STATUS OF SUBMERGED AQUATIC VEGETATION IN NORTH CAROLINA

JUD KENWORTHY

&

APNEP PARTNERSHIP SAV MONITORING AND ASSESSMENT TEAM

THE MESSAGE TODAY

SAV DECLINES OUTNUMBER GAINS

EXTENT OF SAV IS NOT AT CARRYING CAPACITY

SAV RESTORATION IS UNCERTAIN AND EXPENSIVE

PROACTIVE INTERVENTION

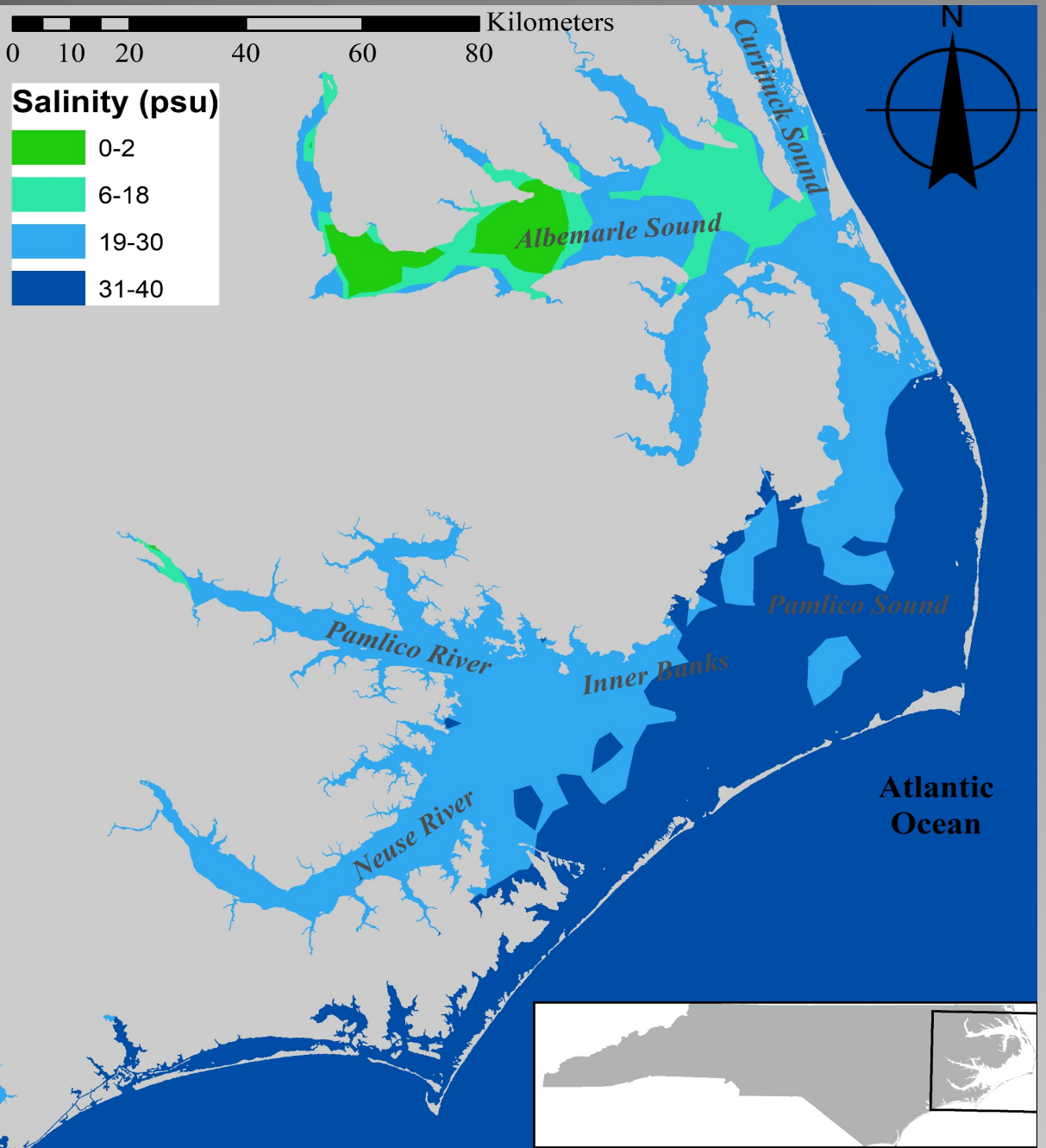
ILLUSTRATION OF THE MAXIMUM EXTENT OF SAV IN NC

THE LARGEST ON THE ATLANTIC SEABORD

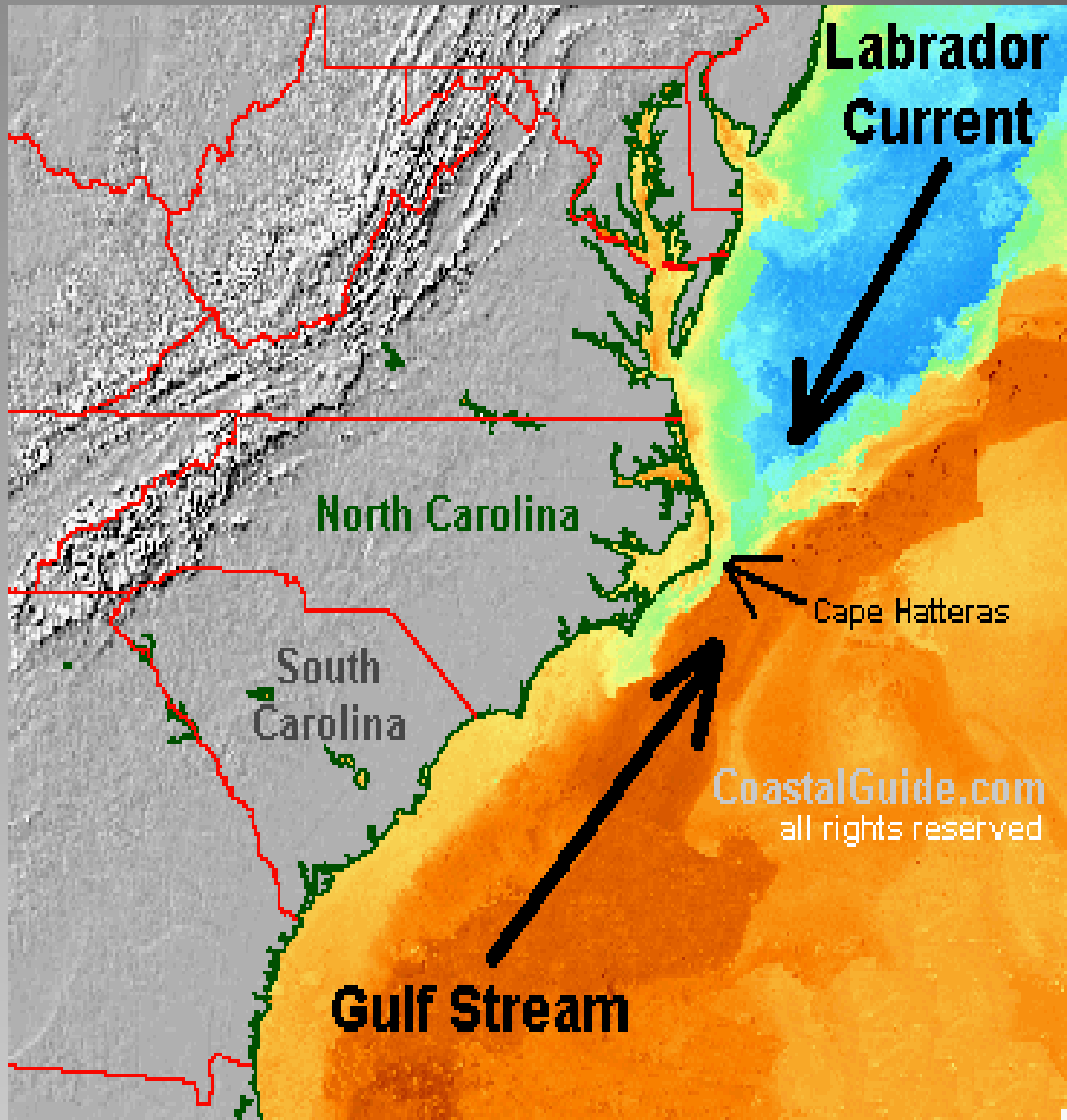
12.5 BILLION DOLLARS PER YEAR

FUNCTIONALLY IRREPLACEBLE

SALINITY GRADIENT

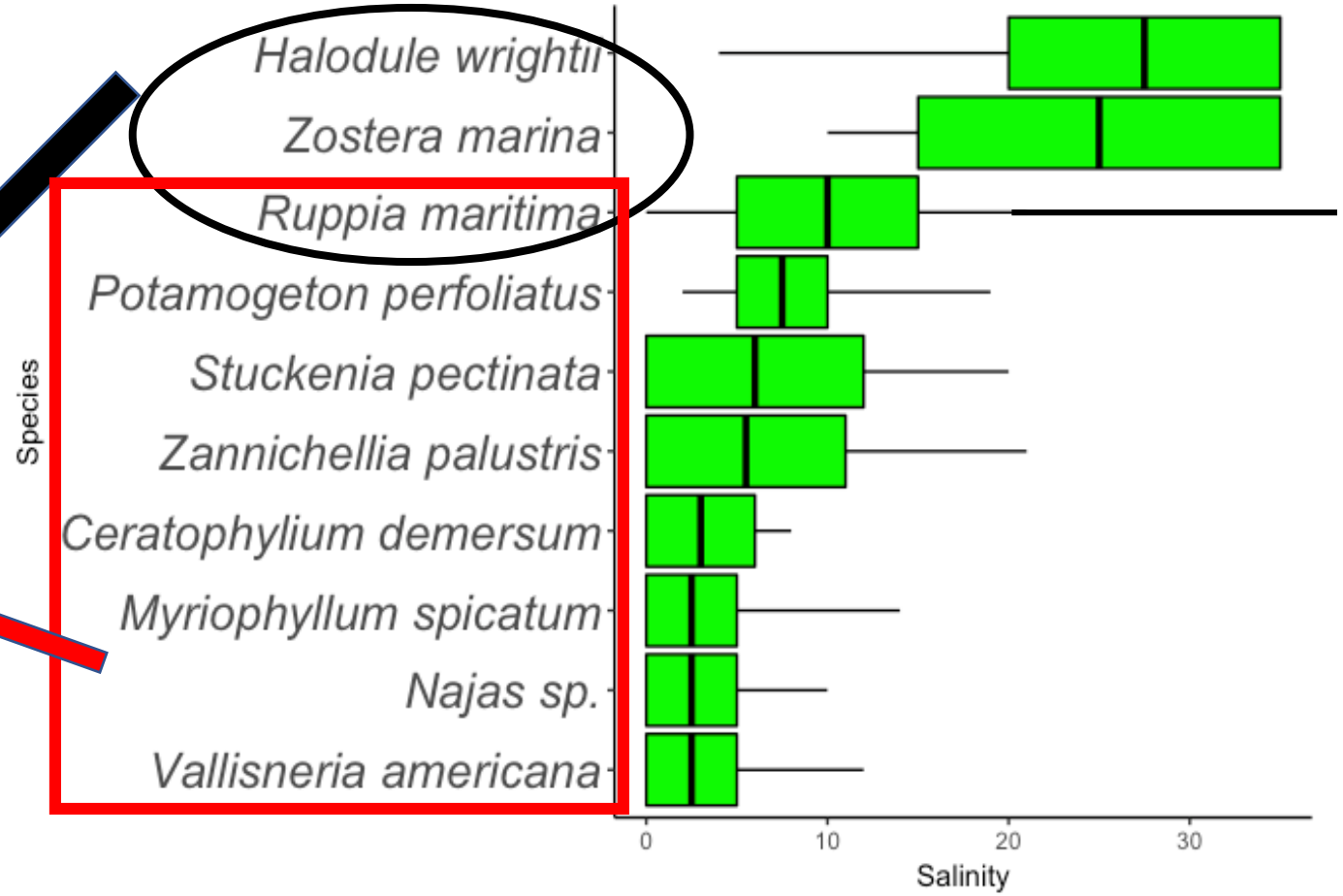


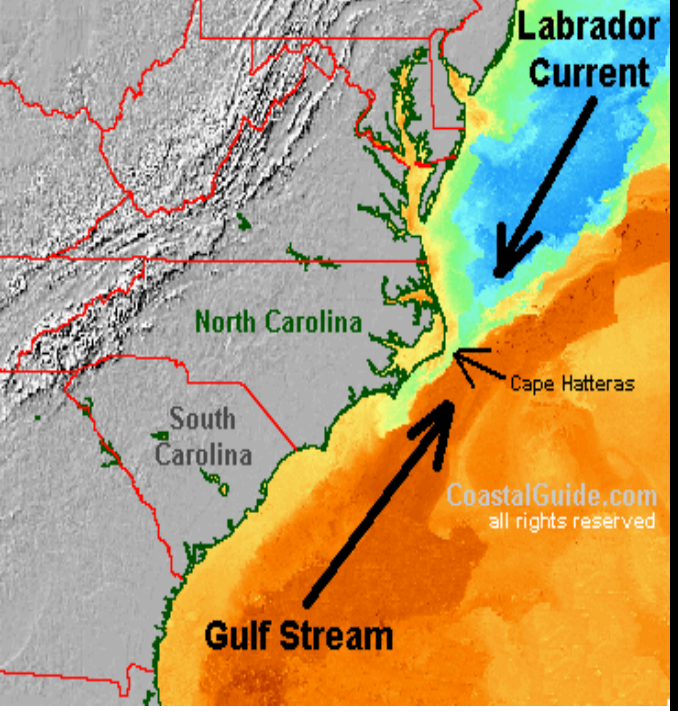
TEMPERATURE



TWO SAV PERSONALITIES

TWO DIFFERENT ENVIRONMENTS





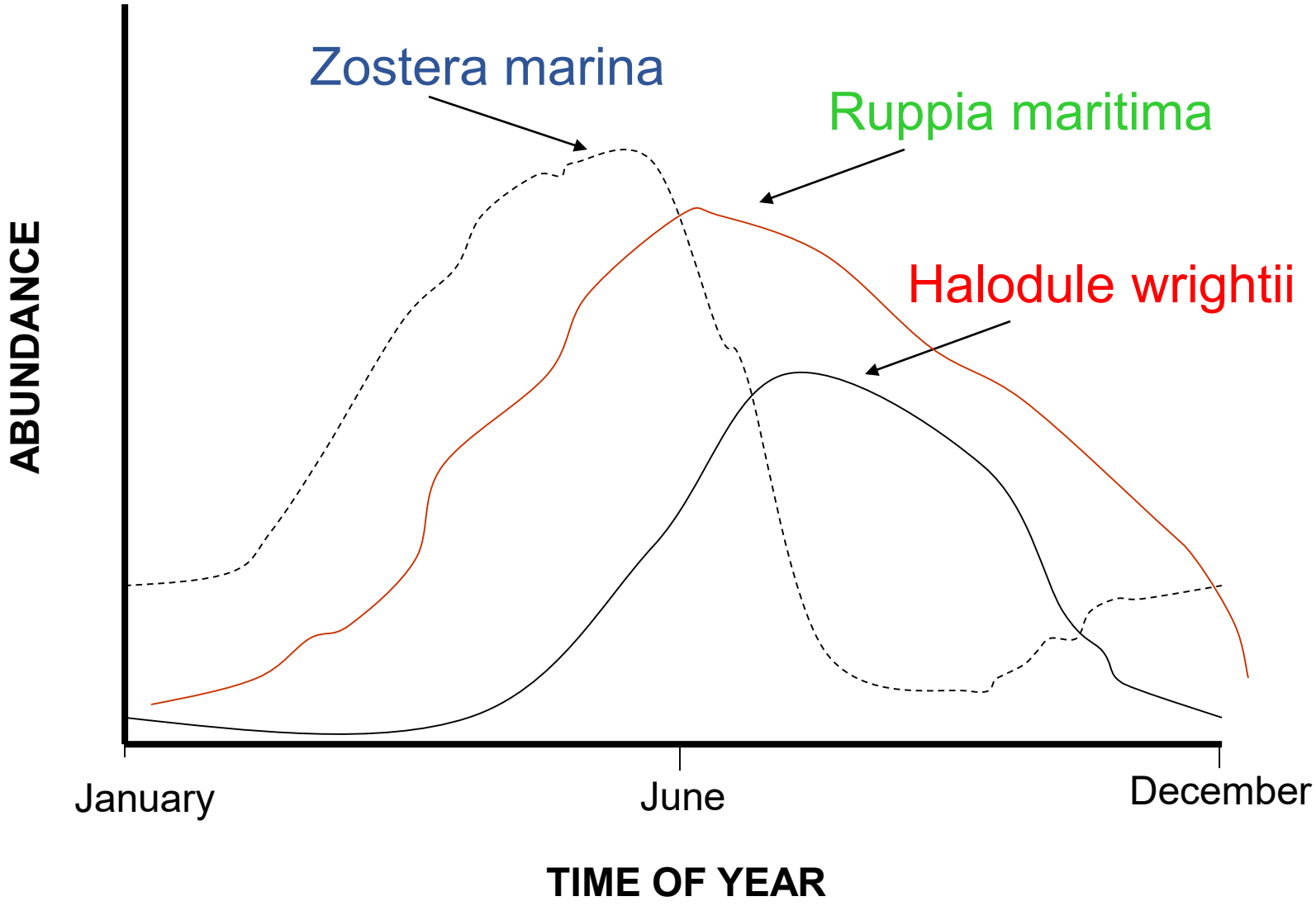
High-salinity species	Photos
Halodule wrightii (Shoal grass) Photo by: P. Prado	
Ruppia maritima (Widgeon grass) Photo by: P. Prado	
Zostera marina (Saltwater Eelgrass) Photo by: P. Prado	

TROPICAL

COSMOPOLITIN

TEMPERATE

SPECIES RANGE OVERLAP



HIGH SALINITY SAV TRENDS

2006 -2013

NORTH ZONE - 5.9%

CENTRAL ZONE - 2.67%

SOUTH ZONE - 10.38%

PERSPECTIVE AND CONSEQUENCE

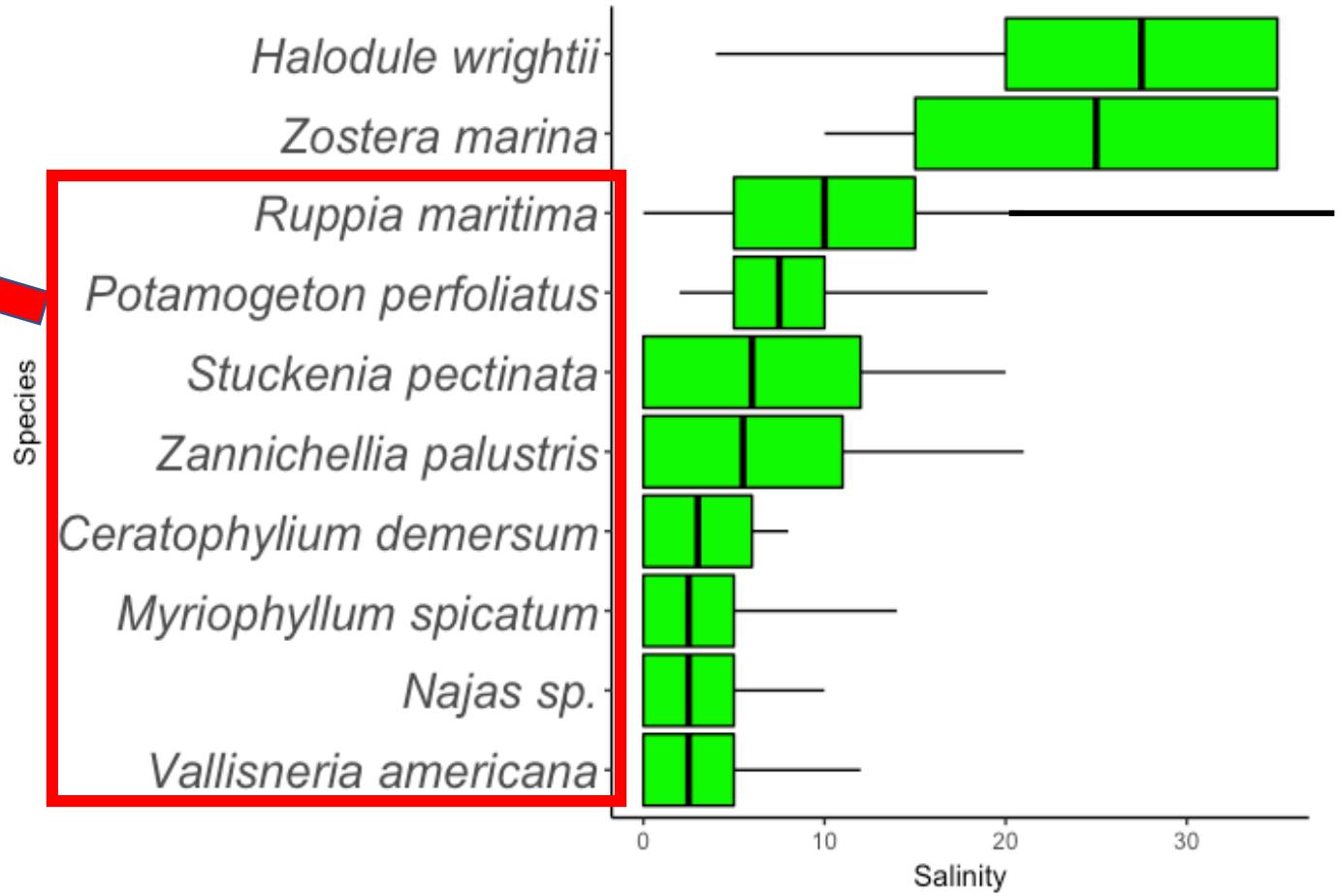
SOUTH ZONE (-1.5% Y^{-1})

ASSUME THIS RATE DOESN'T CHANGE

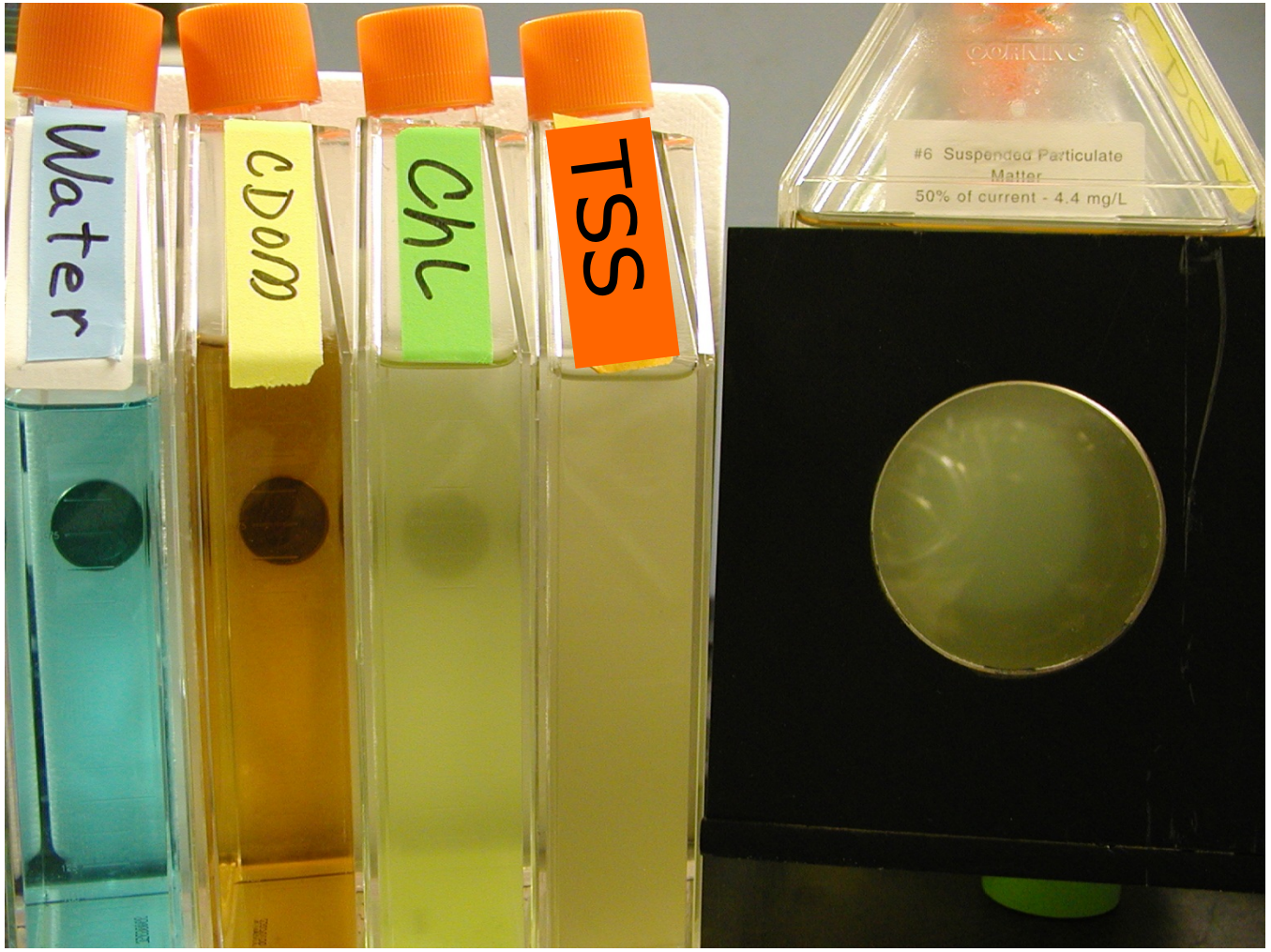
BY 2025 THE LOSS ~ 20%

WE SHOULD BE CONCERNED ABOUT THIS

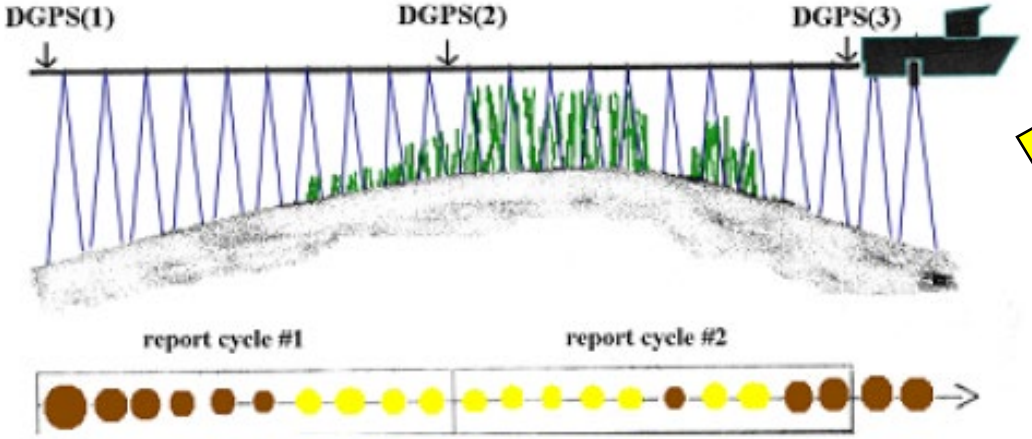
LOW SALINITY SAV PERSONALITY

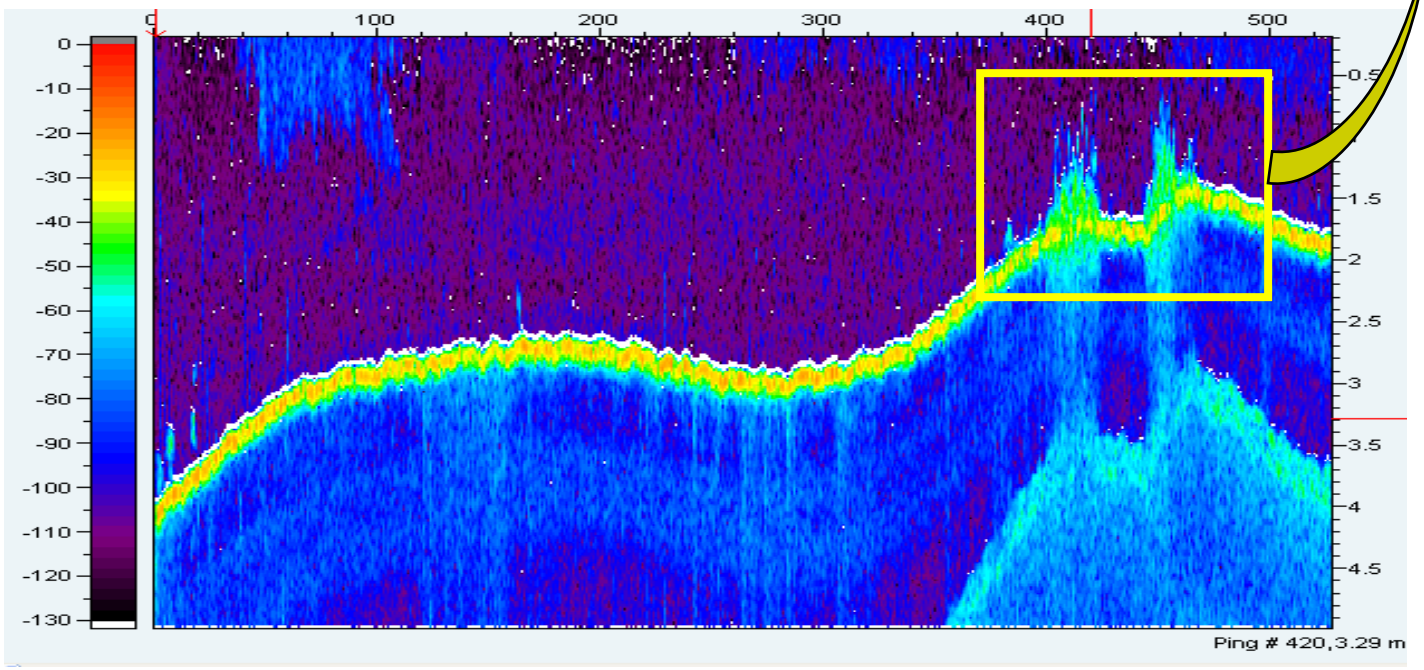


THE INVISIBLE SAV RESOURCE

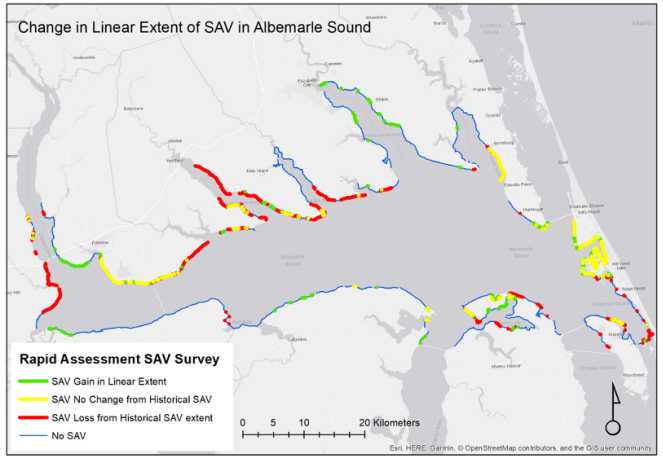


ACOUSTIC DETECTION METHODS (2011 – PRESENT)

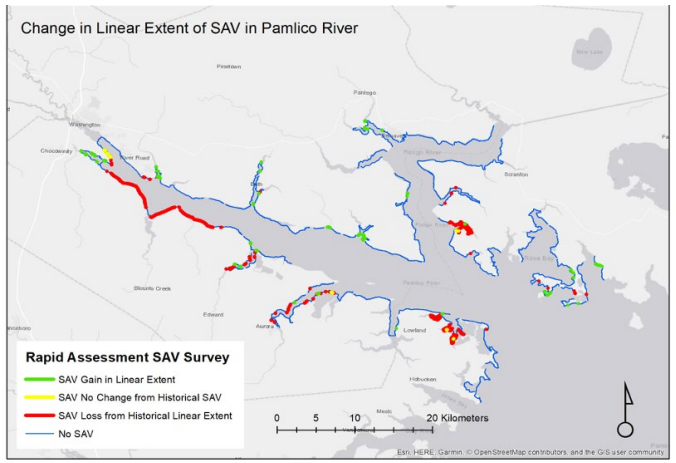




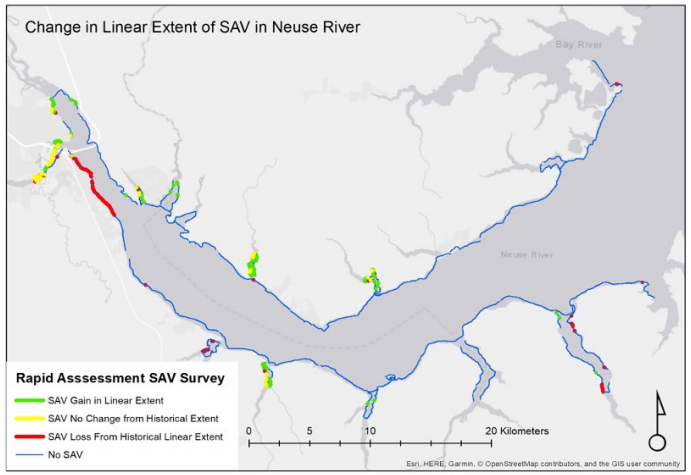
LOW SALINITY SAV RAPID ASSESSMENT SURVEY (2014 - 2019)



ALBEMARLE SOUND



PAMLICO RIVER



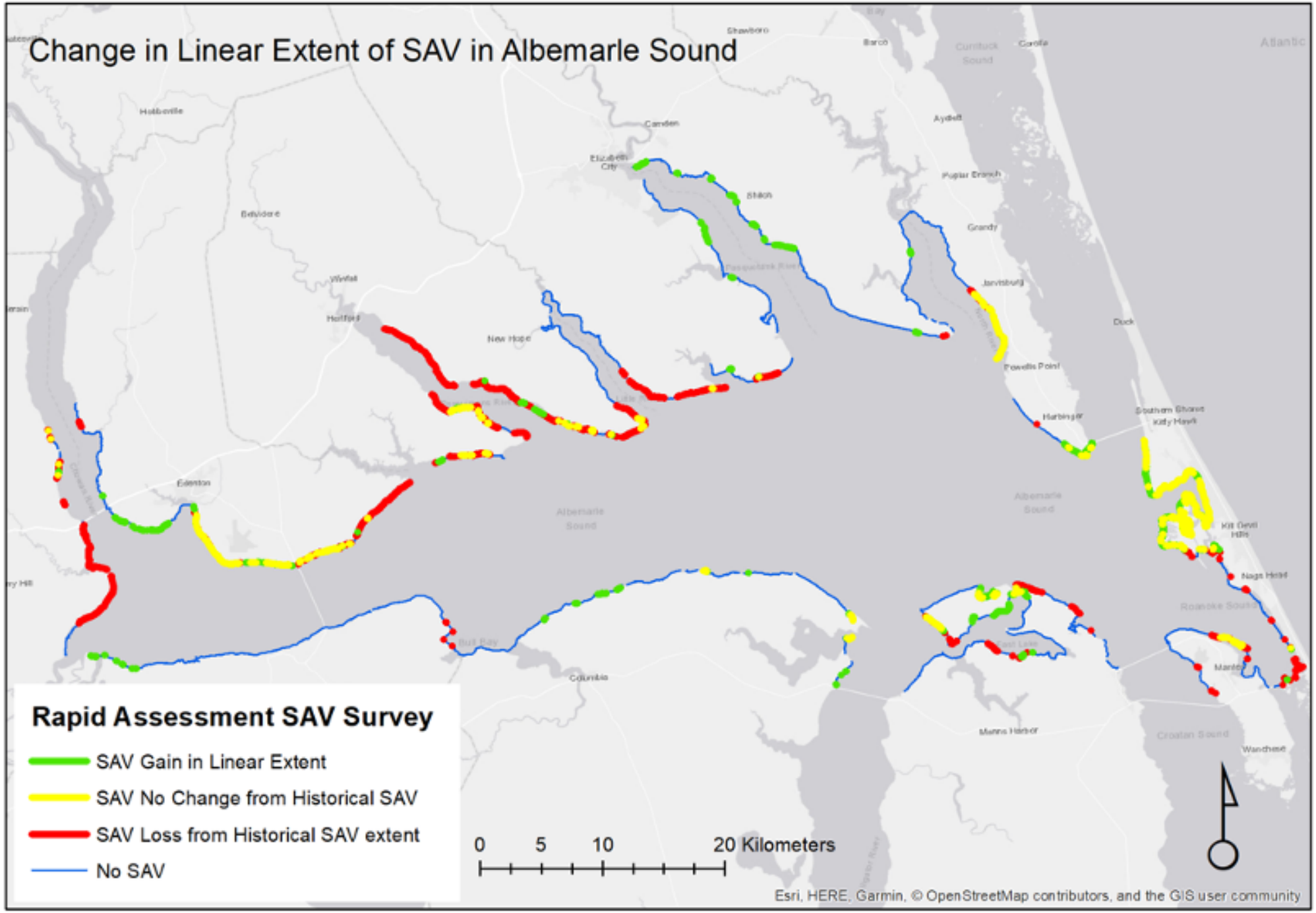
NEUSE RIVER

SHORE PARALLEL TRANSECTS

- 1.0 m ISOBATH

IN WATER VERIFICATION

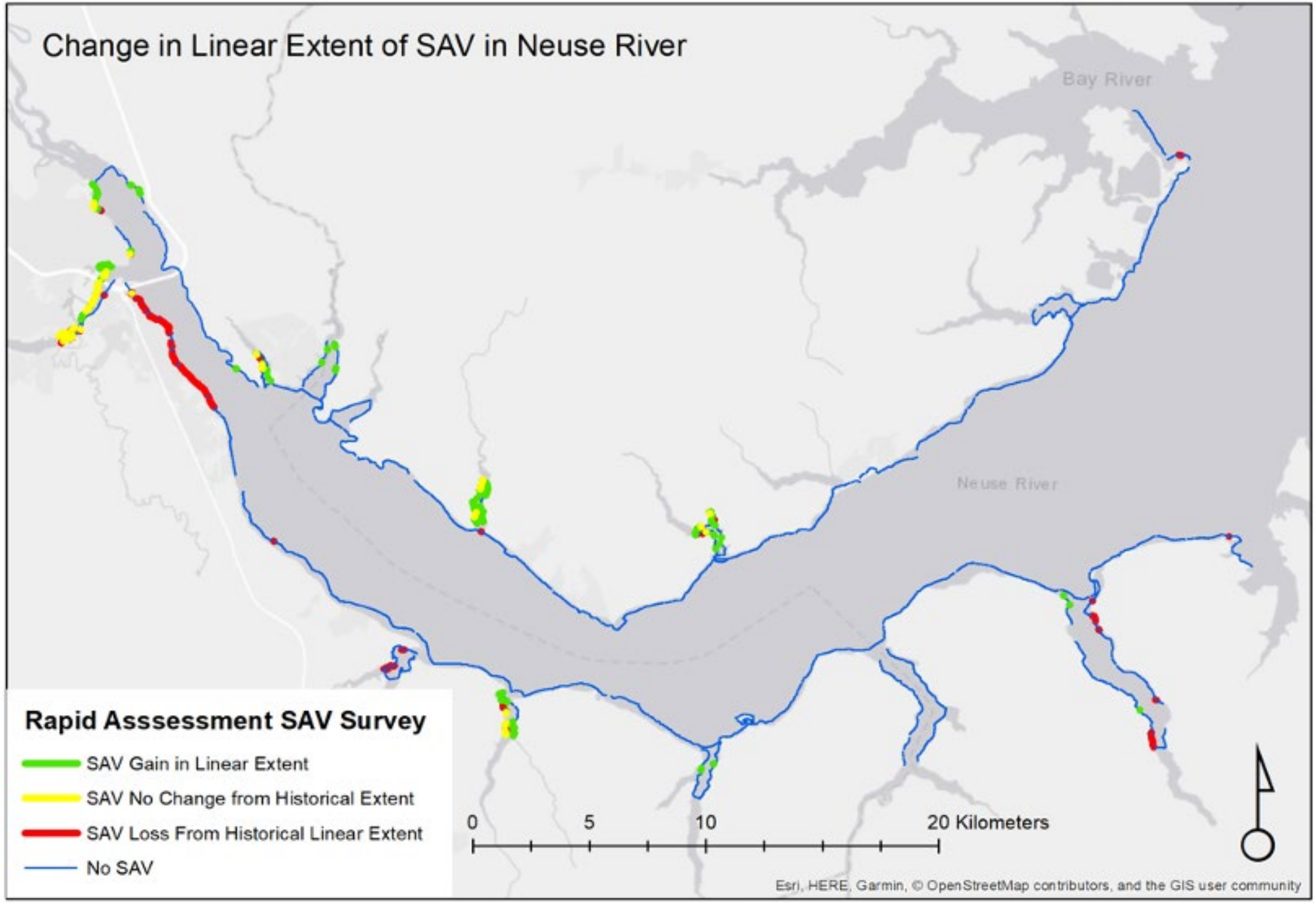
COMPARED TO HISTORICAL EXTENT


Change in Linear Extent of SAV in Albemarle Sound
Rapid Assessment SAV Survey
SAV Gain in Linear Extent
SAV No Change from Historical SAV
SAV Loss from Historical SAV extent
No SAV
0 5 10 20 Kilometers
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

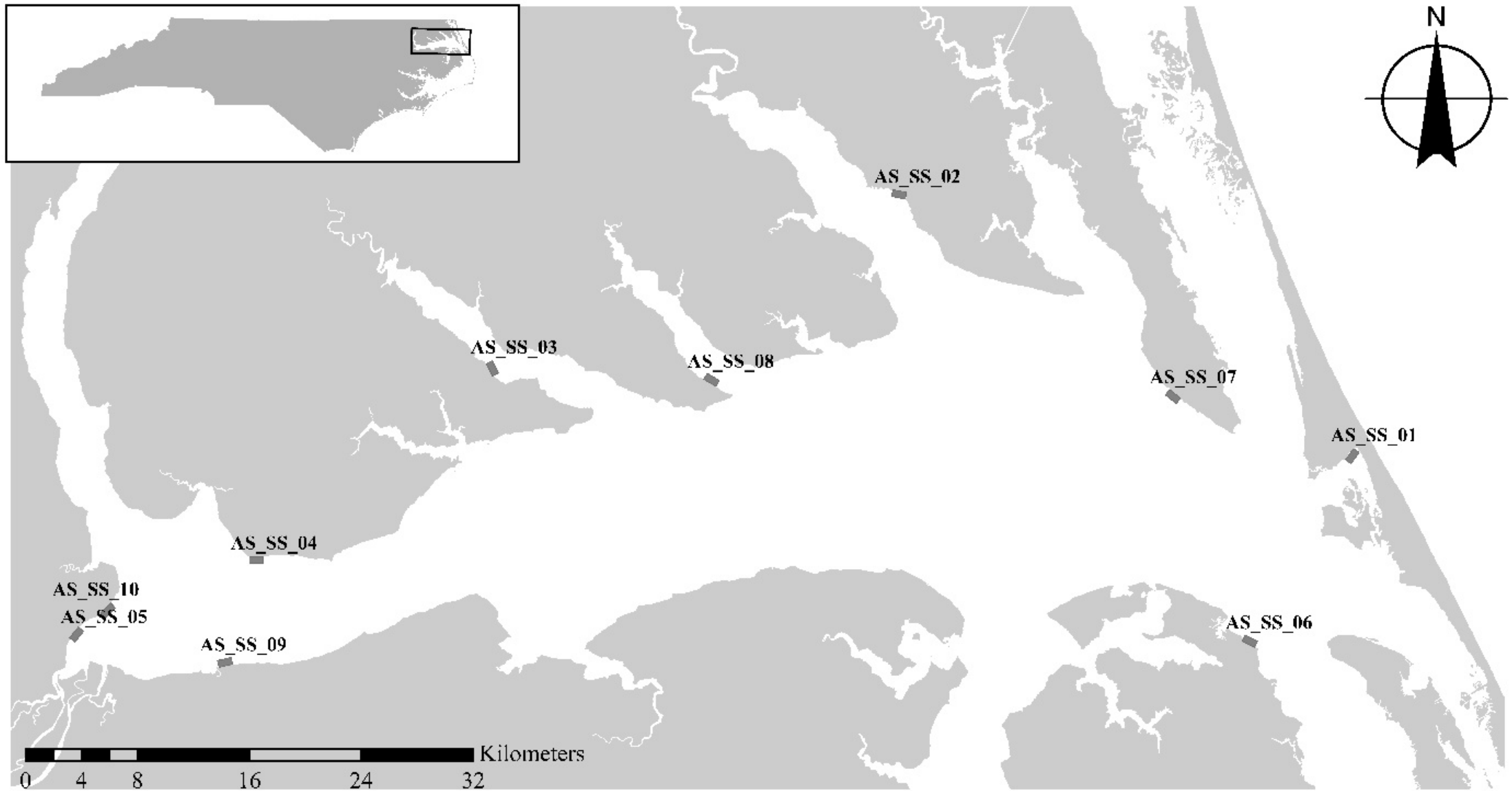
Estuary	Historical SAV LE (km)	2014-2017 SAV LE (km)	No Change in SAV LE from Historical (km)	Change in SAV LE (km GAIN)	Change in SAV LE (km LOSS)	% change in SAV (LOSS)	% net change in SAV (LOSS)
Albemarle Sound	117.78	90.56	56.45	34.11	61.32	-52.06	-23.10
Pamlico River	29.22	6.03	0.75	5.28	28.46	-97.41	-79.33
Neuse River	10.51	9.51	2.82	6.69	7.68	-73.11	-9.42
TOTAL	157.51	107.00	60.02	46.08	97.46	-61.88	-32.62

CHPP SOURCE DOCUMENT 2016

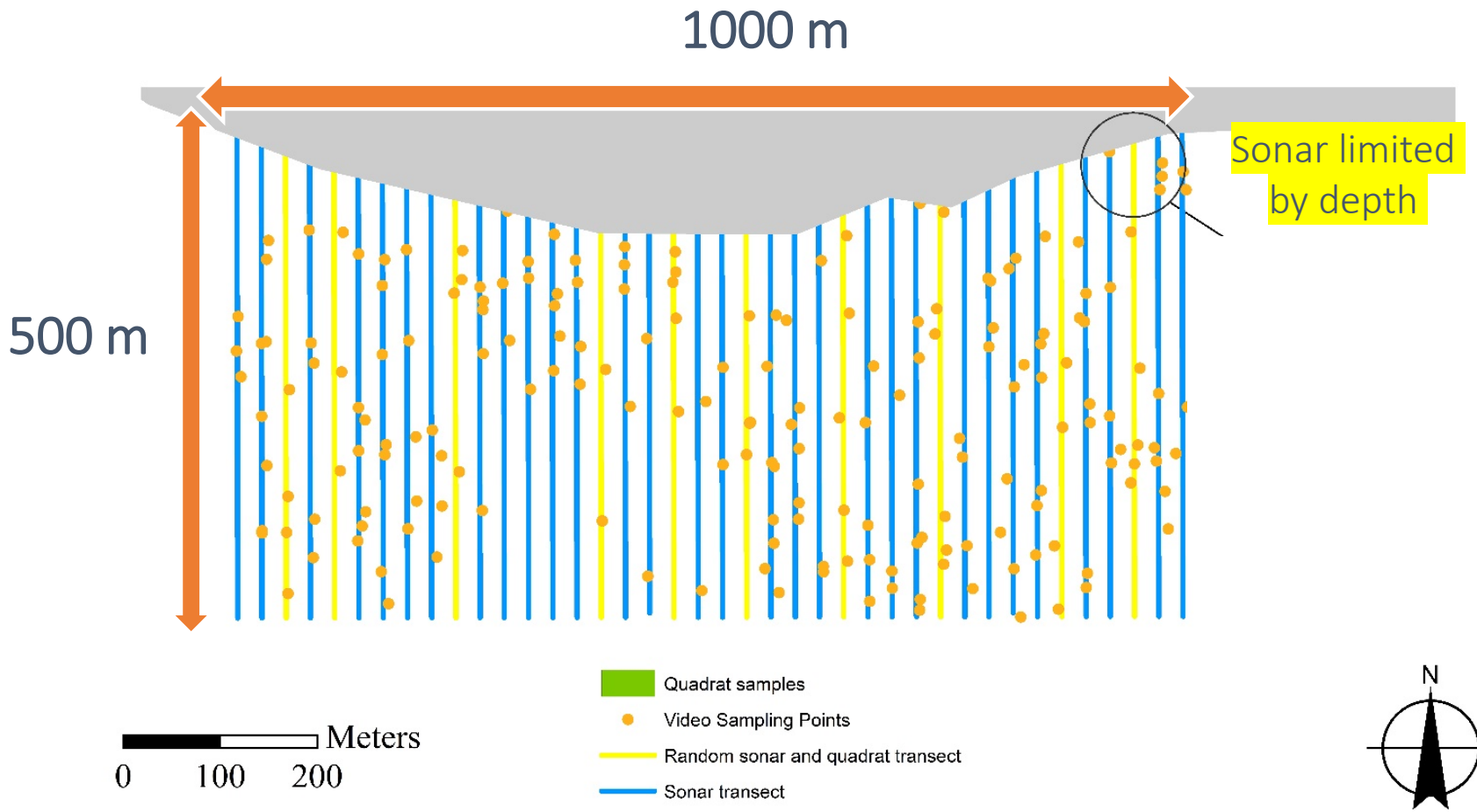
"In North Carolina, SAV loss has not been quantified, but anecdotal reports indicate that the extent of SAV may have been reduced by as much as 50%, primarily on the mainland side of the sounds (North Carolina Sea Grant 1997), (J. Hawkins, pers. com., B. J. Copeland, pers. com.)."

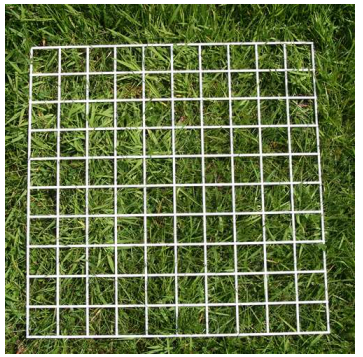

Change in Linear Extent of SAV in Neuse River
Bay River
Neuse River
Rapid Asssessment SAV Survey
SAV Gain in Linear Extent
SAV No Change from Historical Extent
SAV Loss From Historical Linear Extent
No SAV
0
5
10
20 Kilometers
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

TEN SENTINEL SITES



Methods: data collection

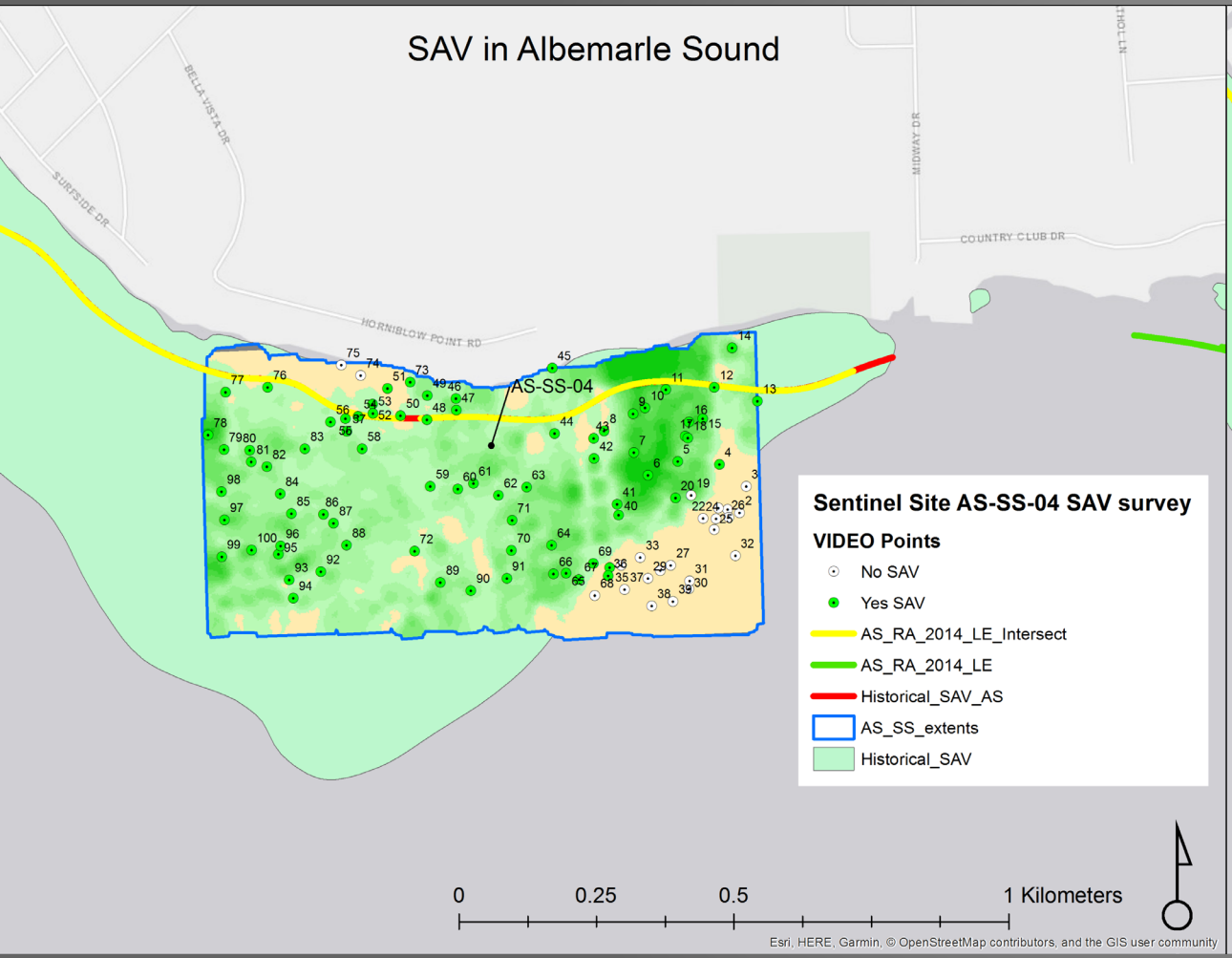




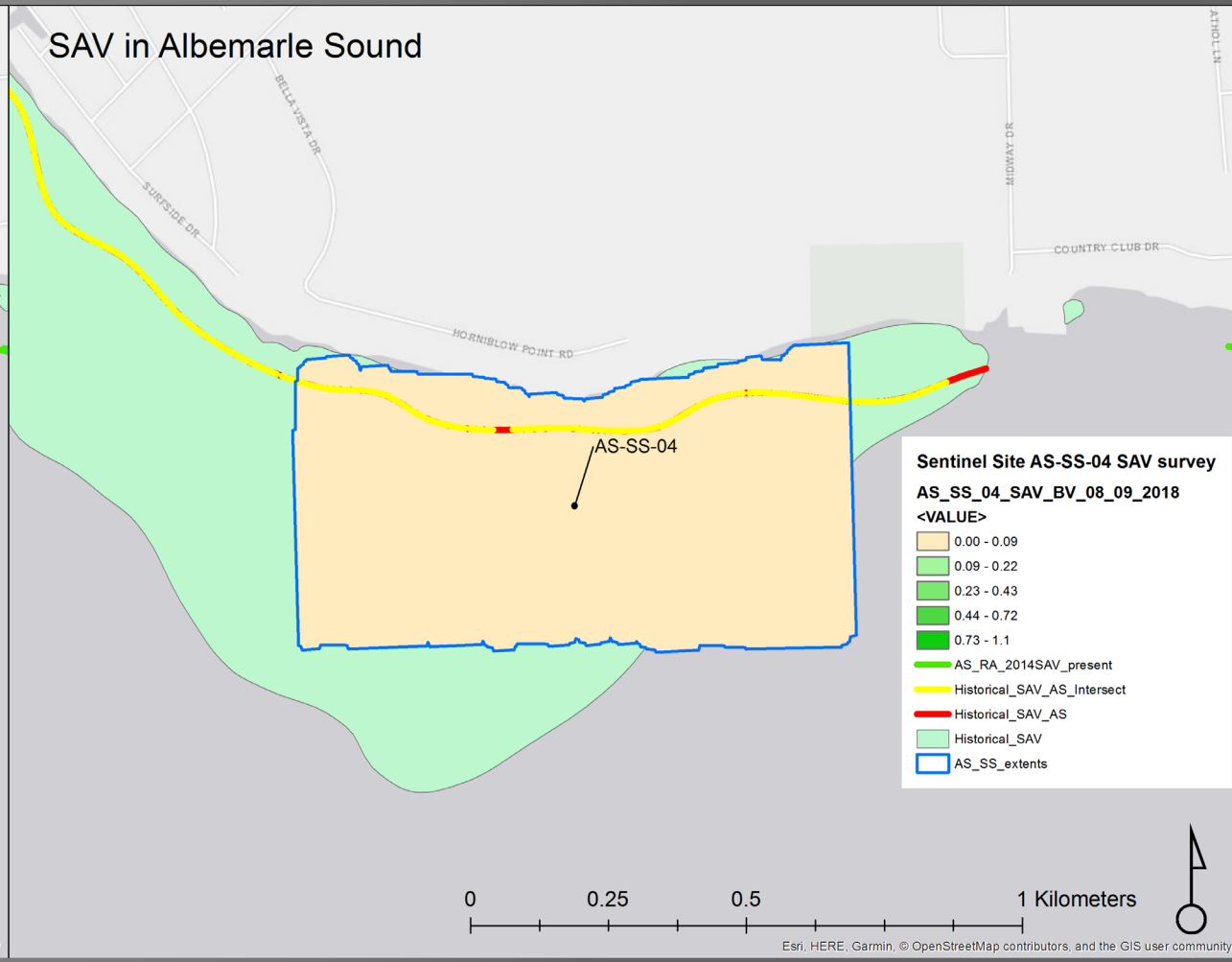
- Sample with sonar (same as RAS)
- 10 transects sampled with 1x1 m quadrats (in-water)

SENTINEL SITES; THE LIGHT GOES OUT

(2015 35.6 Ha)

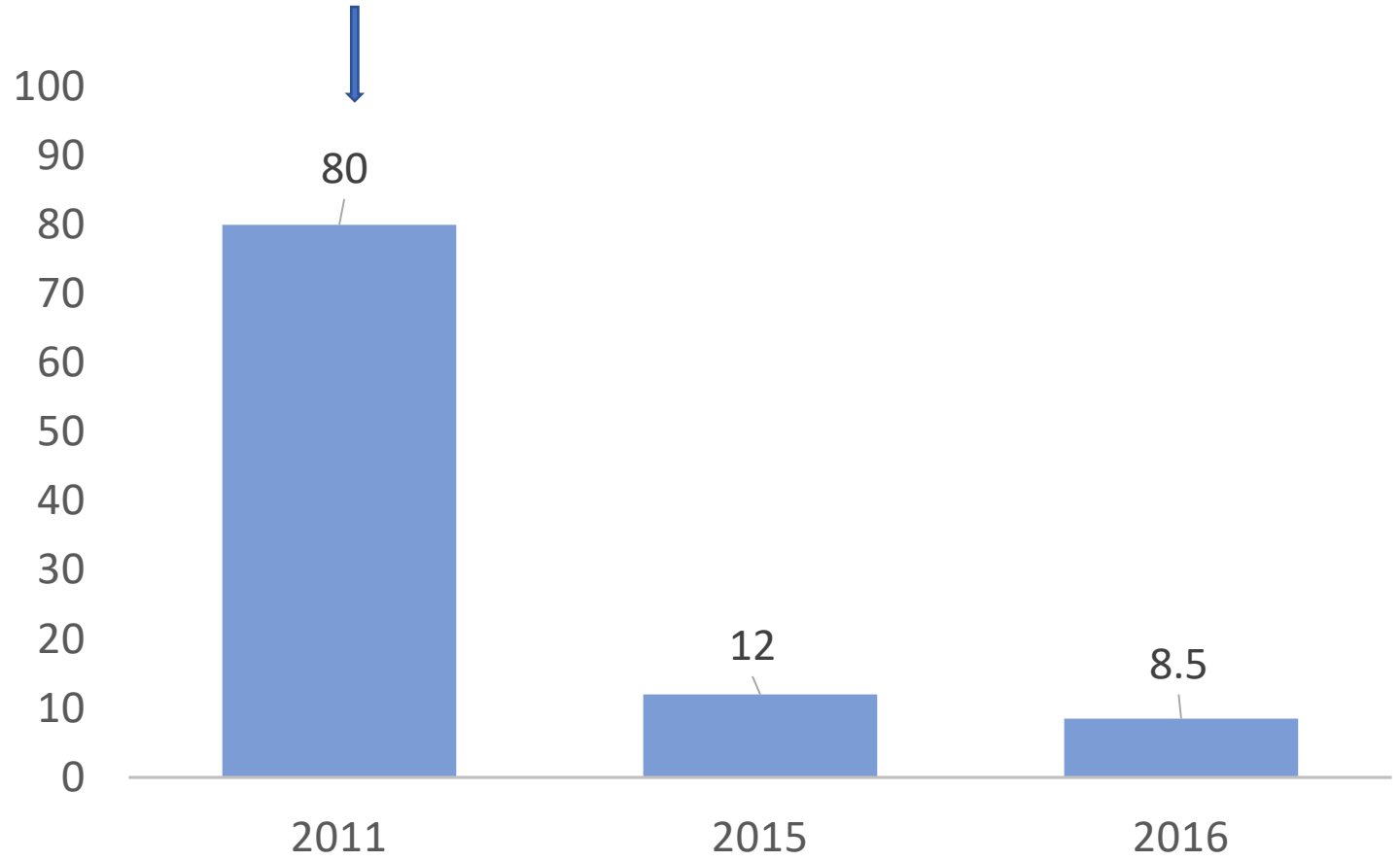


(2019 0.0 Ha)

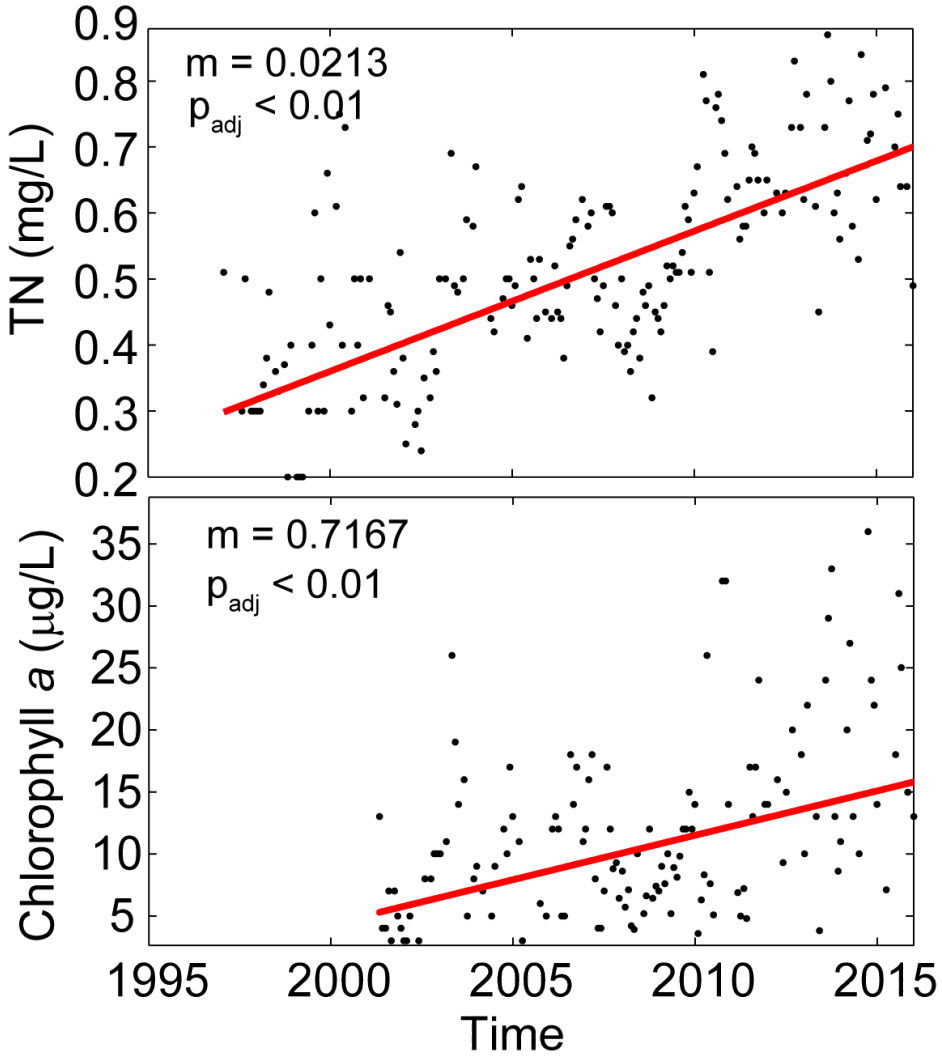


CHANGE IN PERCENT SAV COVER

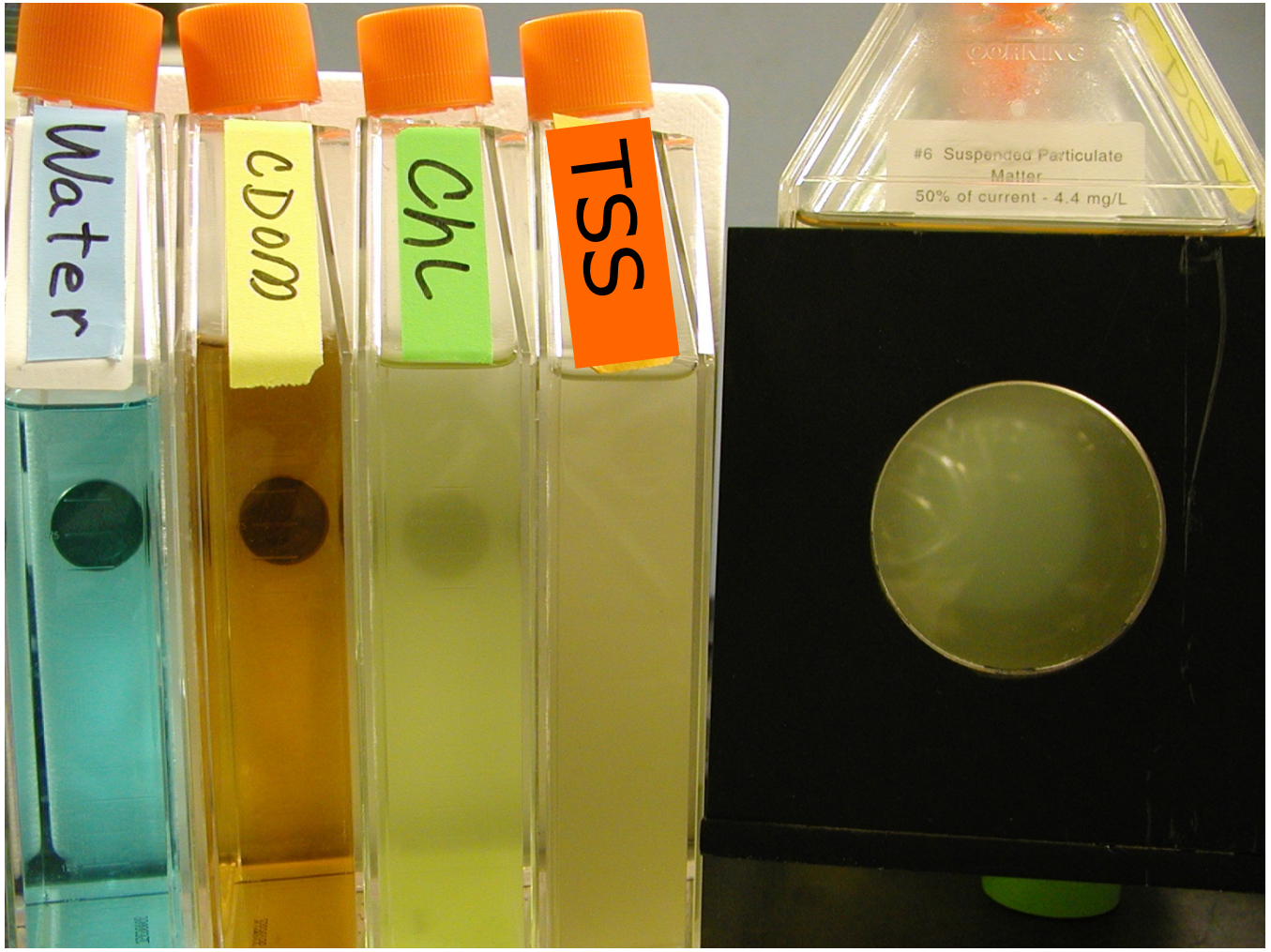
QUIBLE & ASSOC. SURVEYS (2007-2011)

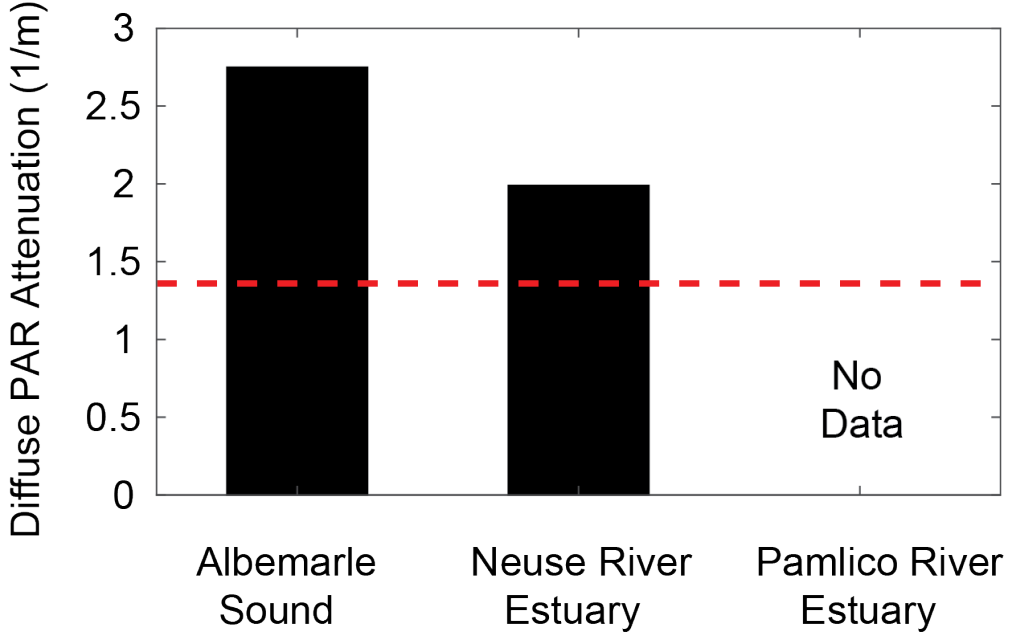


Total Nitrogen and Chlorophyll *a* in Eastern Albemarle Sound

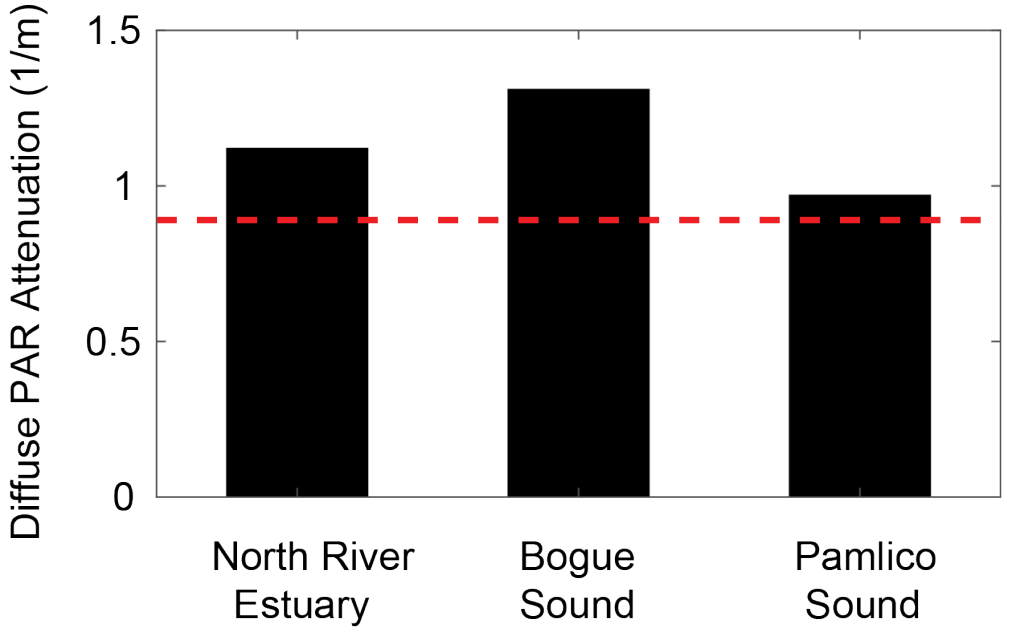


OPTICAL WATER QUALITY



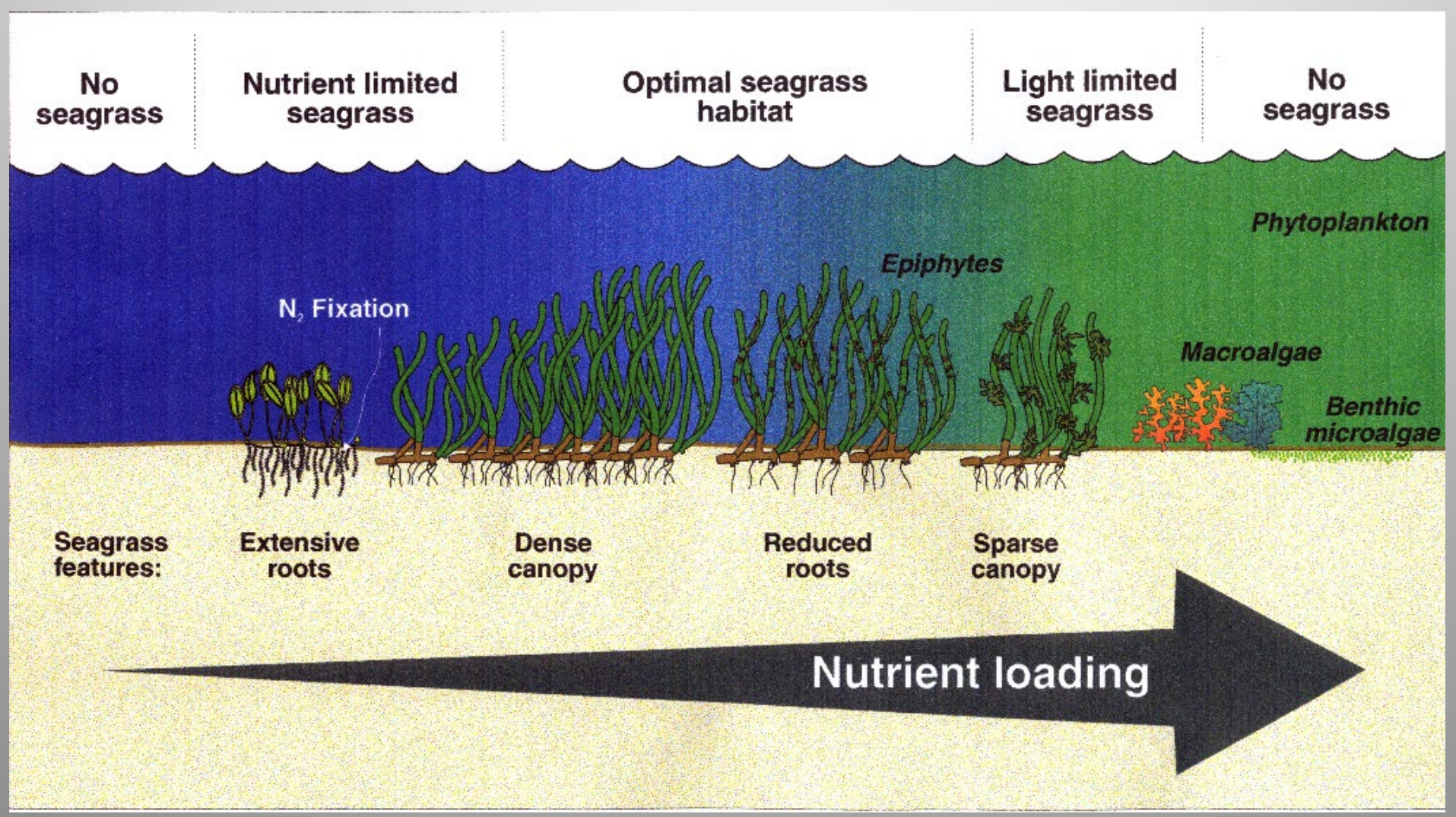


13% SI @ 1.5 m

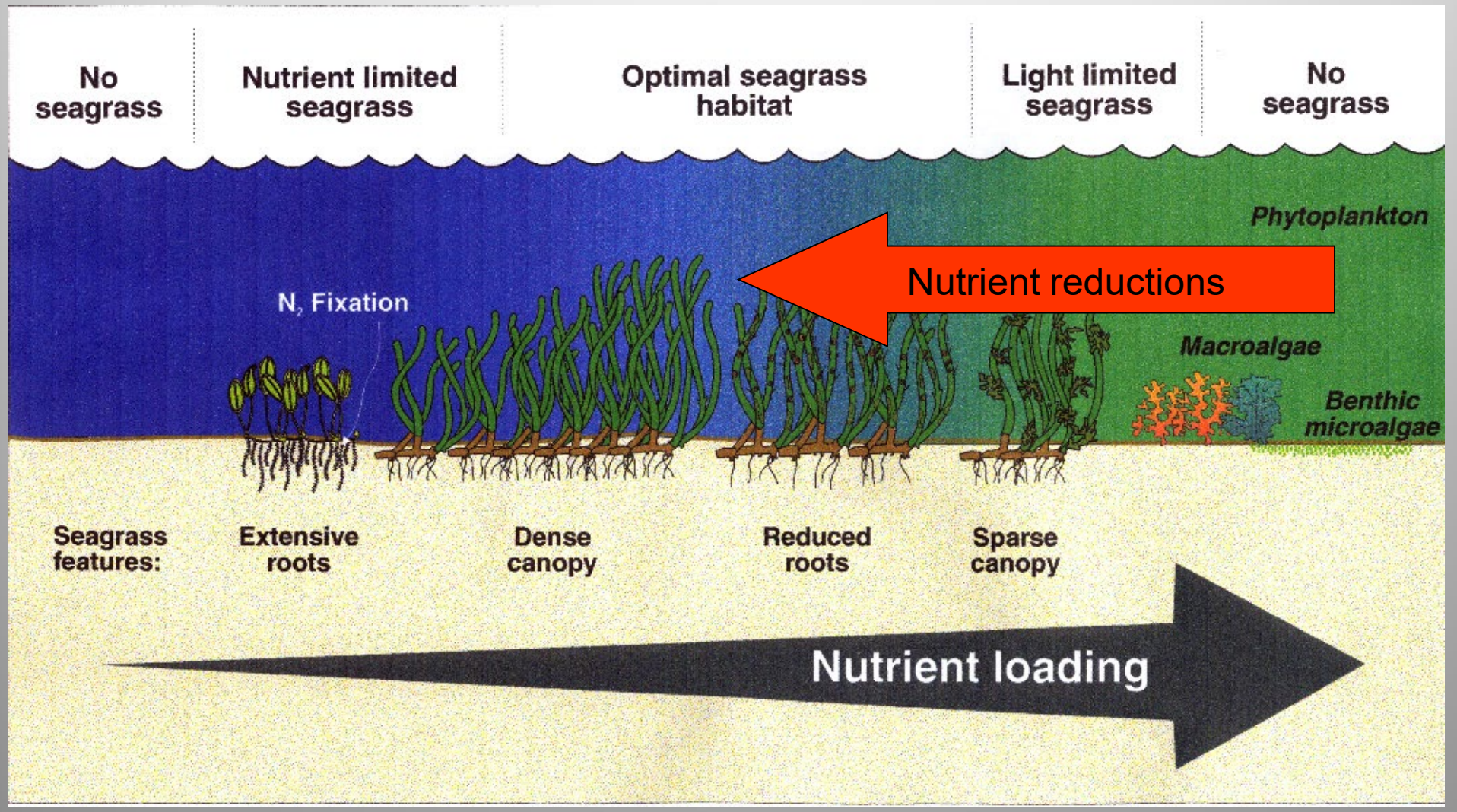


22% SI @ 1.7 m

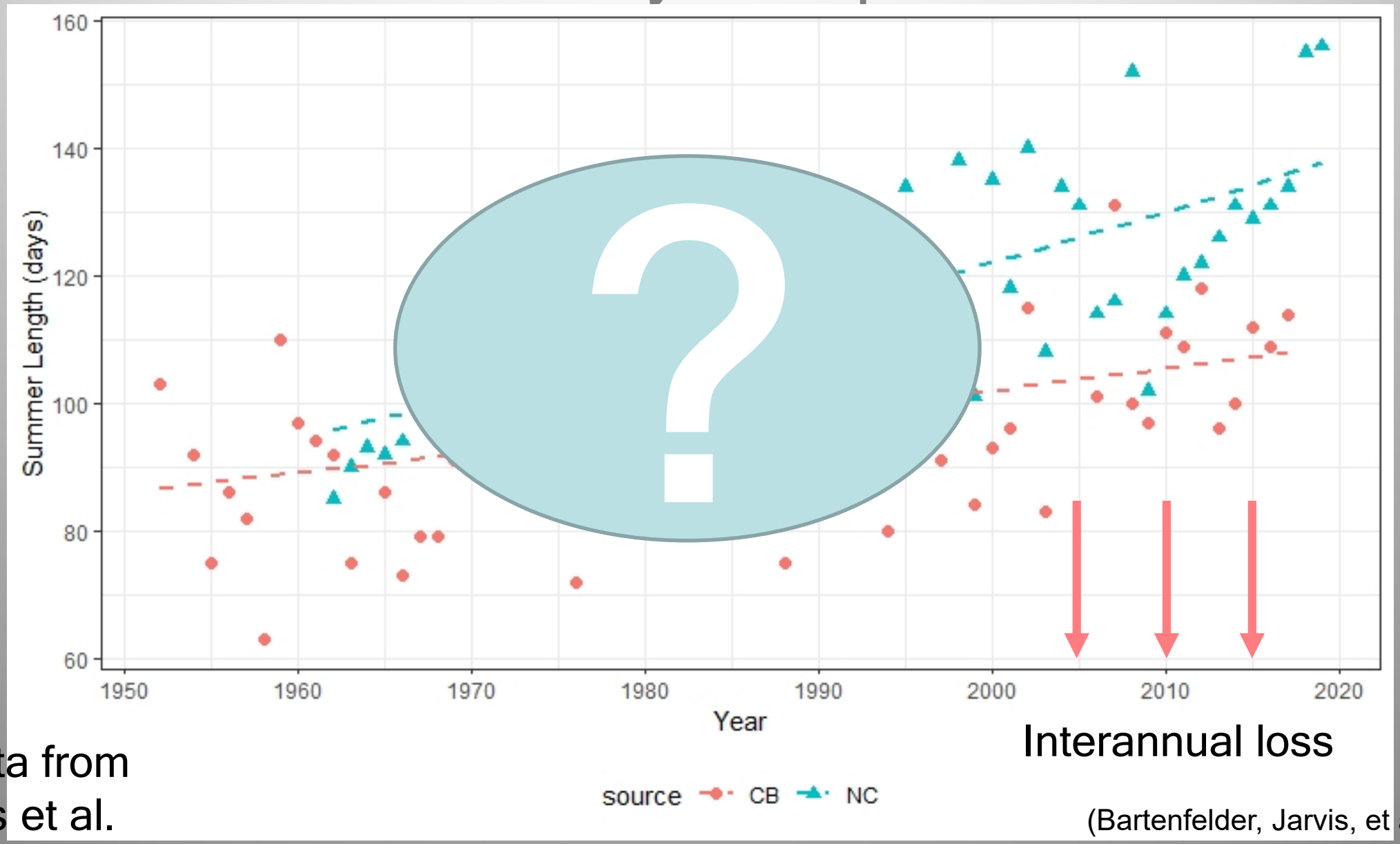
Nutrient and sediment loading = major cause of SAV declines



Nutrient and sediment reductions can lead to SAV recoveries



Water Quality: Temperature



Interannual loss

CB Data from Shields et al. 2018

(Bartenfelder, Jarvis, et al. *in prep*)