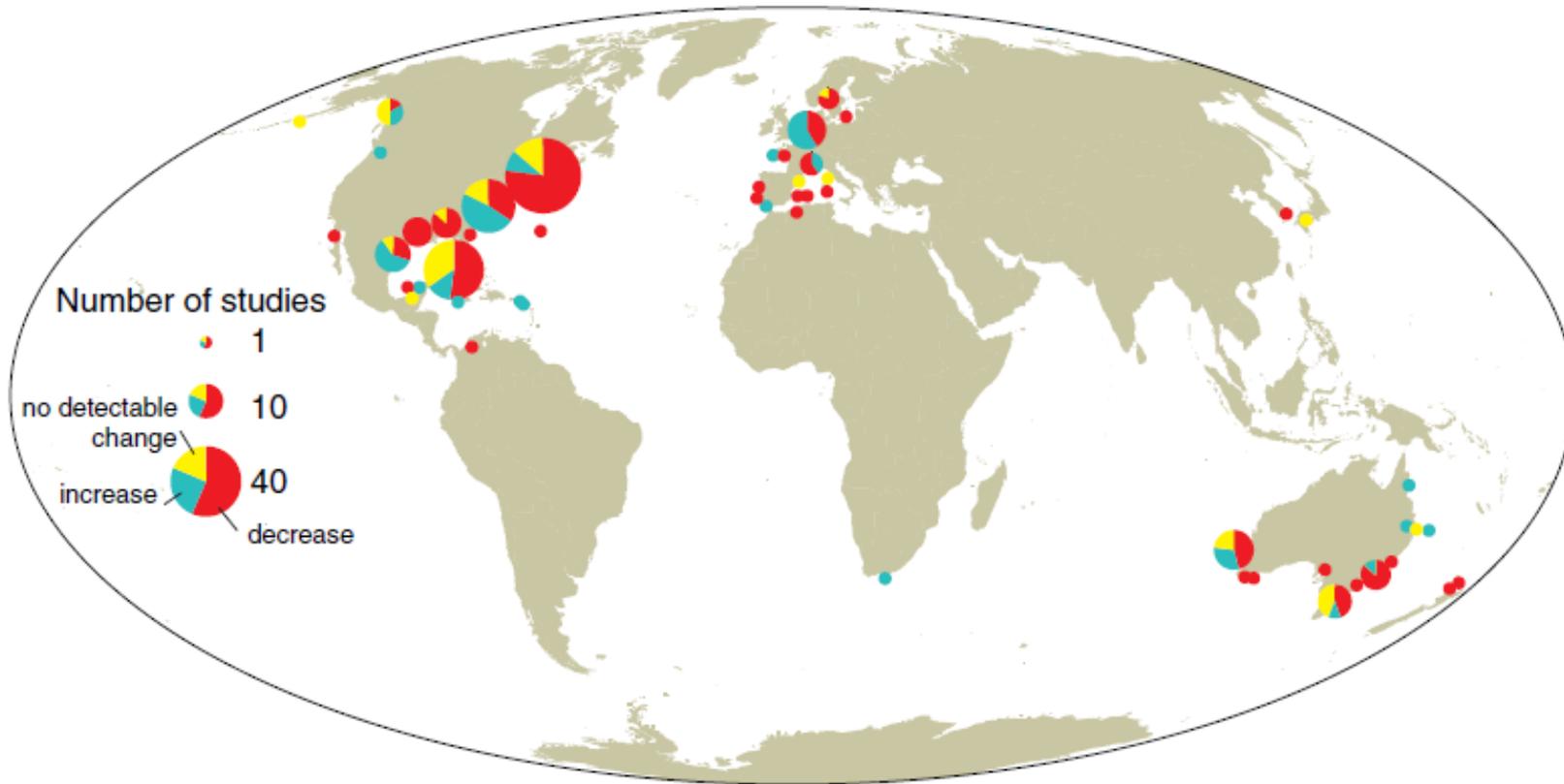
# Overview

- SAV importance
- SAV in NC - current status
- SAV in the Albemarle Sound - current status
- Future Research

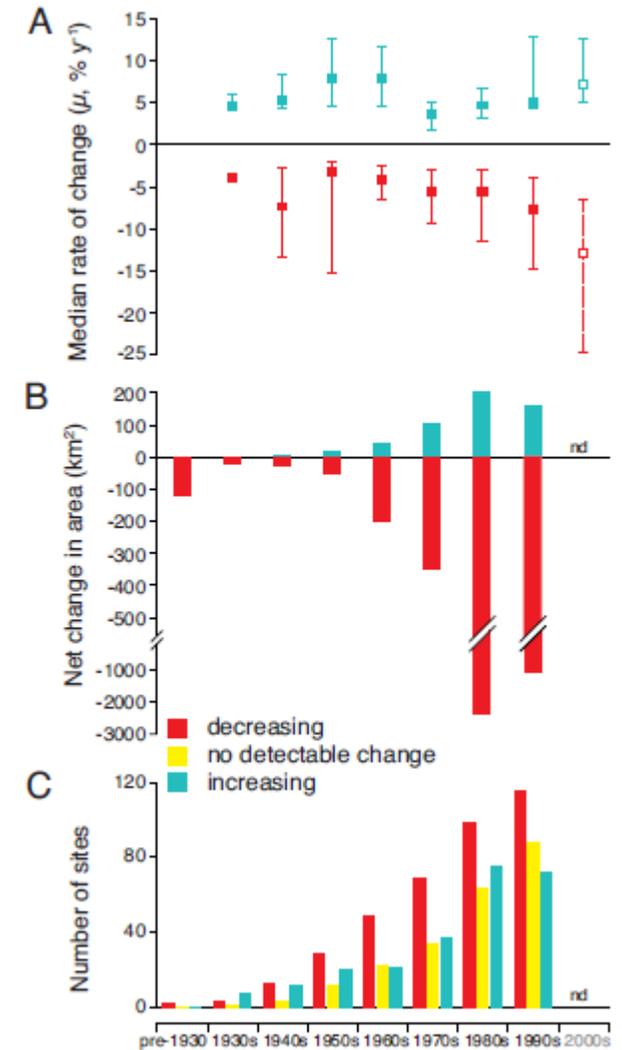
# Importance of SAV



# Global Decline of SAV

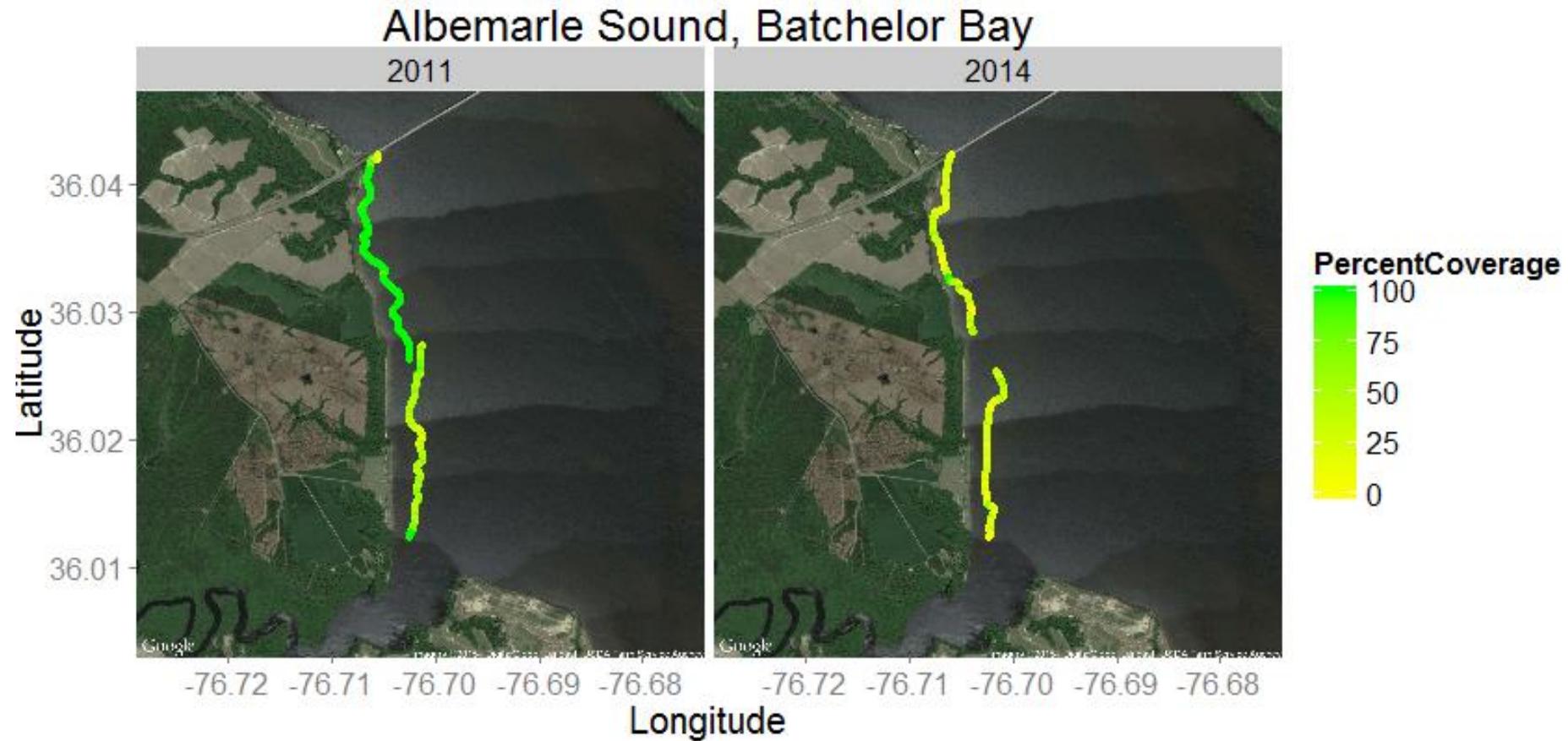


Global map indicating changes in seagrass area plotted by coastline regions.. From Waycott et al. (2009)



Decadal trends in seagrass areal extent. From Waycott et al. (2009)

# What's happening in NC?



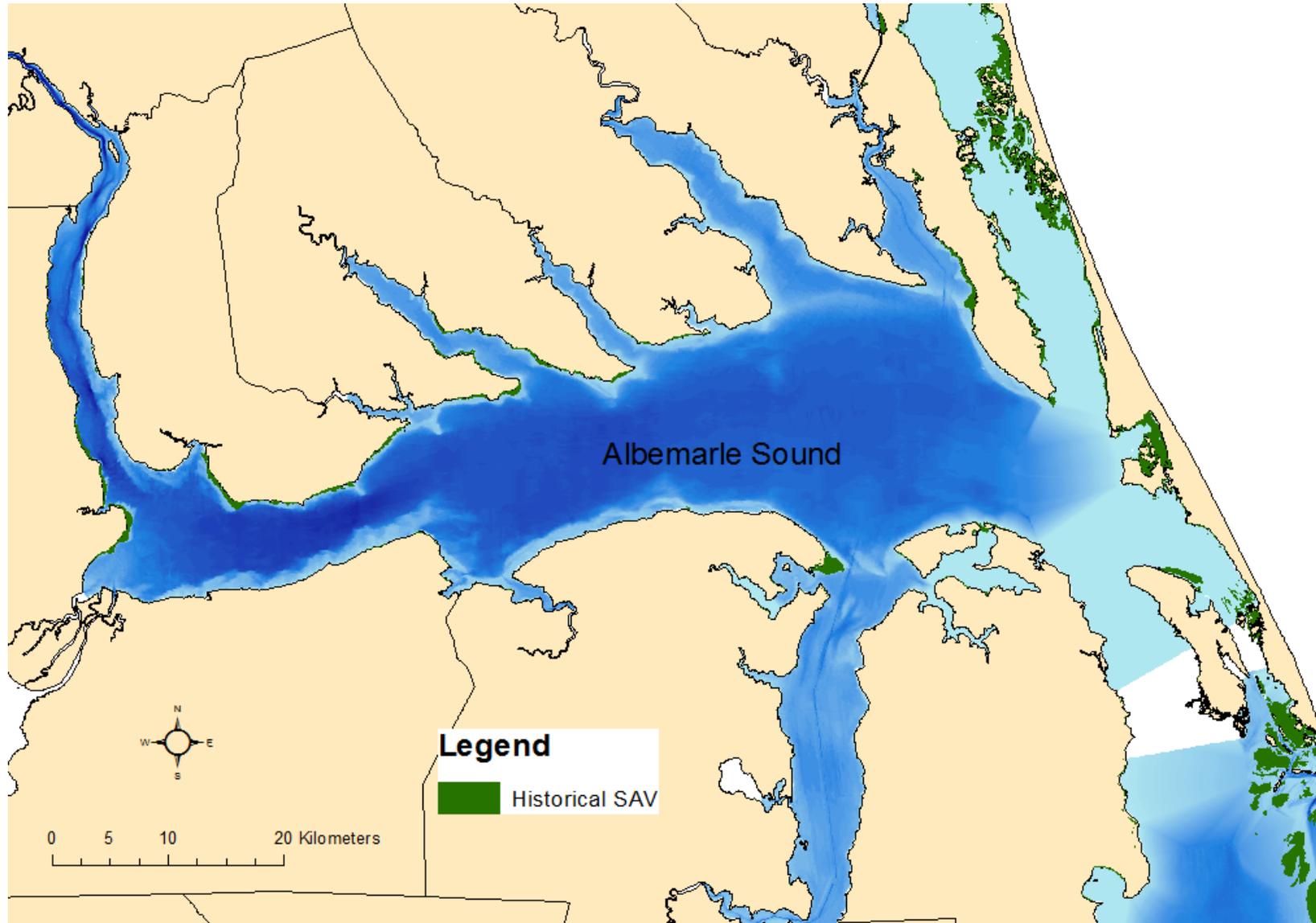
Mean = 77.23%

Mean = 27.27%

2011 data collected by C. Krahforst (Kenworthy et al. 2012)

**Significant loss 50 % decline**  
 $t = 51.39$   $P < 0.00000001$

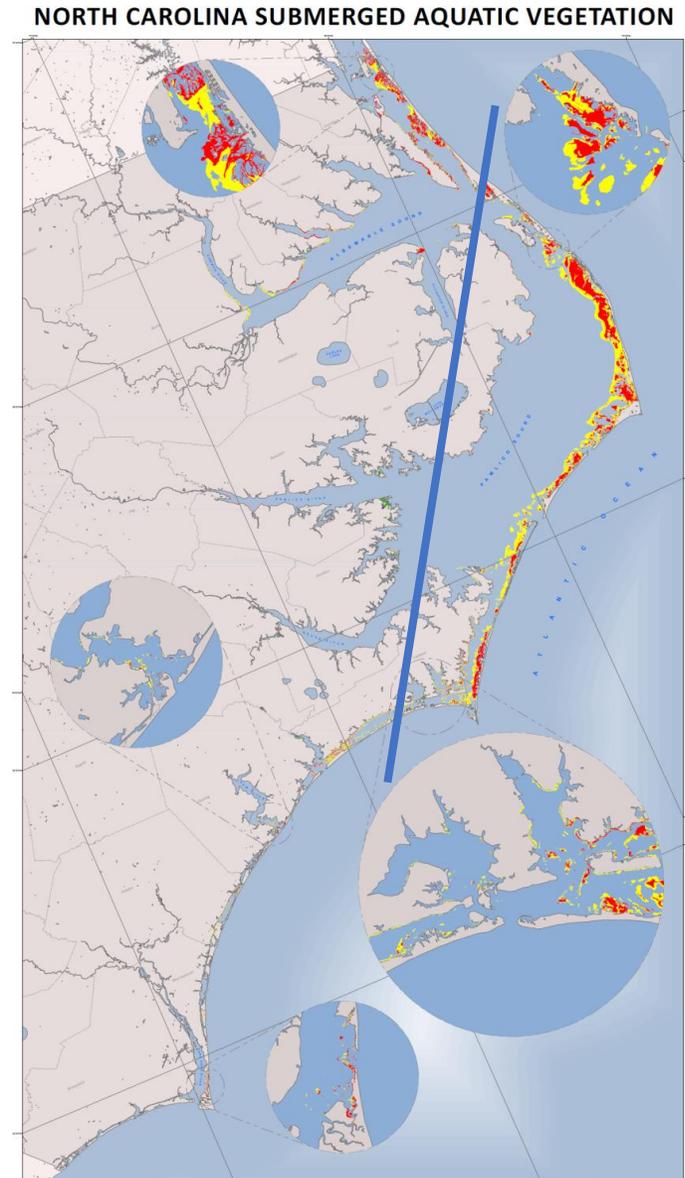
# SAV Distribution Historical (various sources)

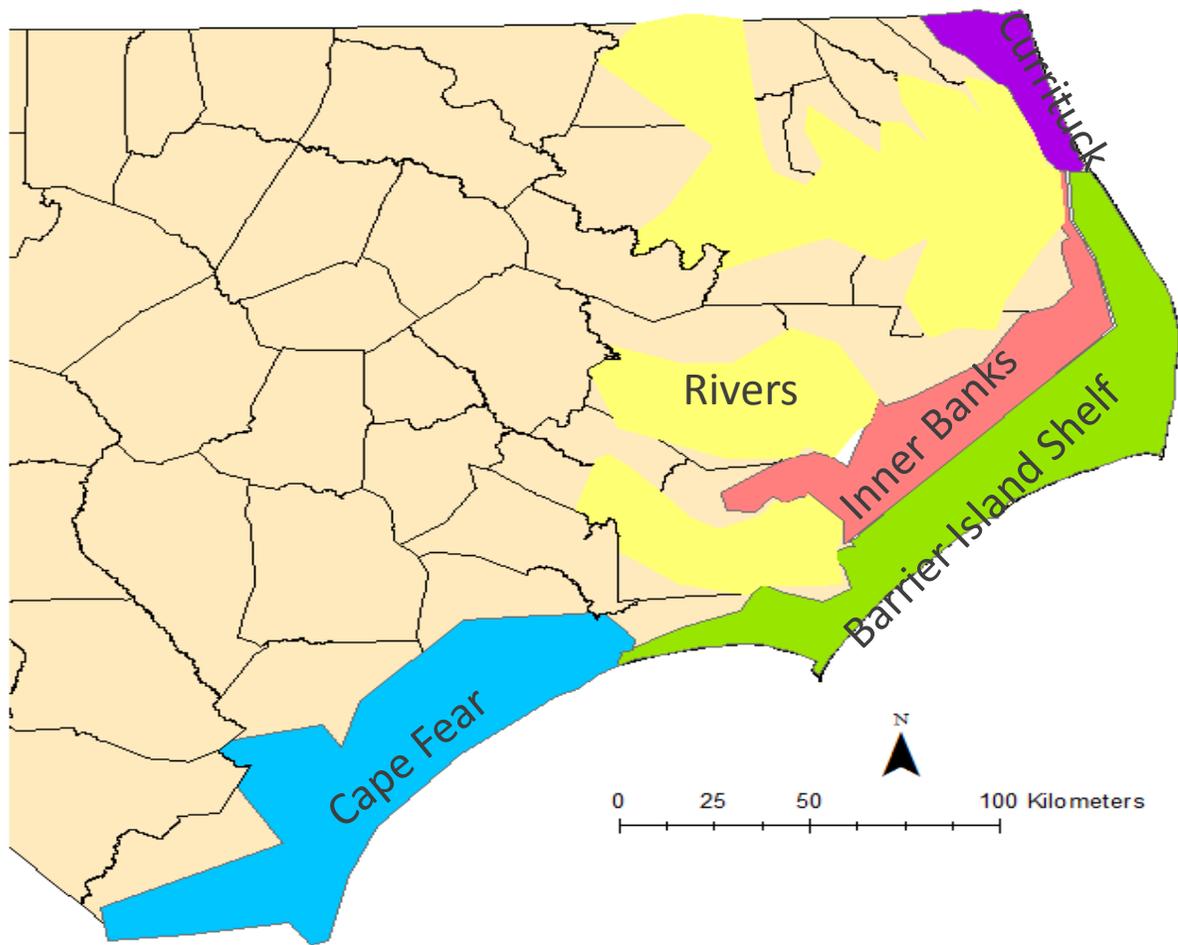


# Monitoring in NC

- Current status:
  - ~56,000 hectares or 138,000 acres
- Third largest area of SAV in Continental USA
- Aerial imaging, SONAR and underwater video
- Low-salinity underestimated

(Kenworthy et al. 2012)

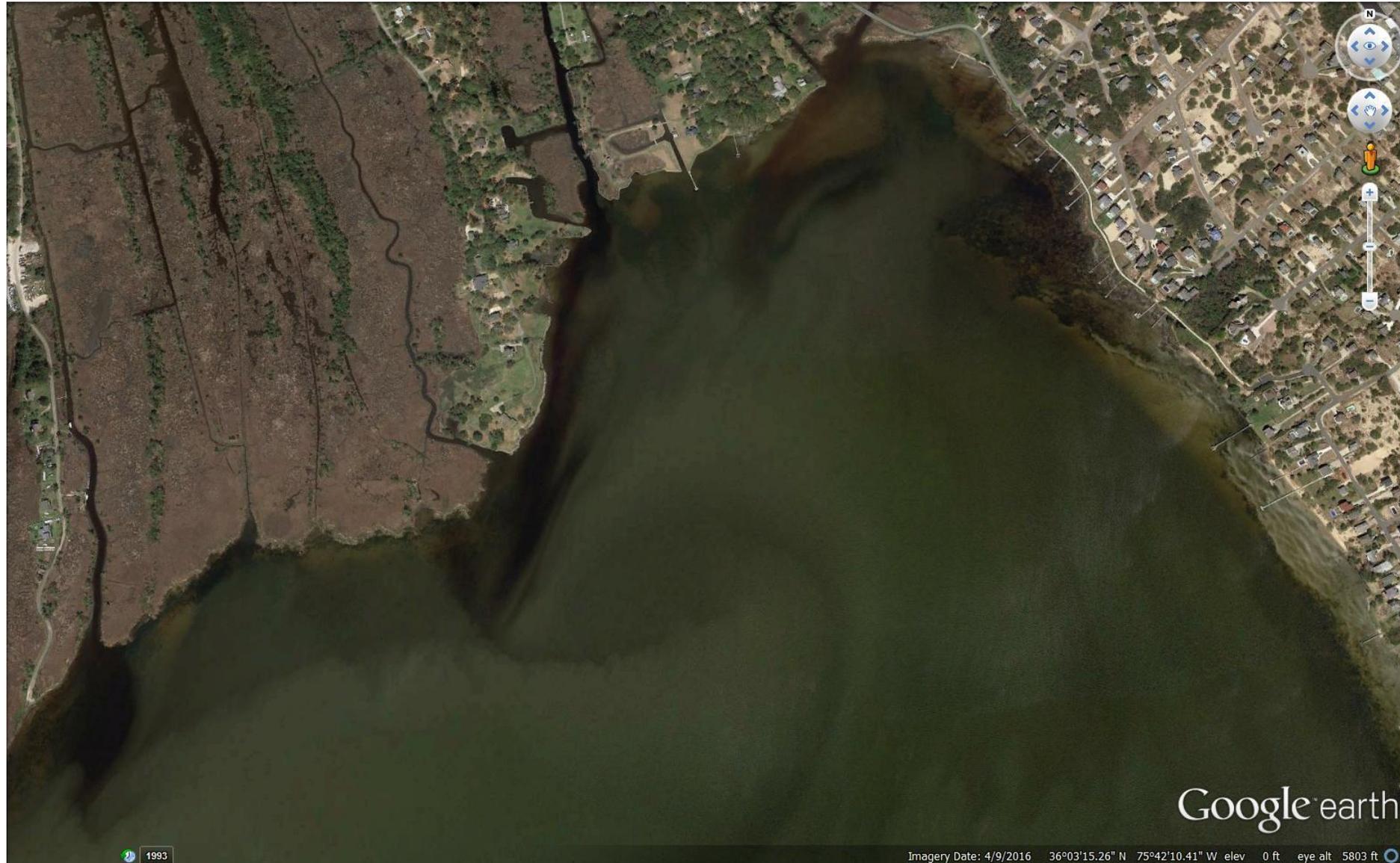




**Divide into five regions, with rapid assessment and multiple sentinel sites/region**

1. Barrier Islands (polyhaline 18-35 ppt)
2. Southern NC (polyhaline 18-35 ppt)
3. Rivers and sounds (oligohaline 0-10 ppt: Albemarle, Pamlico R., Neuse R.)
4. Currituck Sound (oligohaline 0-10 ppt)
5. Inner Banks (mesohaline 10-18 ppt)

# Underestimated SAV in low-salinity areas

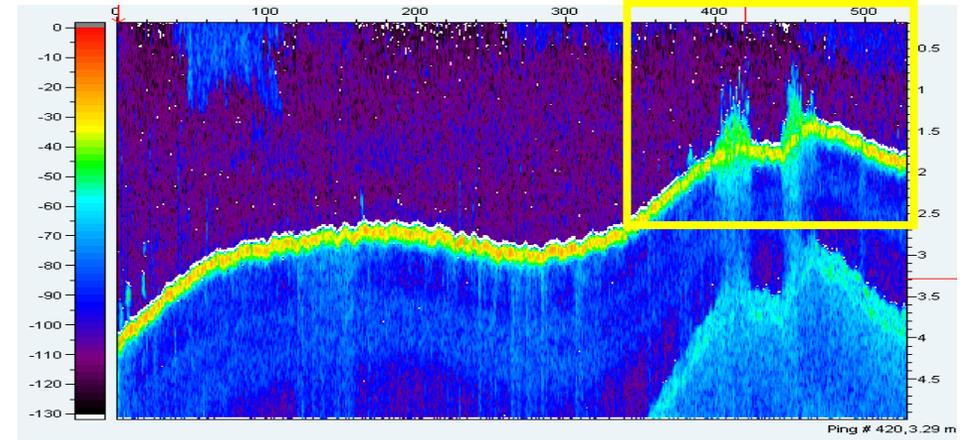
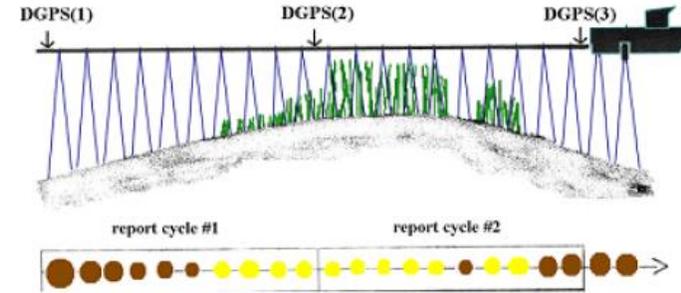


# Underestimated SAV in low-salinity areas

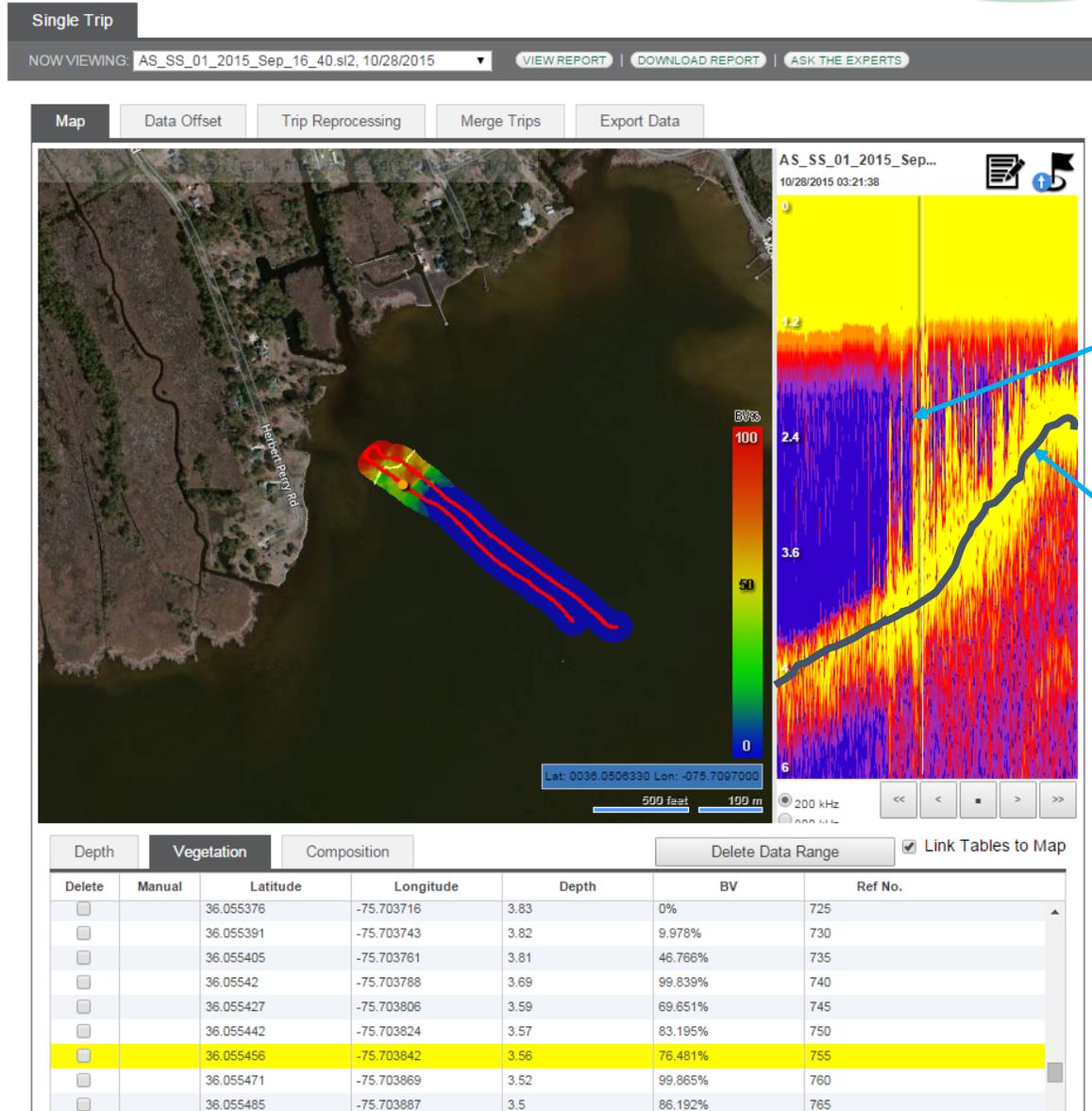


# SAV monitoring methods

- Multiple methods:
  - Aerial Imaging
  - SONAR and underwater video



# SONAR Analysis



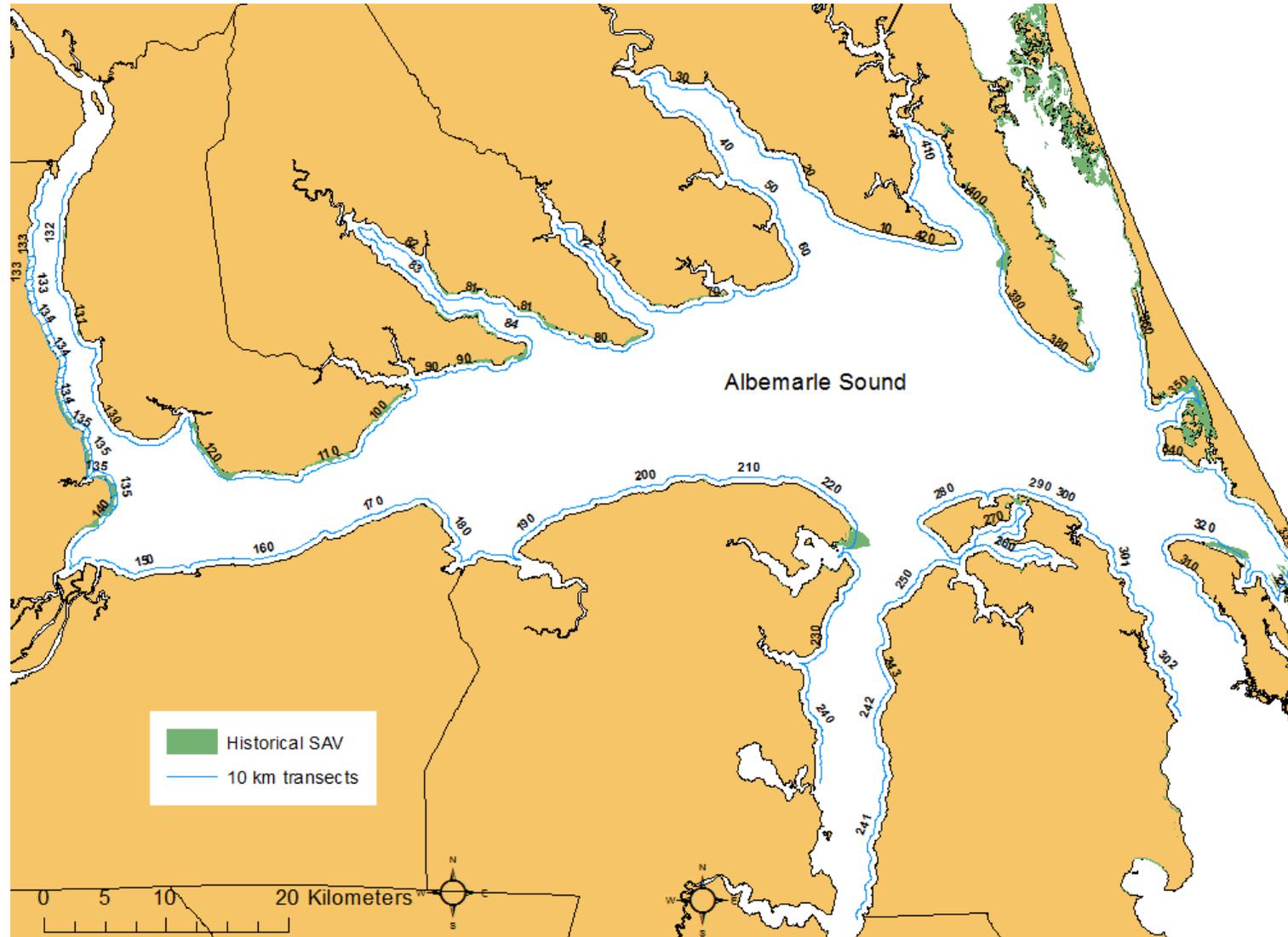
SAV

Bottom  
echo

# Albemarle Sound SAV monitoring

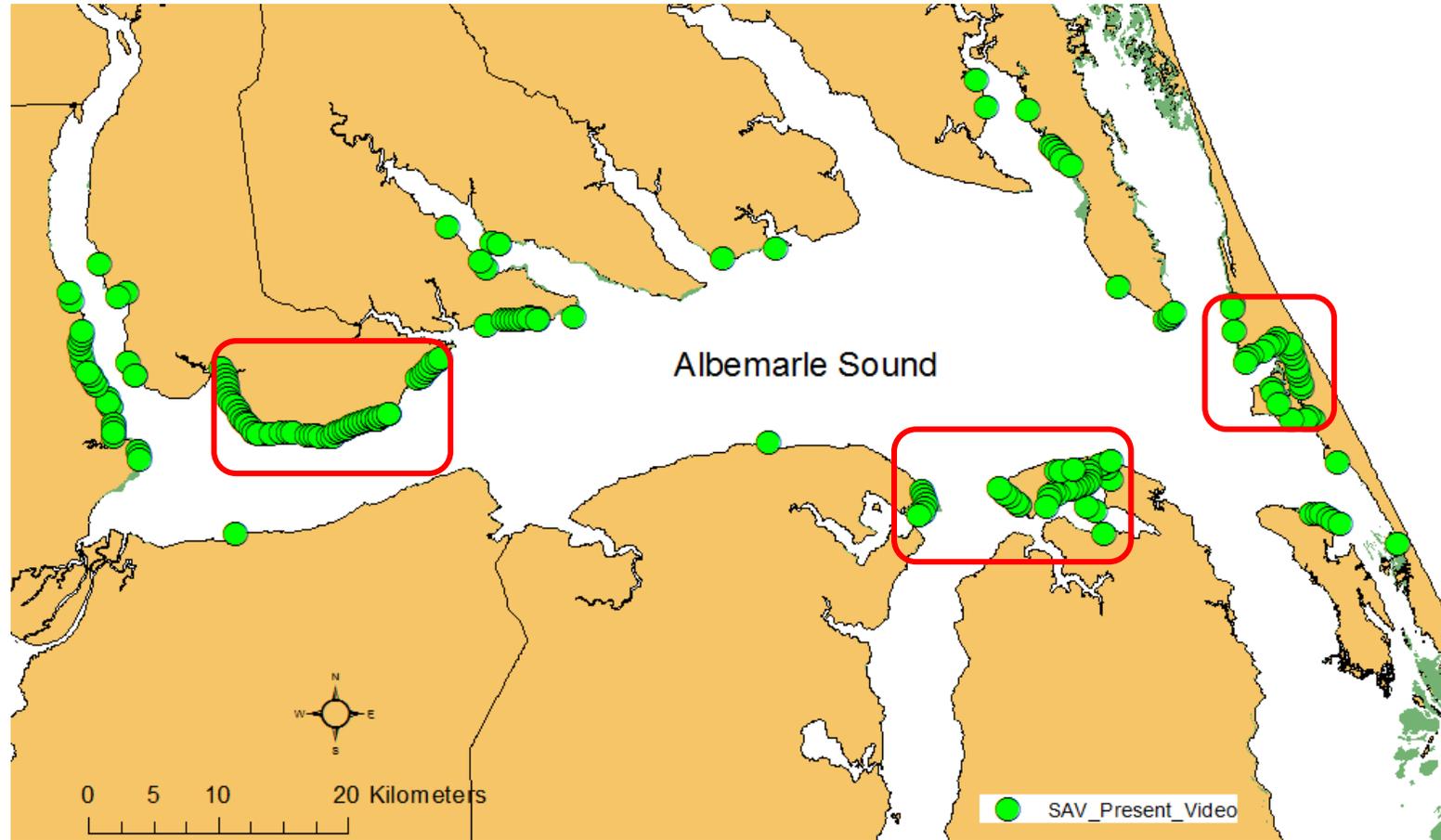
- Two types of sites:
  - Along-shore sites:
    - Rapid assessment of SAV (status)
    - Shore-parallel transects around sound at 1-m isobath
  - Sentinel sites:
    - Intense monitoring smaller locations
    - Longer-term SAV distribution (trends)

# Rapid Assessment 2014

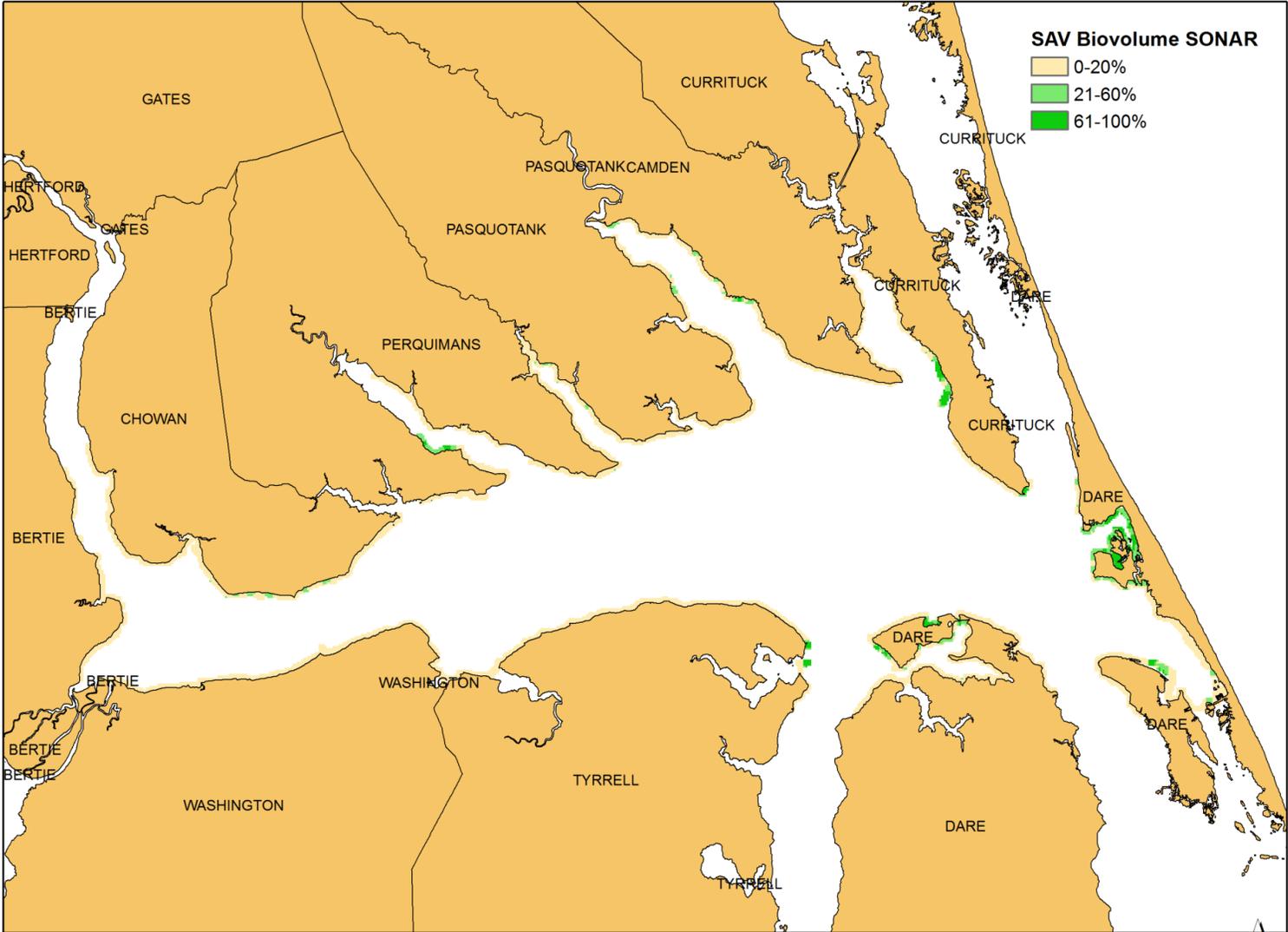


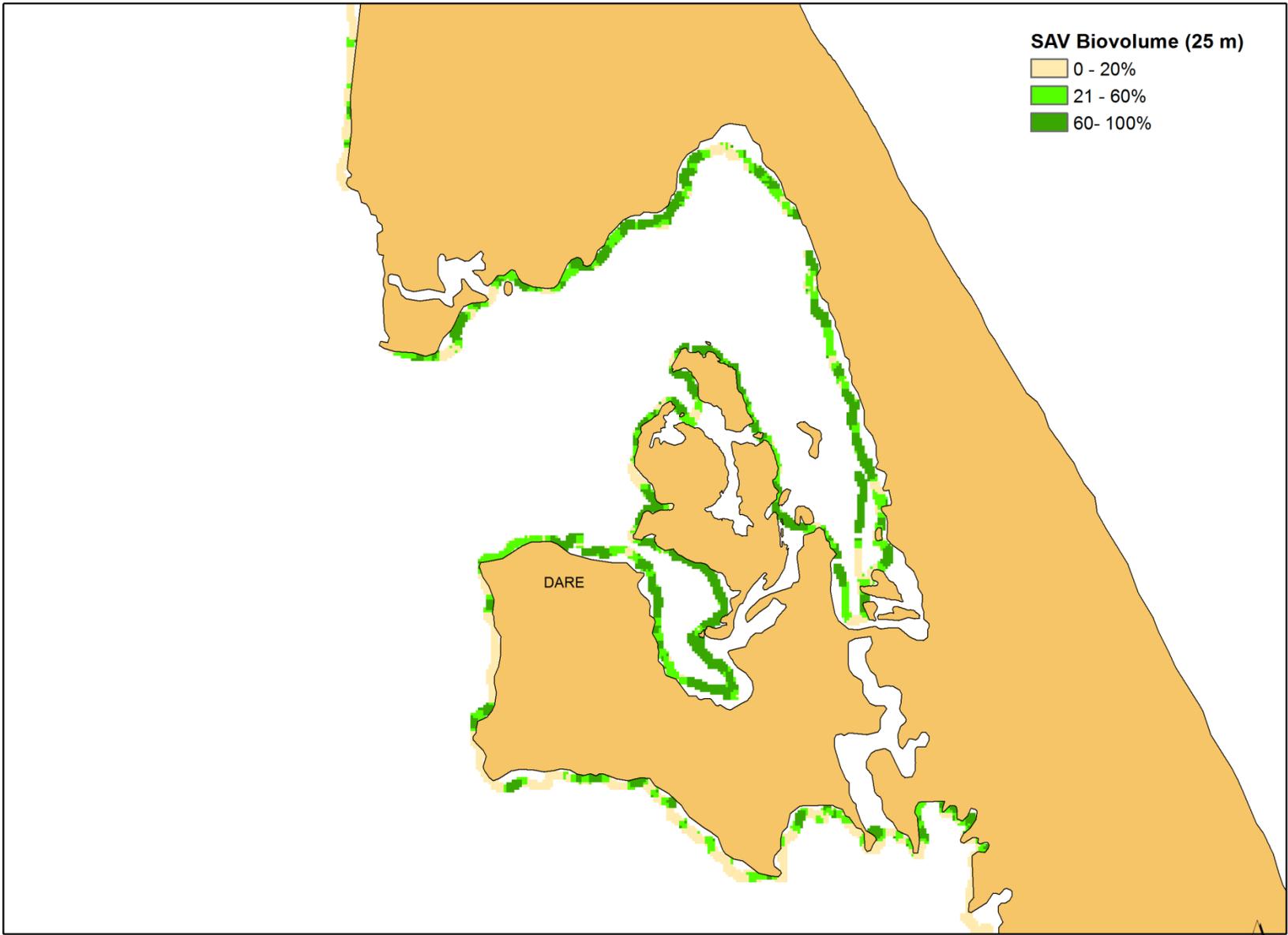
10-km transects in the Albemarle Sound at 1-m isobath

# Video SAV Present 2014



# SONAR SAV Distribution 2014

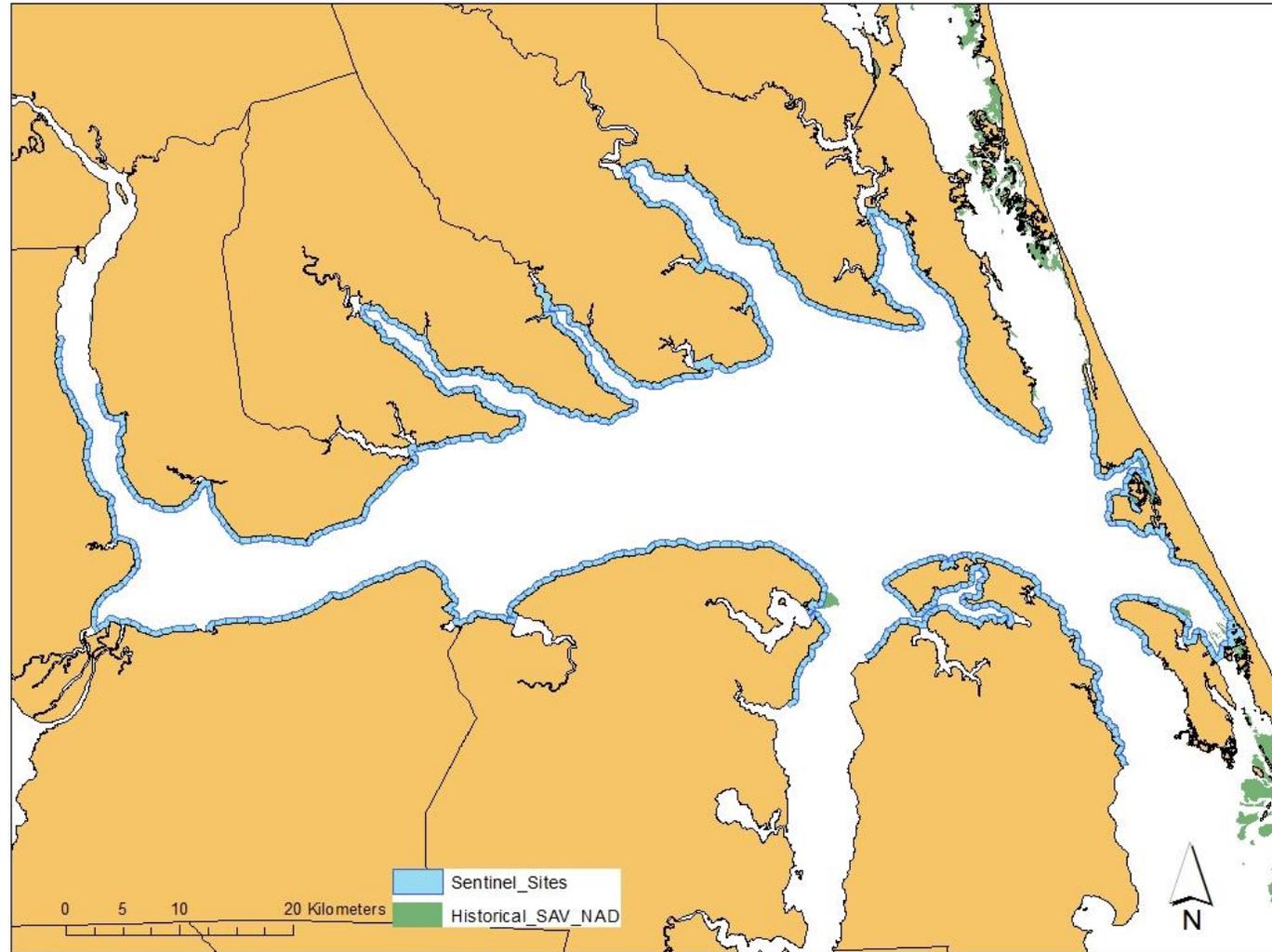




# Sentinel sites

- Purpose: intense monitoring for long-term trend assessment
- Will be sampled annually by the State North Carolina if funding is available
- Selection criteria:
  - SAV historically
  - SAV along-shore sampling
    - SONAR
    - Video

# Sentinel Site Selection



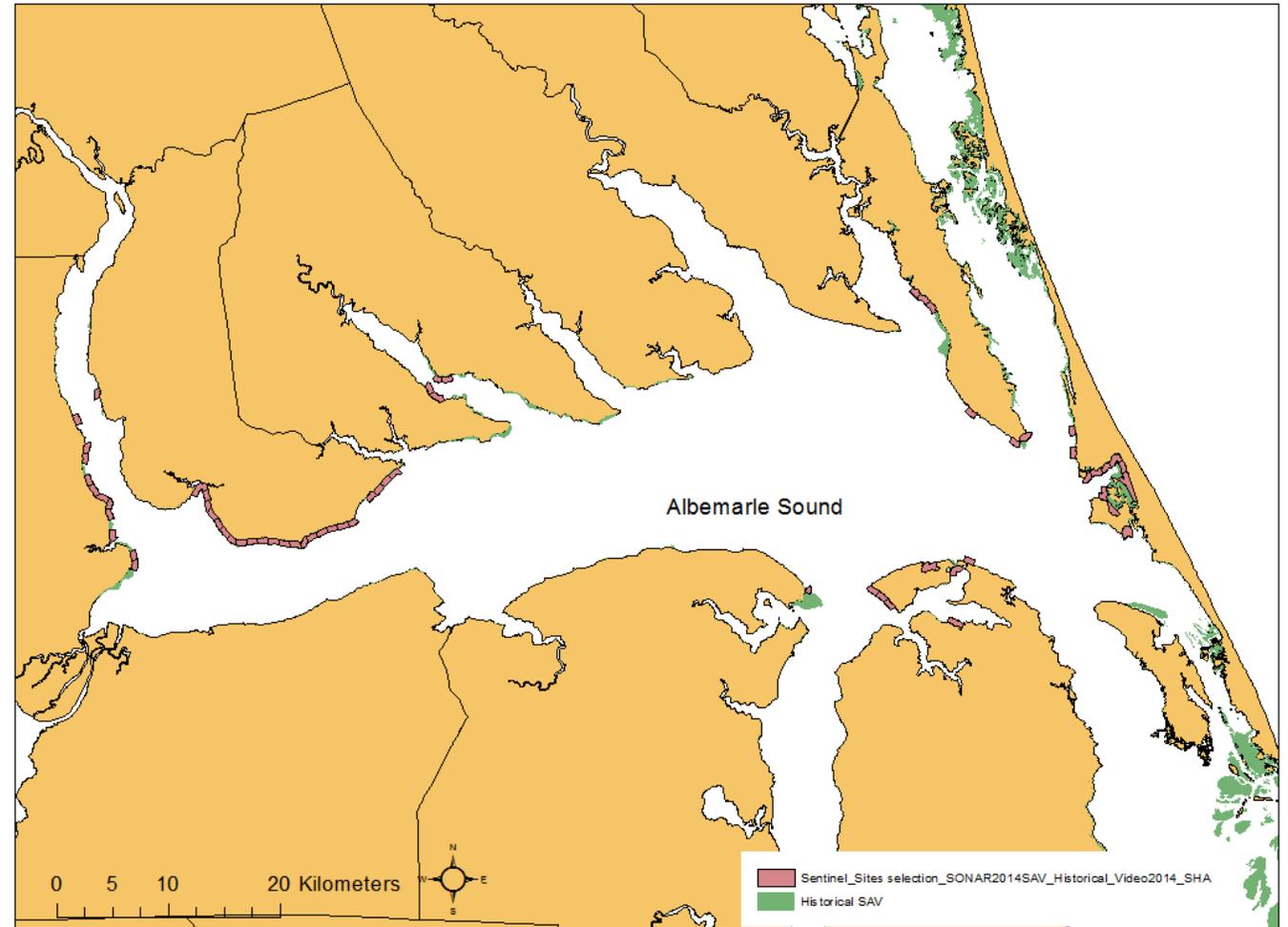
~600 bins around the sound

# Potential Sentinel Sites

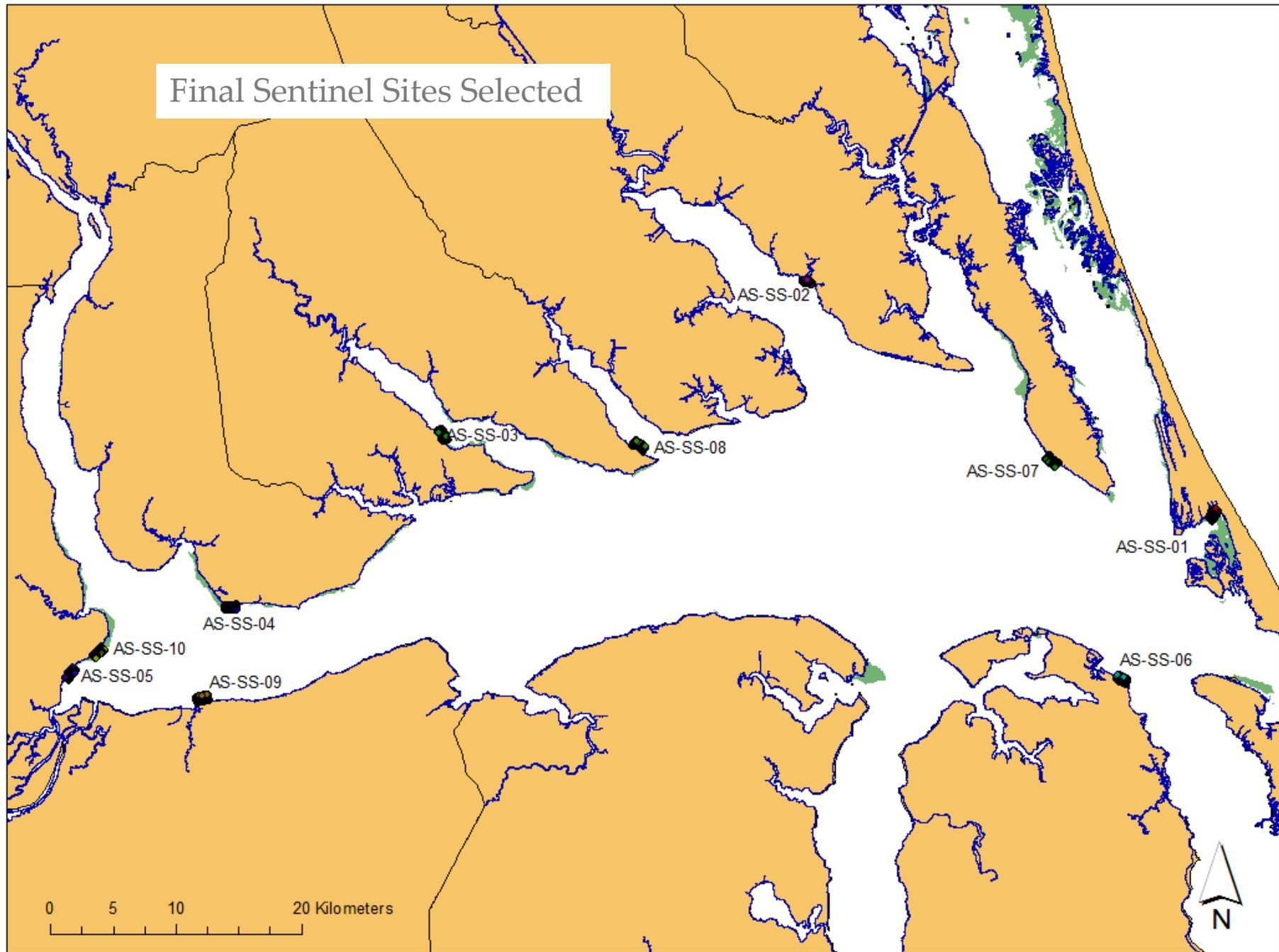
220 bins had historical SAV

88 bins met the criteria of having:

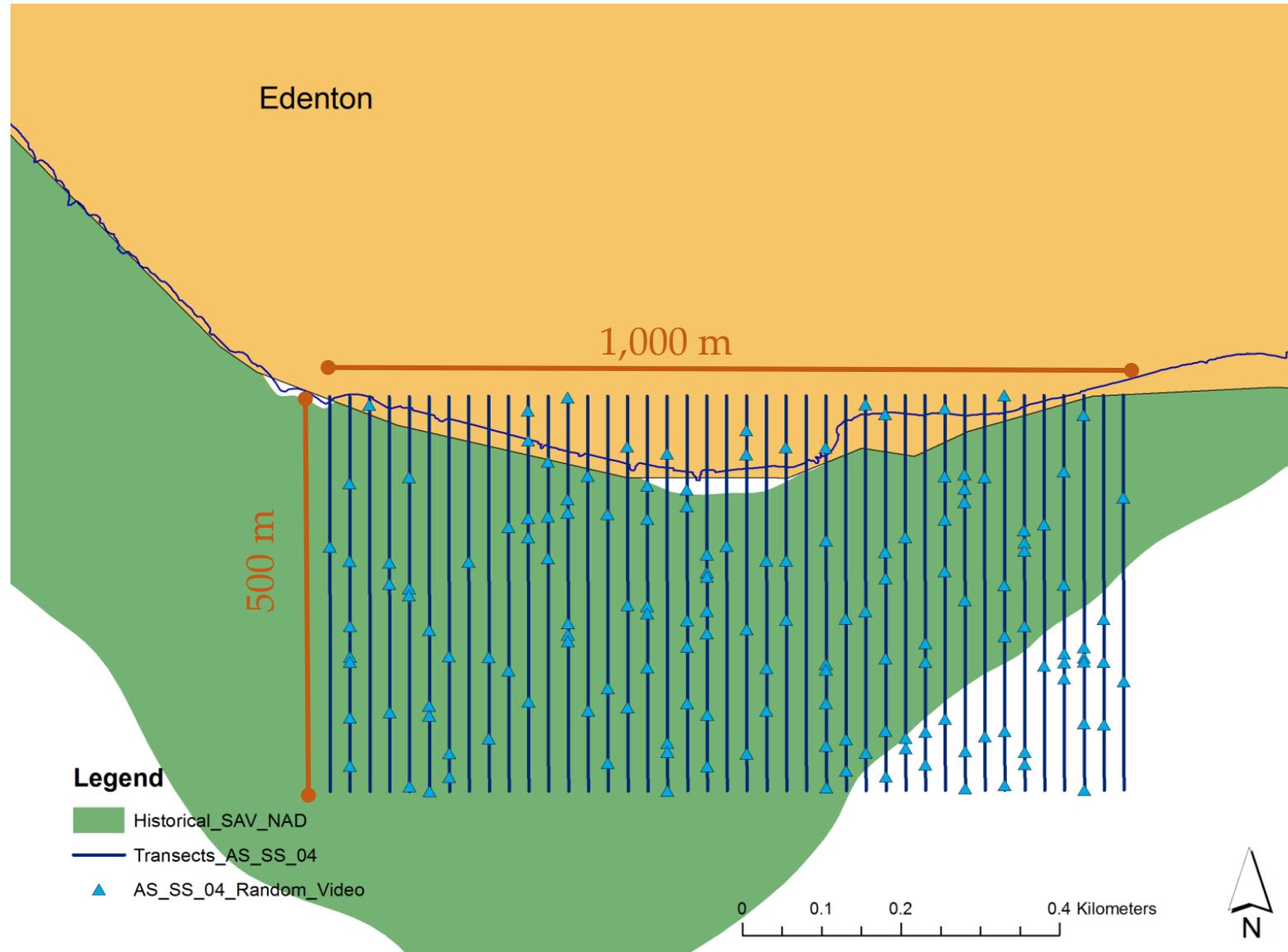
- SAV present historically
- SAV present in SONAR sampling 2014
- SAV present in video in 2014 sampling



# Final Sentinel Sites Selected

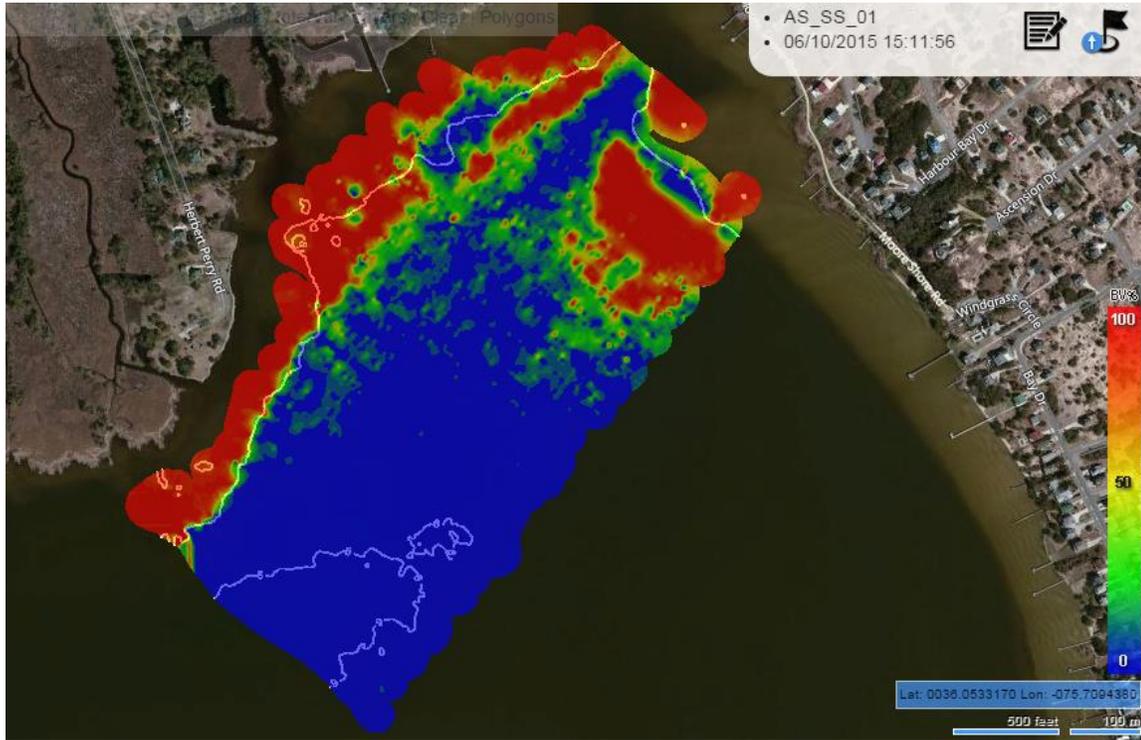


# Sentinel Sites

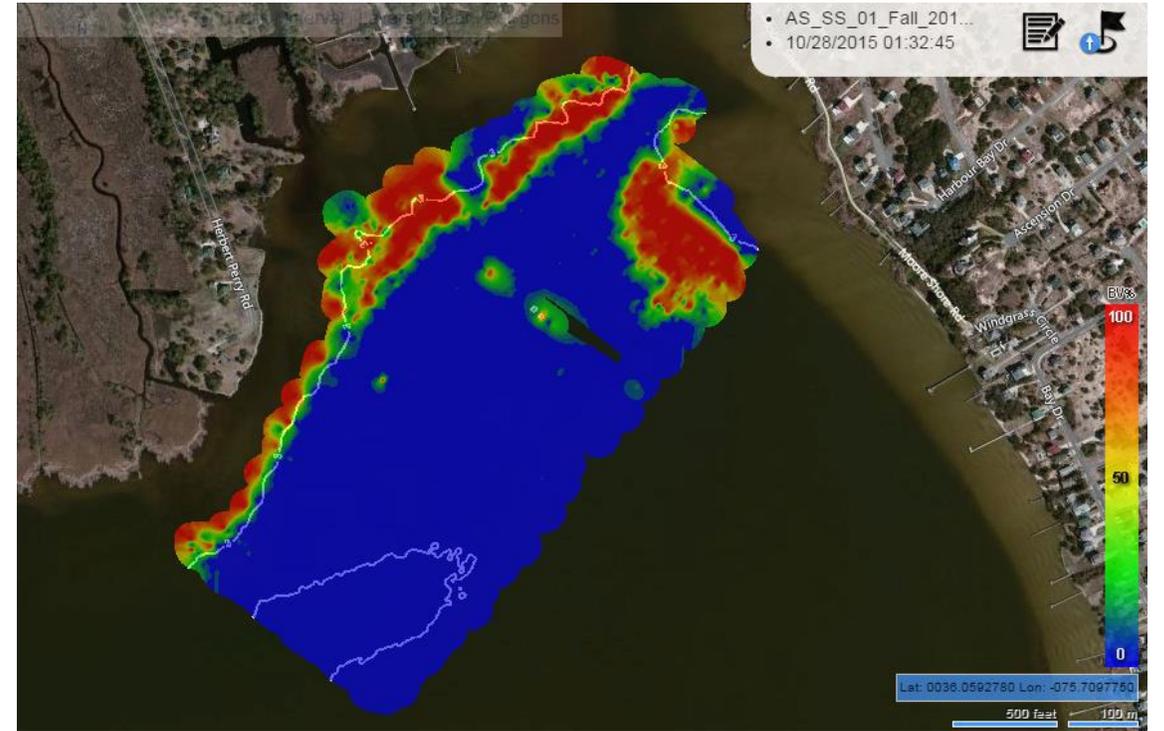


40 perpendicular to shore SONAR transects and 100 random video points

# Seasonal Changes: Kitty Hawk Spring and fall (2015)



- Percent Cover – 37.7 %



- Percent Cover – 23.4 %

# Seasonal Changes Little River: spring and fall (2015)



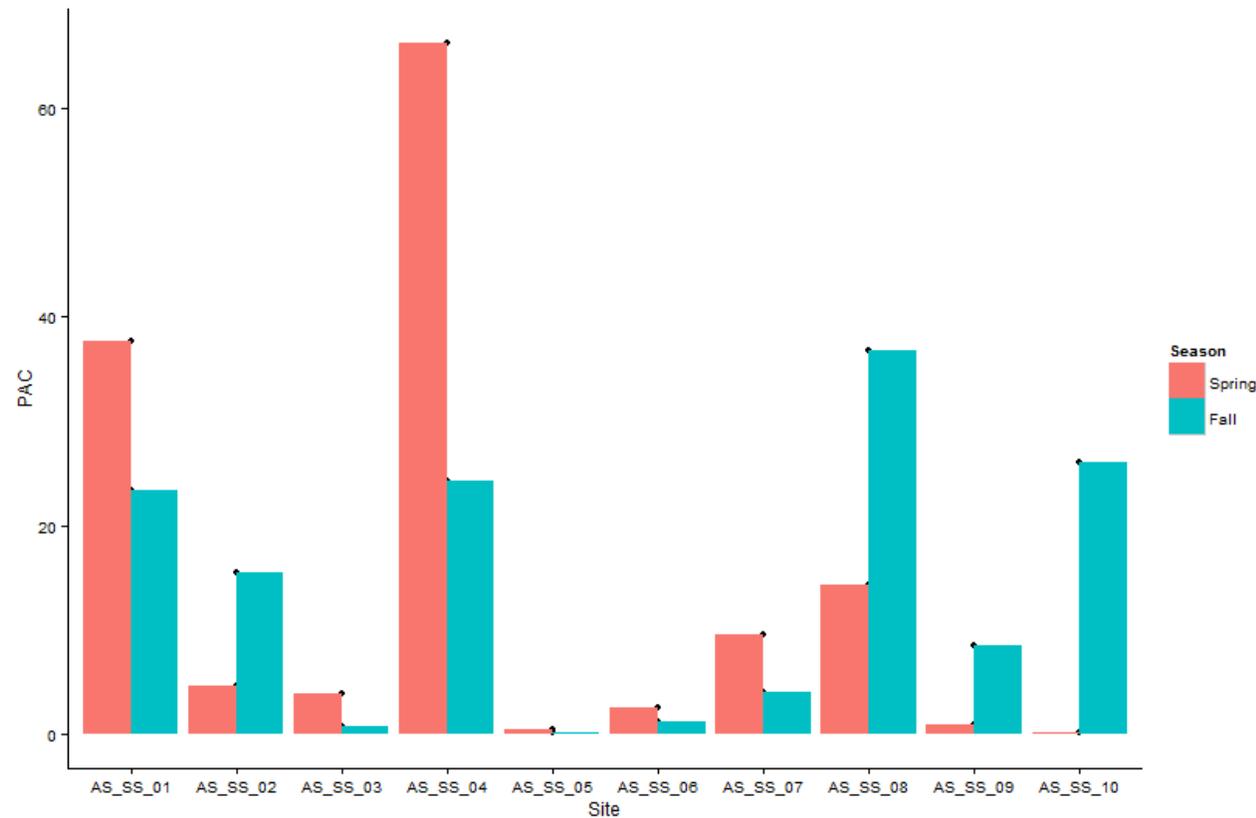
- Percent Cover – 14.3%



- Percent Cover – 36.8%

# Temporal Changes Analysis

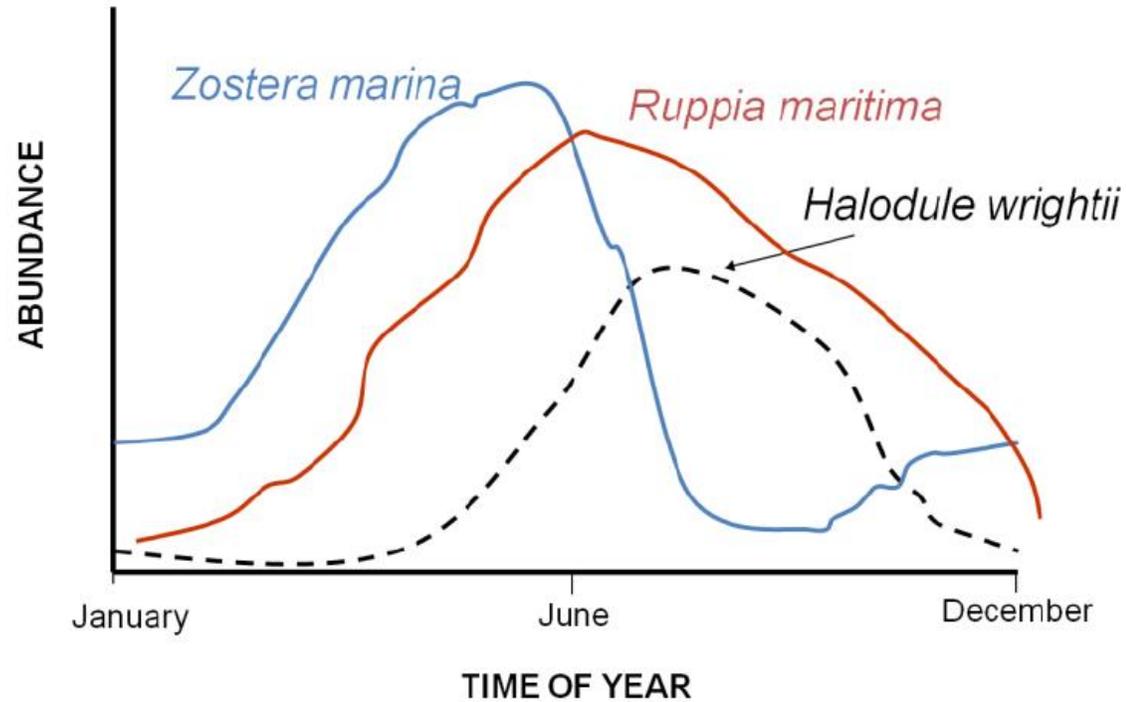
- Preliminary result:  $t = 0.0038$ ,  $df = 14.795$ ,  $p\text{-value} = 0.997$ 
  - No significant difference between seasons
  - High variability between sites.



Sentinel sites Percent Area Cover based on Biobase data. 2015 spring and fall.

# Temporal Changes Analysis

- What causes variability among the sites?
  - Different species

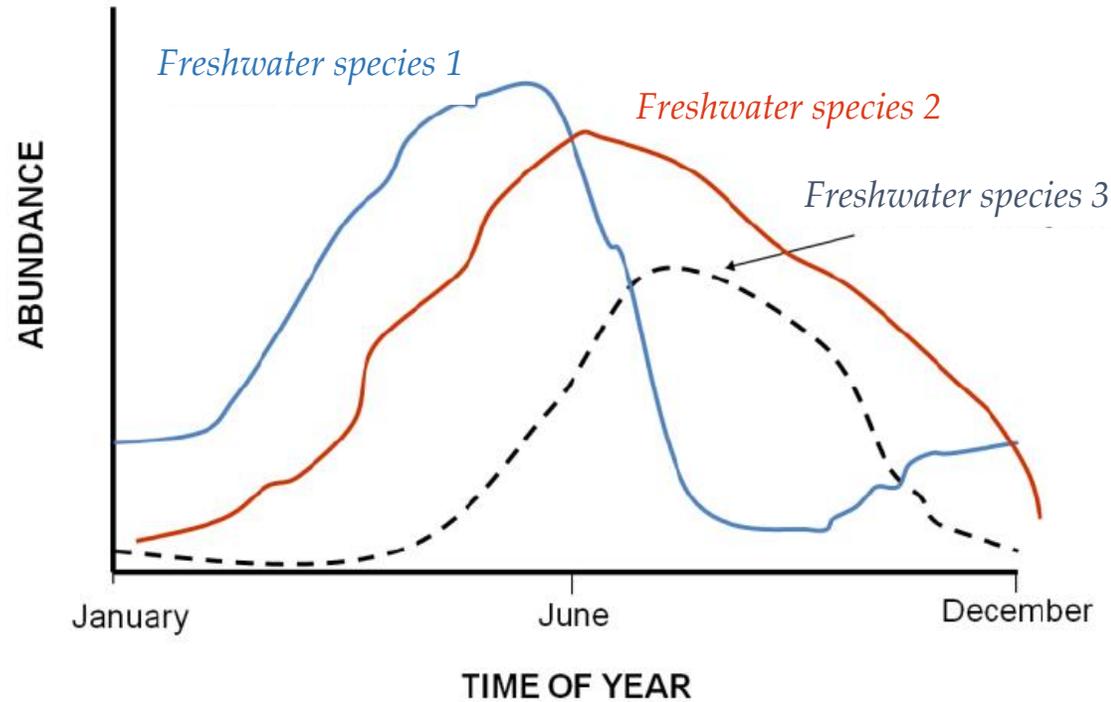


Abundance throughout the year of three seagrass species commonly found in high- salinity environments of North Carolina

Kenworthy et al. 2012

# Temporal Changes Analysis

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  - Different species



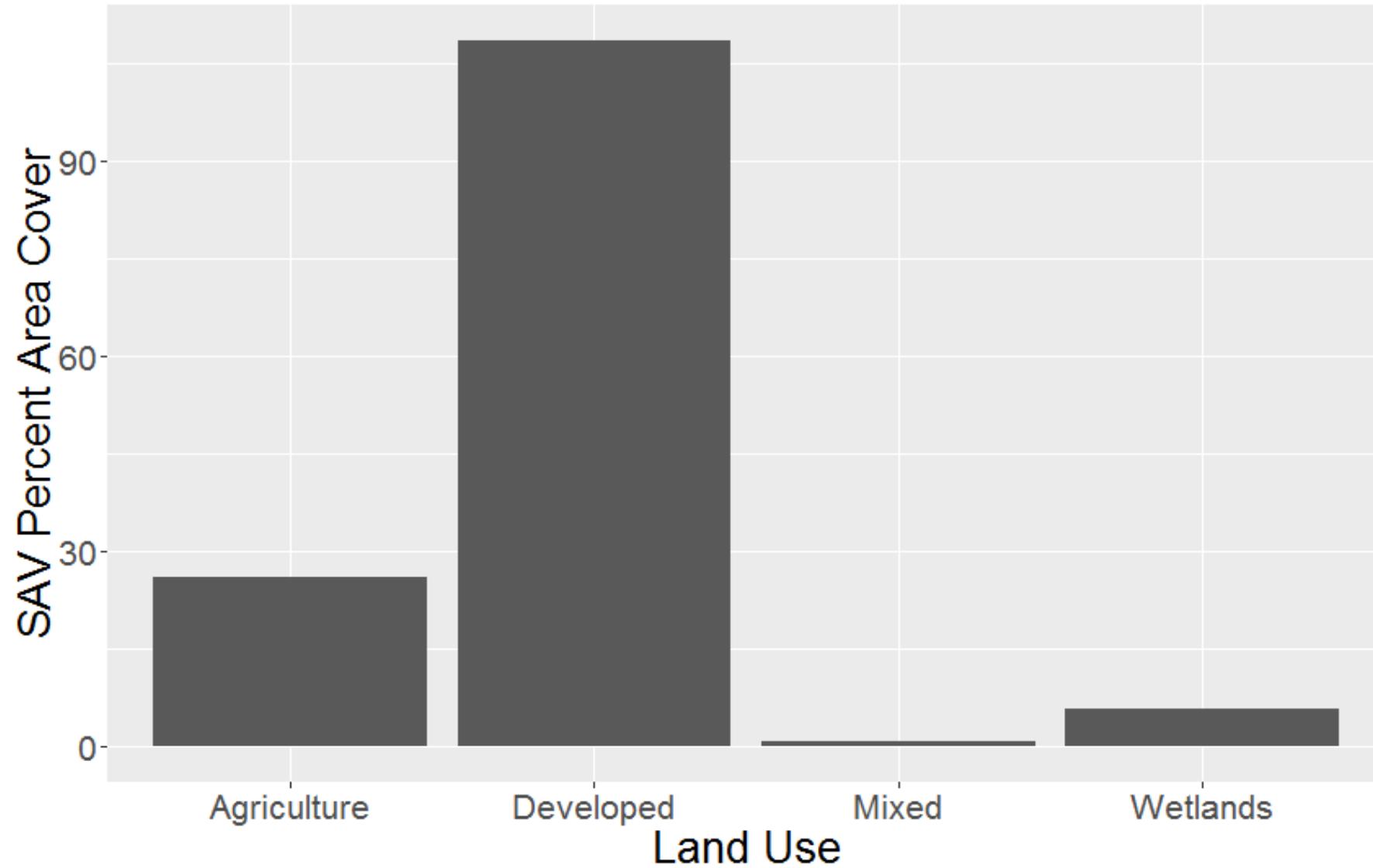
Abundance throughout the year of three seagrass species commonly found in high- salinity environments of North Carolina

- Certain species are not dispersed to this areas

What about nutrients and SAV?



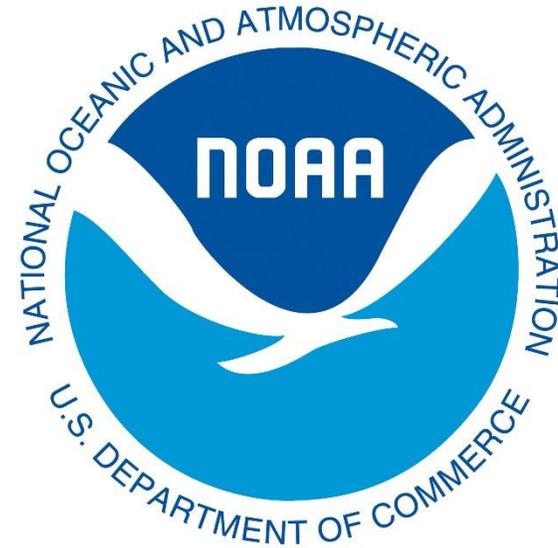
# SAV and Land Use



# Future SAV studies

- Continue Sentinel Sampling 2016
- Determine species composition
- Factors associated with SAV distribution:
  - Shoreline-type
  - Wind-shear stress
  - Salinity
  - Light intensity
- Need: continuous N, P, and Chla samples at the sentinel sites

Dan Craine, ECU  
Catherine Brown, ECU  
Alea Hansinger, ECU  
Claudia Jolls, ECU  
Jud Kenworthy, ECU  
David Griffith, ECU  
Joe Luczkovich, ECU  
Tom Allen, ECU  
Cecilia Krahforst, ECU  
Ana Arciniega, volunteer  
Emily Arciniega, volunteer  
Hilde Becerra, volunteer  
Andy Speight, volunteer  
Dean Carpenter, APNEP  
Jud Kenworthy, NOAA  
Don Field, NOAA



Thank you!!!

# References

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