

Albemarle Sound demonstration study for the National Monitoring Network for U.S. Coastal Waters and their tributaries

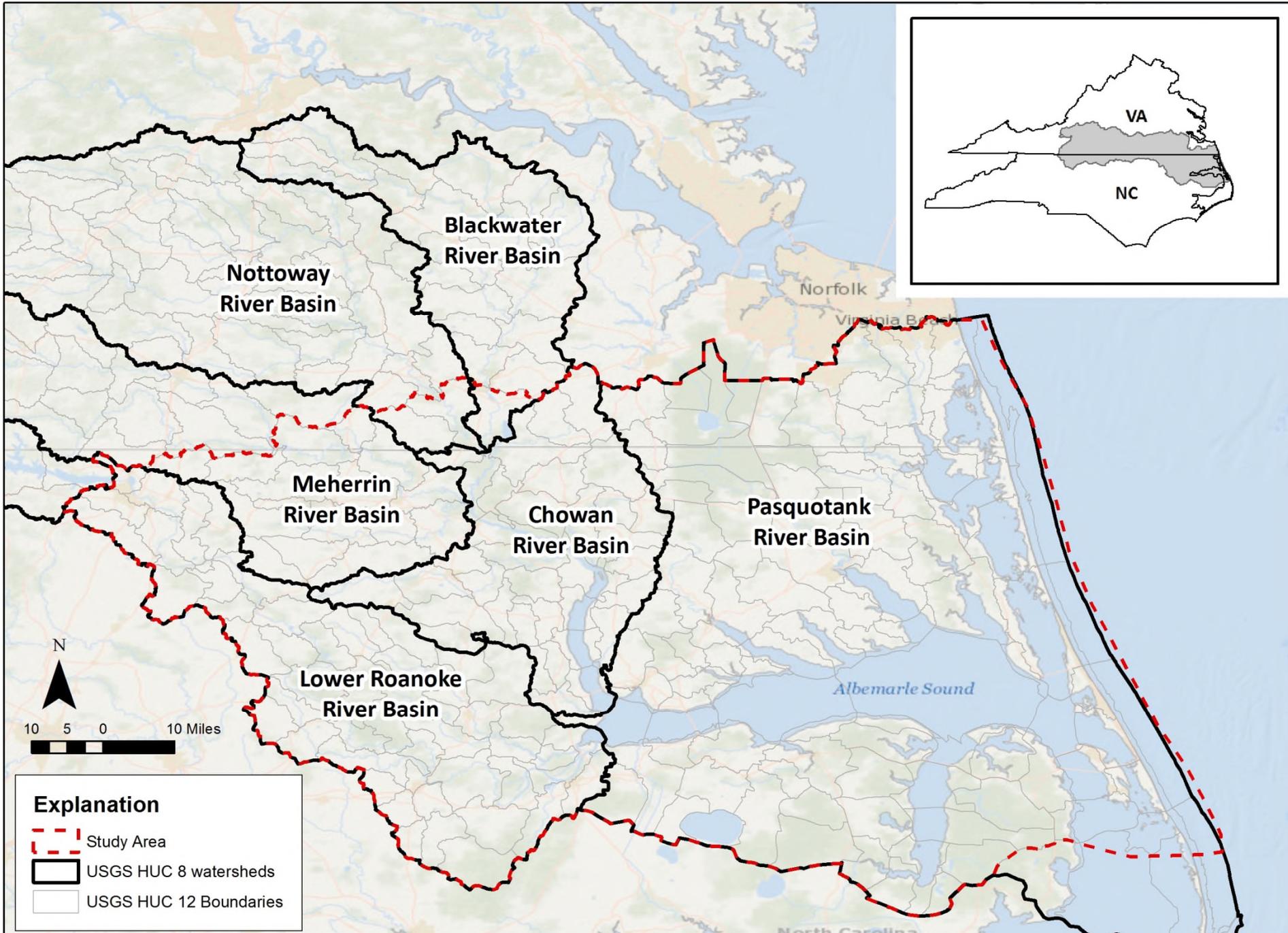
Michelle Moorman



What is the National Monitoring Network for U.S. Coastal Waters and their tributaries?



- The National Monitoring Network is a design that can be used to improve estuarine monitoring
 - A “Network of Networks”
 - An integrated, multidisciplinary, and multi-organizational approach to monitoring
 - It will augment existing monitoring programs and link observational capabilities



**Nottoway
River Basin**

**Blackwater
River Basin**

**Meherrin
River Basin**

**Chowan
River Basin**

**Pasquotank
River Basin**

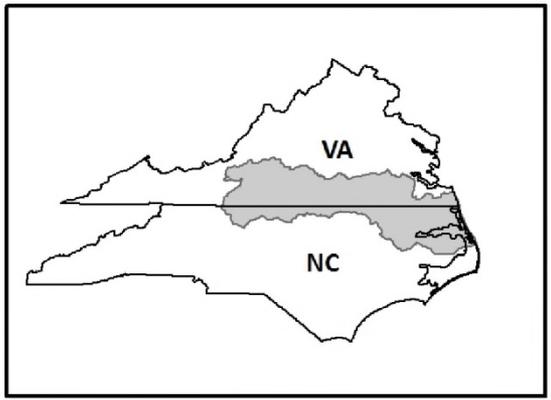
**Lower Roanoke
River Basin**

Norfolk

Virginia Beach

Albemarle Sound

North Carolina



N

10 5 0 10 Miles



Explanation

-  Study Area
-  USGS HUC 8 watersheds
-  USGS HUC 12 Boundaries

Implementation of the Albemarle demonstration project

Obj. 1: Assess current monitoring programs

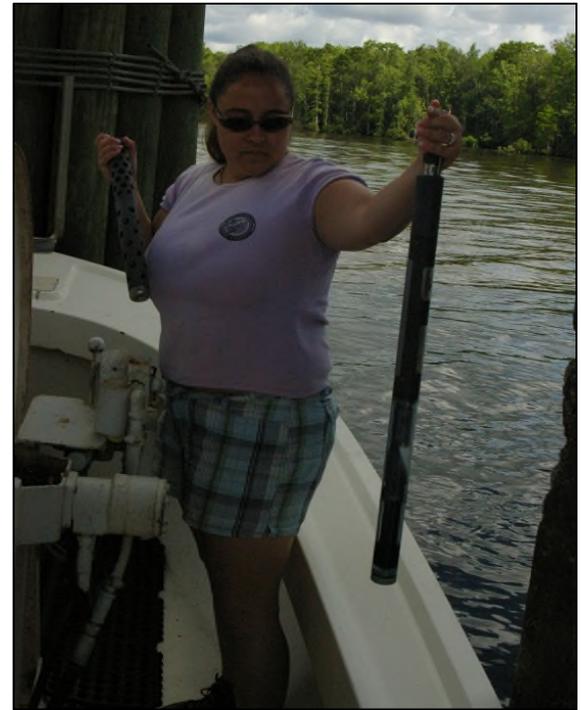
- Inventory current monitoring programs in the Region
- Conduct a gap analysis to determine current monitoring needs
- Publish Albemarle Region monitoring database and report

Obj. 2: Implement monitoring to address data gaps

- Conduct a regional water-quality synoptic
- Implement a pilot monitoring program to address nutrient and phytoplankton data gaps
- Synthesize available data to report on water quality in the Albemarle Sound and provide guidance for further research and monitoring

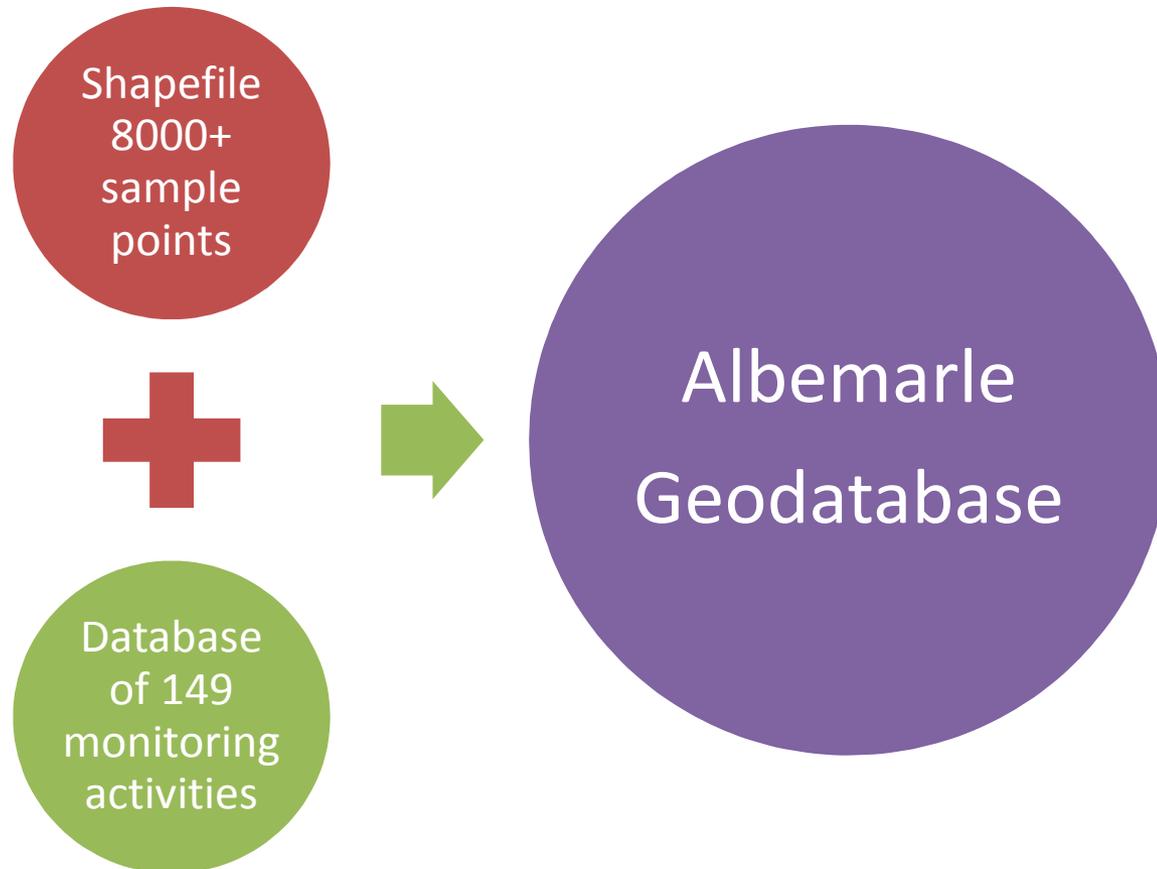
Partner collaboration has been used

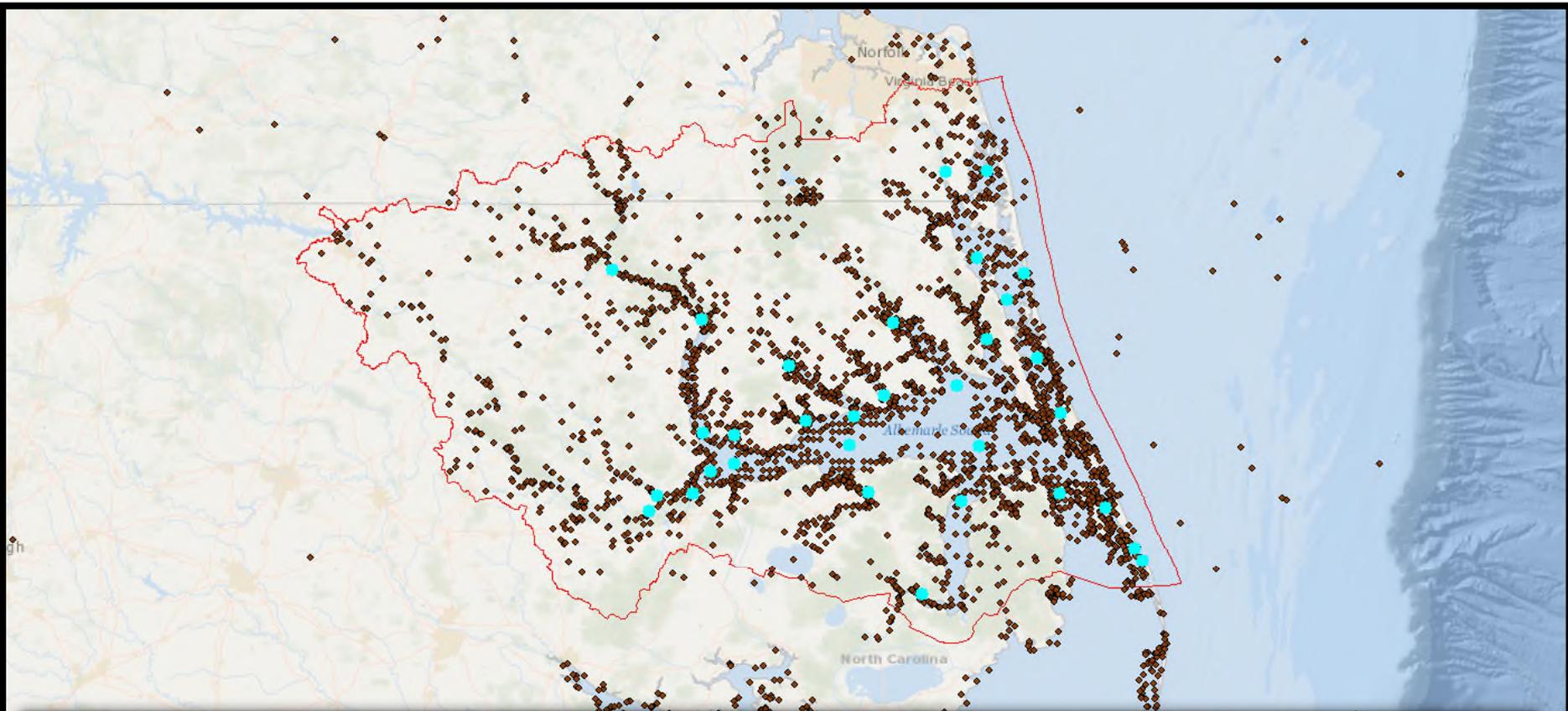
- Document current monitoring programs including
 - Location of monitoring sites
 - Agency contacts
 - Type of data collected
 - Links to on-line holdings
 - Metadata
- Identify specific management issues that research and monitoring could address
- Collaborate on monitoring and research



Develop Albemarle Monitoring Database

- Worked in partnership with Albemarle-Pamlico National Estuary Program
- Compiled information into a geospatial database that could be queried
- Database includes 19 organizations documenting 62 current monitoring, 18 current research, and 26 recently discontinued projects.





Table

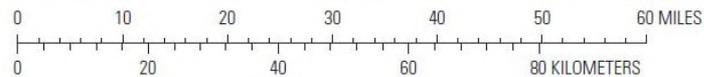
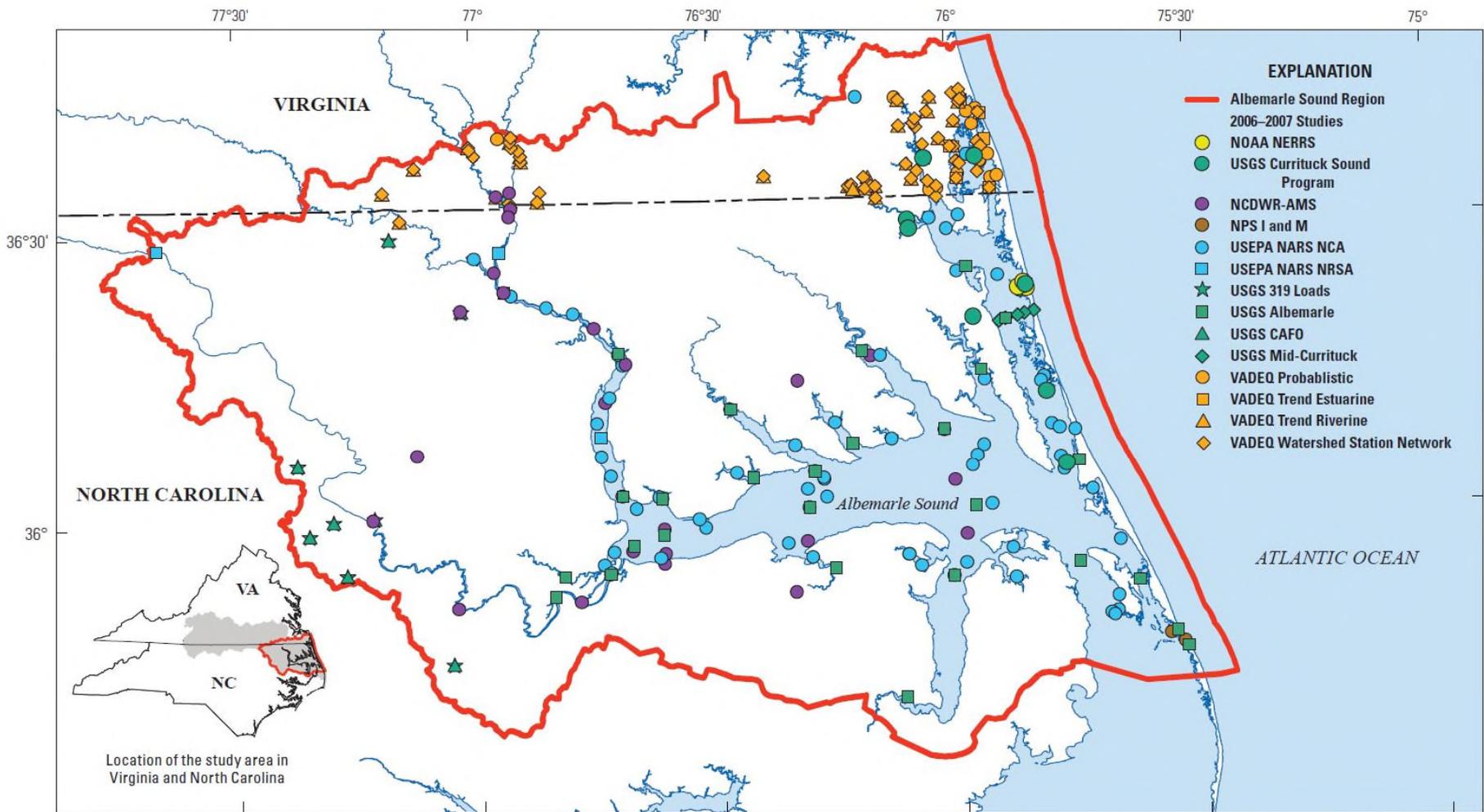
MonPrograms12102013

SamplName	Cnt_Samp	Org	Div	LastName	FrstName	Phone	Em
AgLUS_Trend	7	USGS	NC WSC	Harned	Doug	919-571-4024	daharned@usgs.gov
AgLUS_WL	9	USGS	NC WSC	Harned	Doug	919-571-4024	daharned@usgs.gov
AgroEcosystem Services Remote Sensing Crops	5	USEPA	Environmental Sciences	Williams	David	919-541-2573	williams.david@epa.g
AgroEcosystem Services Remote Sensing RS	5	USEPA	Environmental Sciences	Williams	David	919-541-2573	williams.david@epa.g
Albemarle Sediment	20	USGS	NC WSC	Moorman	Michelle	919-571-4013	mmoorman@usgs.gov
Albemarle2012	32	USGS	NC WSC	Moorman	Michelle	919-571-4013	mmoorman@usgs.gov
Albemarle2013	8	USGS	NC WSC	Moorman	Michelle	919-571-4013	mmoorman@usgs.gov
APNEP CMP	7	NC DENR	APNEP	Smith	Chad	252-328-1747	smithmich@ecu.edu
Back Bay Phragmites Inventory	1	USFWS: VA Dept. Conservat	Back Bay N.W.D. Division of Natural Har	Gallone & Heffernan	John & Kevin	757-301-7370/154	John_Gallone@fwp

(1 out of 148 Selected)

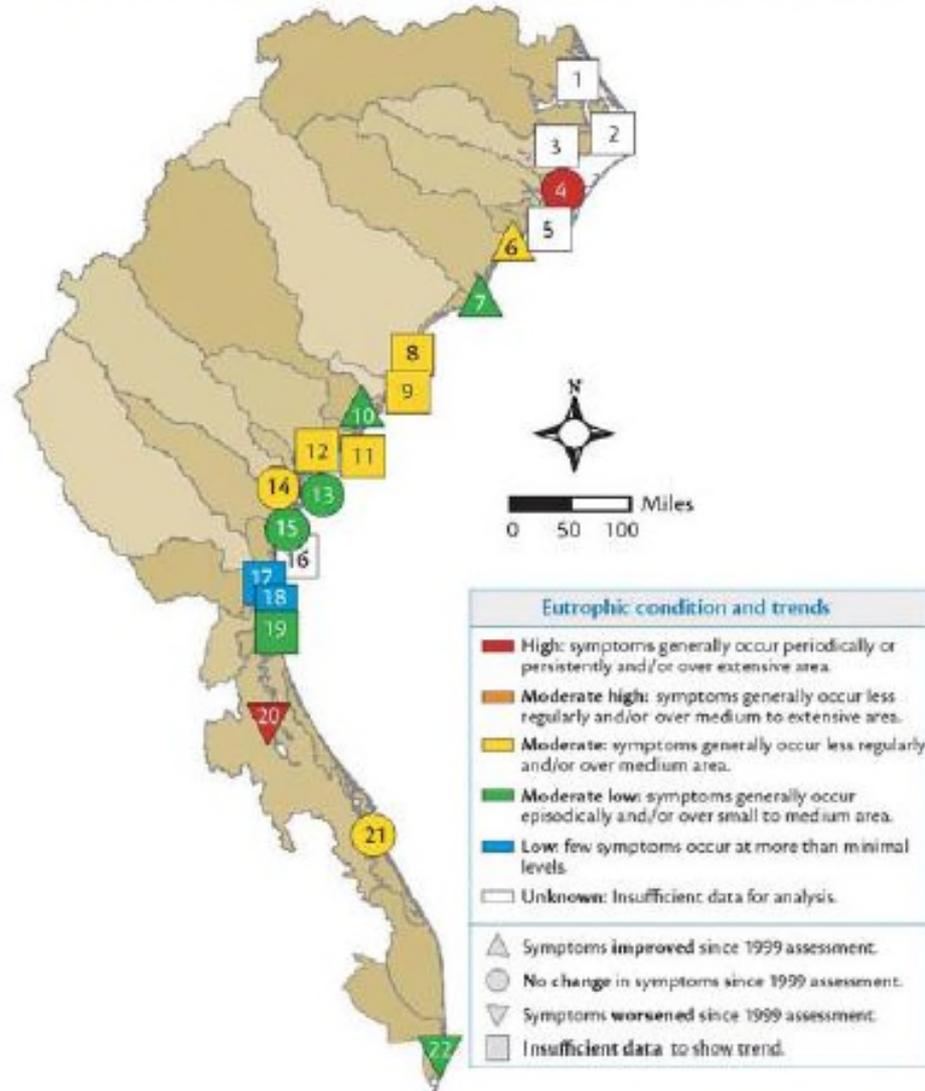
albemon_11182013 | MonTableShort | Organizations | Sum_Output | Organization | Org2 | Sum_Output_2 | MonPrograms12102013

Table Of Contents | Table



Eutrophication status of estuary unknown

Nutrient Pollution (Eutrophic) Condition of Southeast Coastal Region Estuaries in 2004



Soundwide synoptic conducted

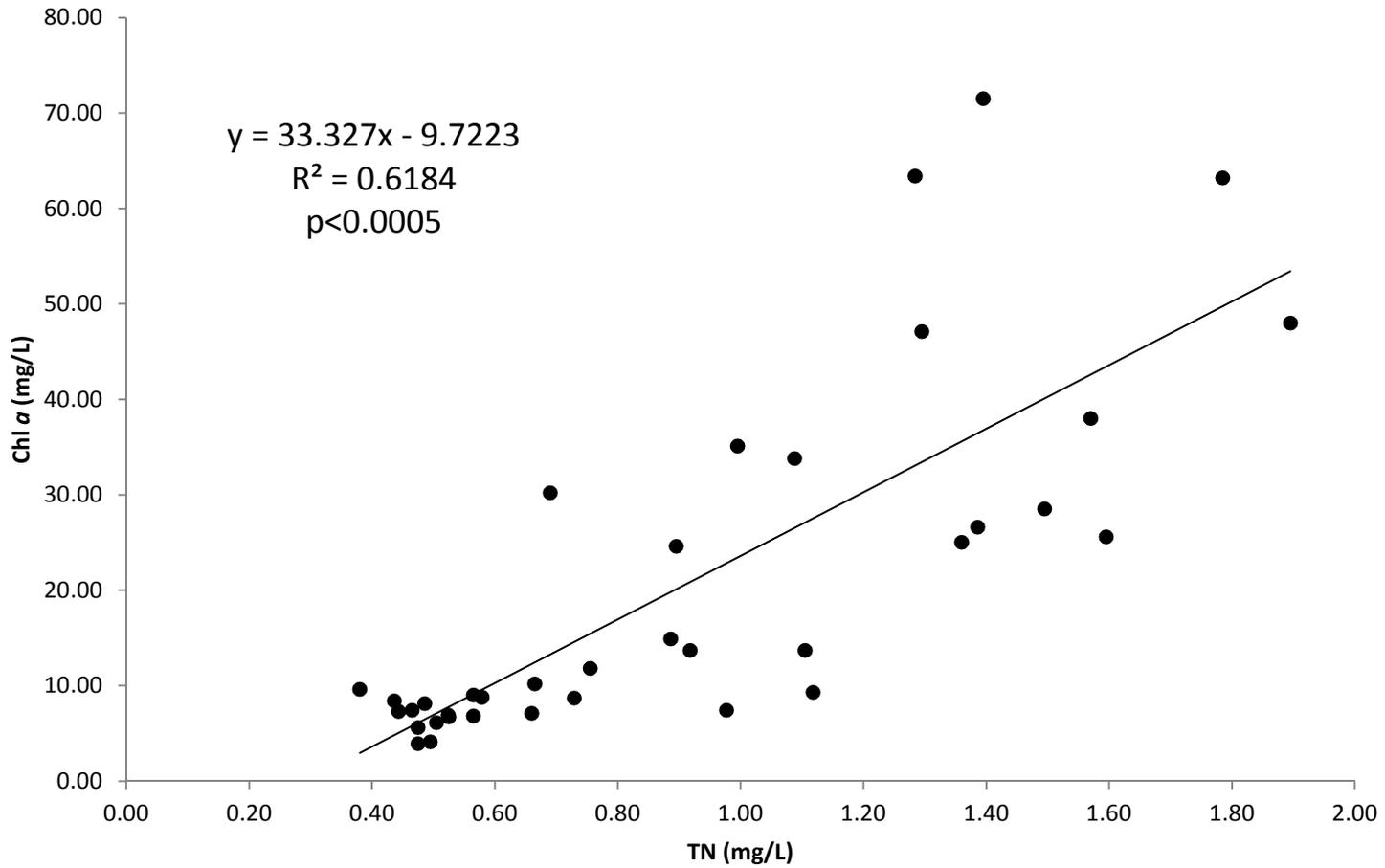
- **Objective:** Improve understanding of water quality in Albemarle Sound with a specific emphasis on eutrophication and harmful algal blooms
- Samples Analyzed for:
 - Phytoplankton composition, Nutrients, Silica, DOC, Cyanotoxins
 - Total Suspended Solids
 - Chlorophyll a , Temp, DO, pH, conductivity, turbidity, PAR, secchi depth, alkalinity
 - Pesticides (Atrazine and glyphosate)
 - Metals in water and sediment



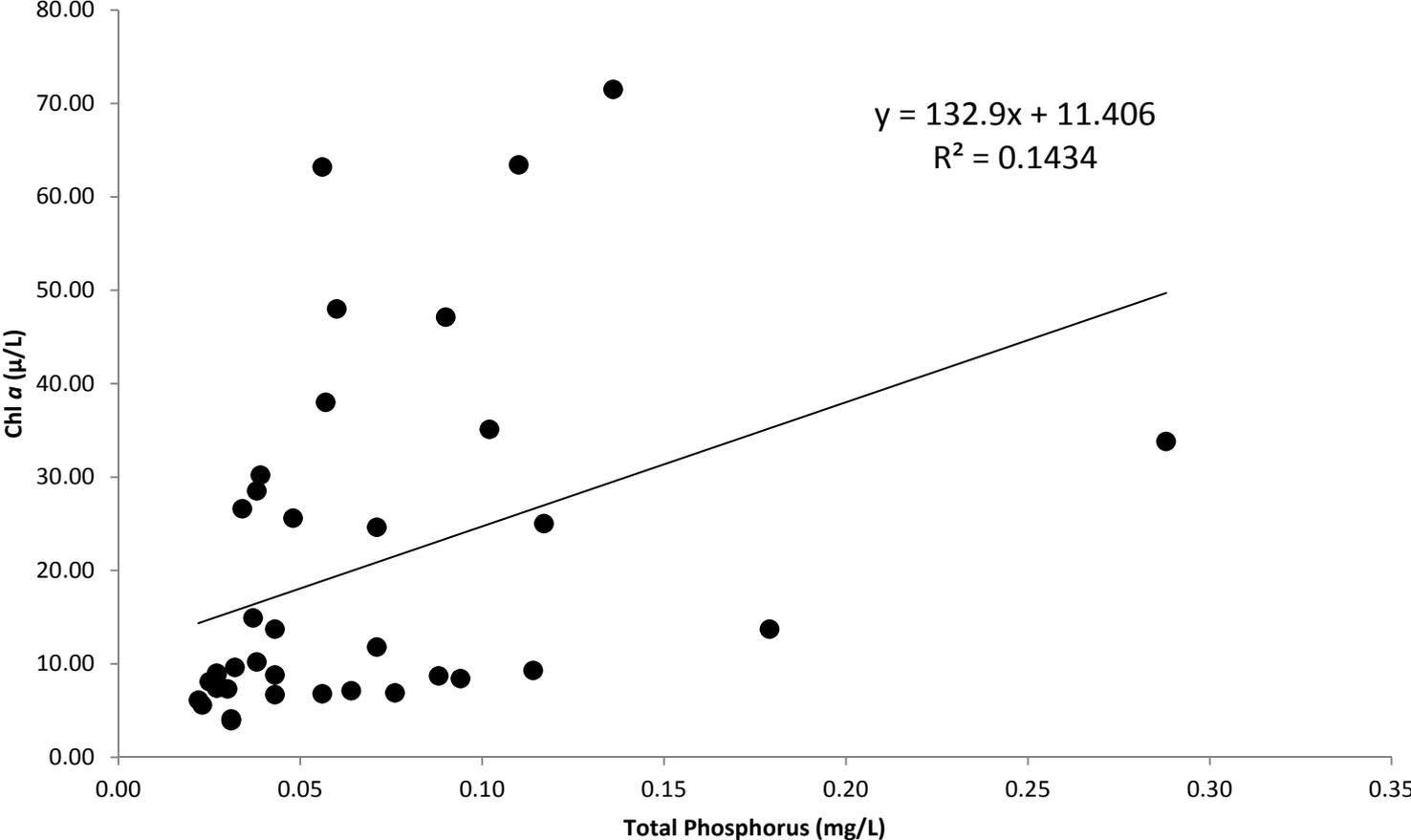
Results from 2012 synoptic: Number of samples exceeding regulatory limits or NOAA guidelines

- 20 Sediment Samples at 20 sites
 - ERM Lead (>8.0 ppm, 13 sites)
 - ERL for Mercury (≥ 0.15 mg/kg, 7 sites)
- 41 Water Samples at 33 sites
 - Chl a (≥ 40 mg/L, 5 samples)*
 - high pH (≥ 8.5 , 5 samples)*
 - low DO (<5 mg/L, 2 samples)*
 - Zinc (86 $\mu\text{g/L}$, 1 sample)*
 - Copper (3 $\mu\text{g/L}$, 4 samples)*
 - Cyanobacterial cell count ($\geq 100,000$ units/mL, 15 samples)**
 - TN (≥ 1 mg/L, 13 samples)
 - TP (≥ 0.1 mg/L, 7 samples)

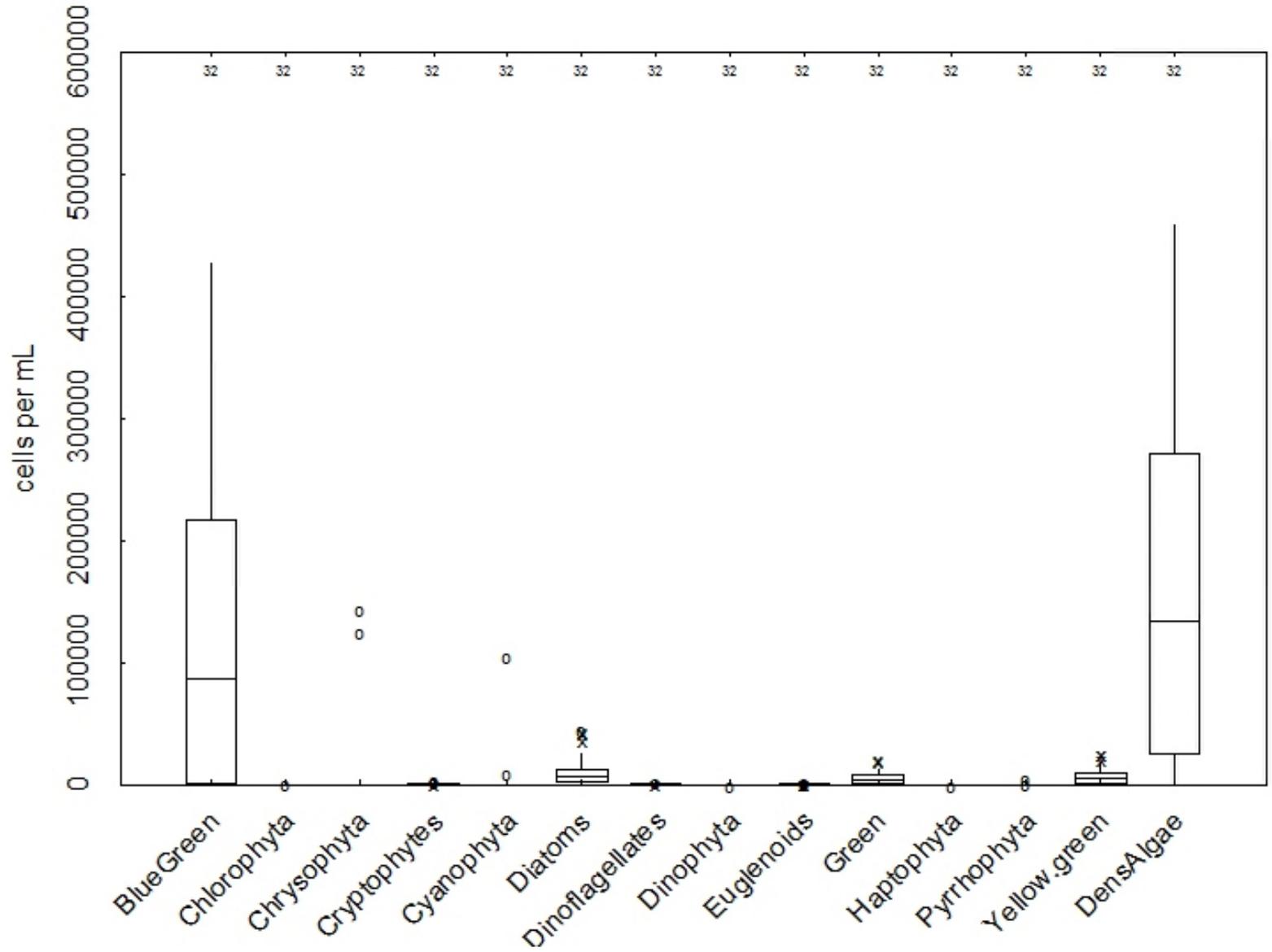
Relationship between TN and Chl a

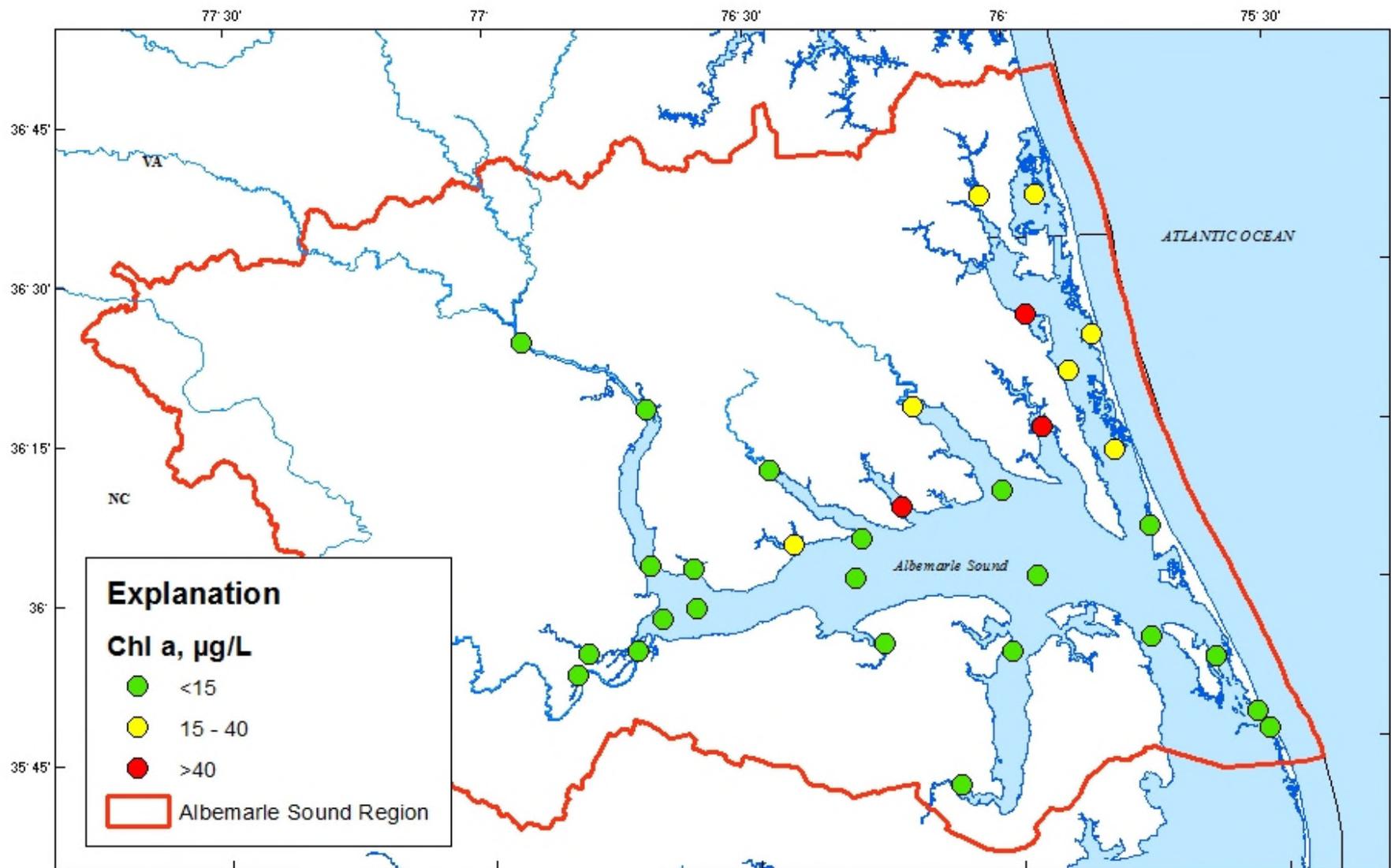


Relationship between TP and Chl a

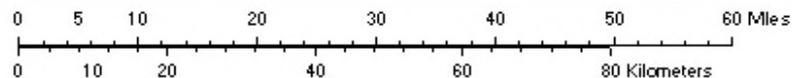


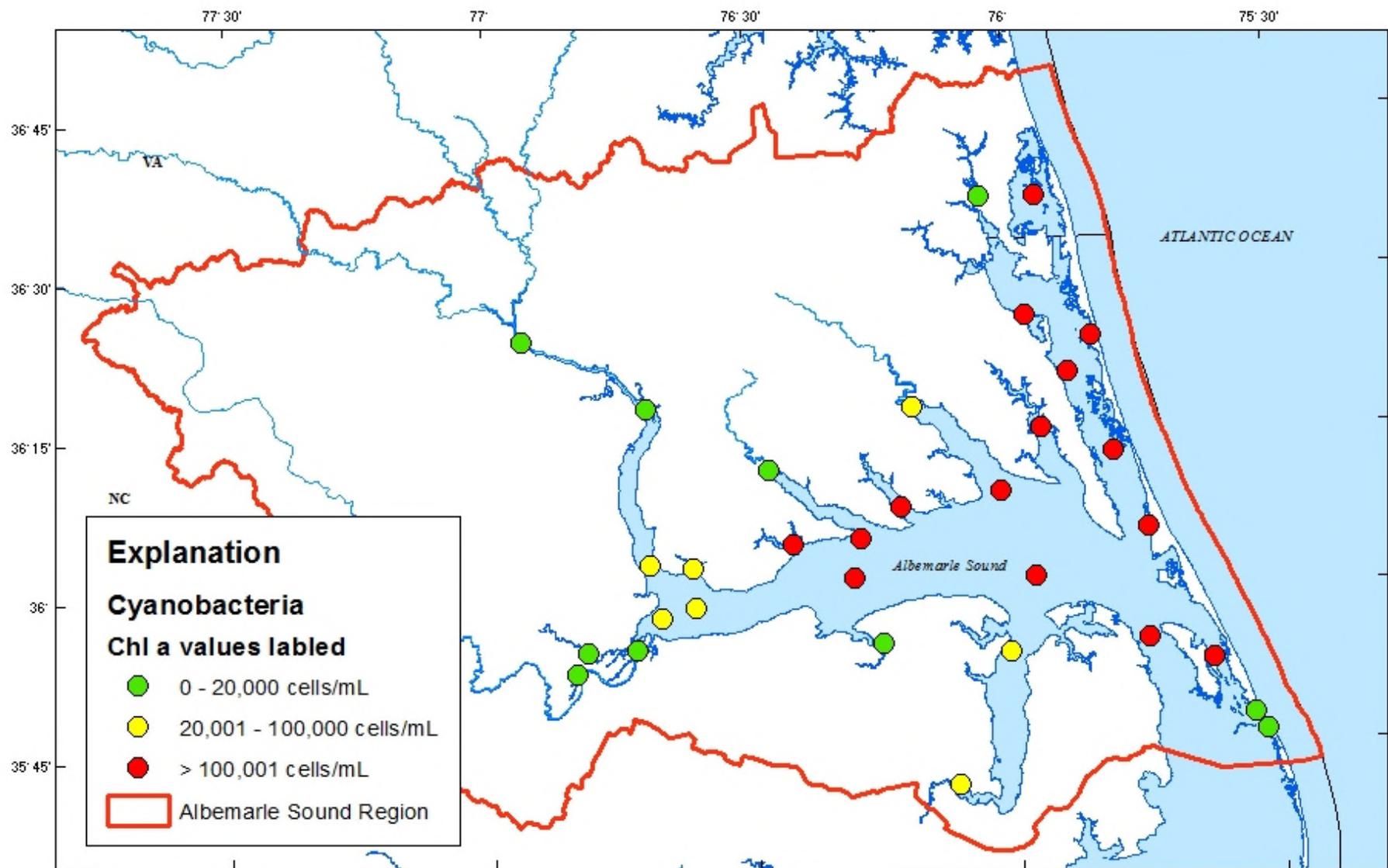
Density of Algae by Algal Group



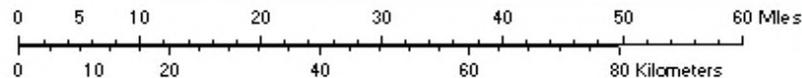


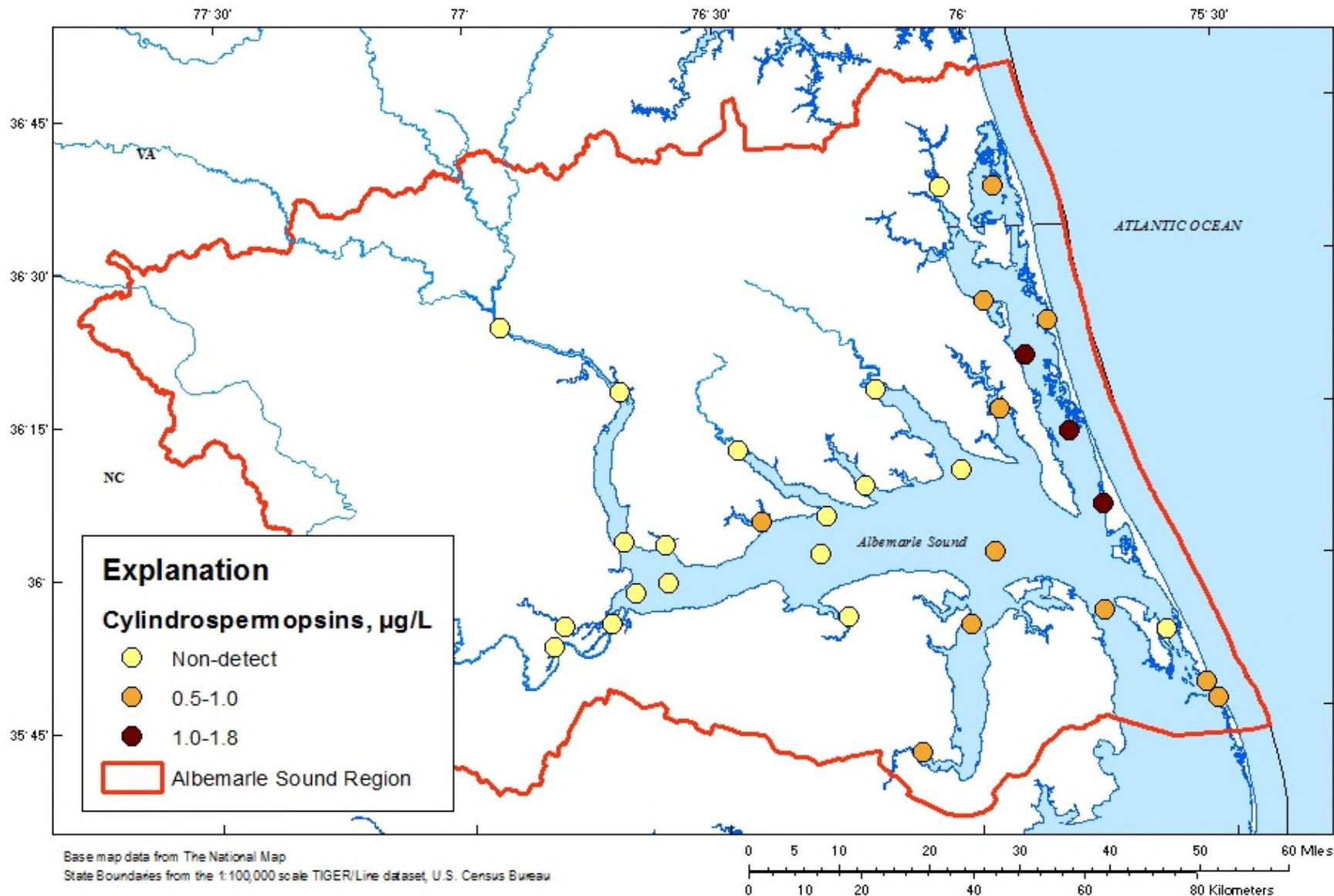
Base map data from The National Map
 State Boundaries from the 1:100,000 scale TIGER/Line dataset, U.S. Census Bureau



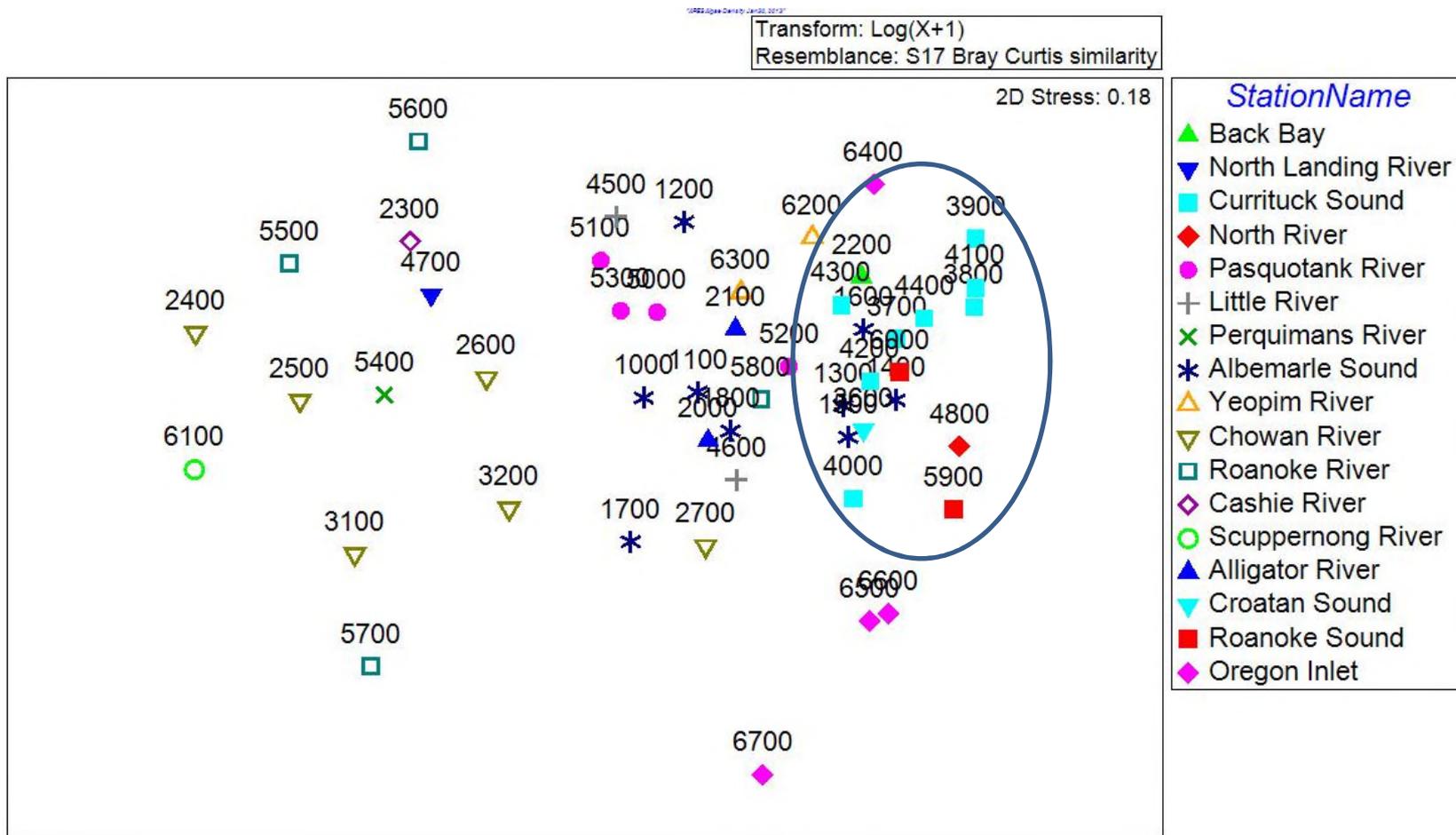


Base map data from The National Map
 State Boundaries from the 1:100,000 scale TIGER/Line dataset, U.S. Census Bureau

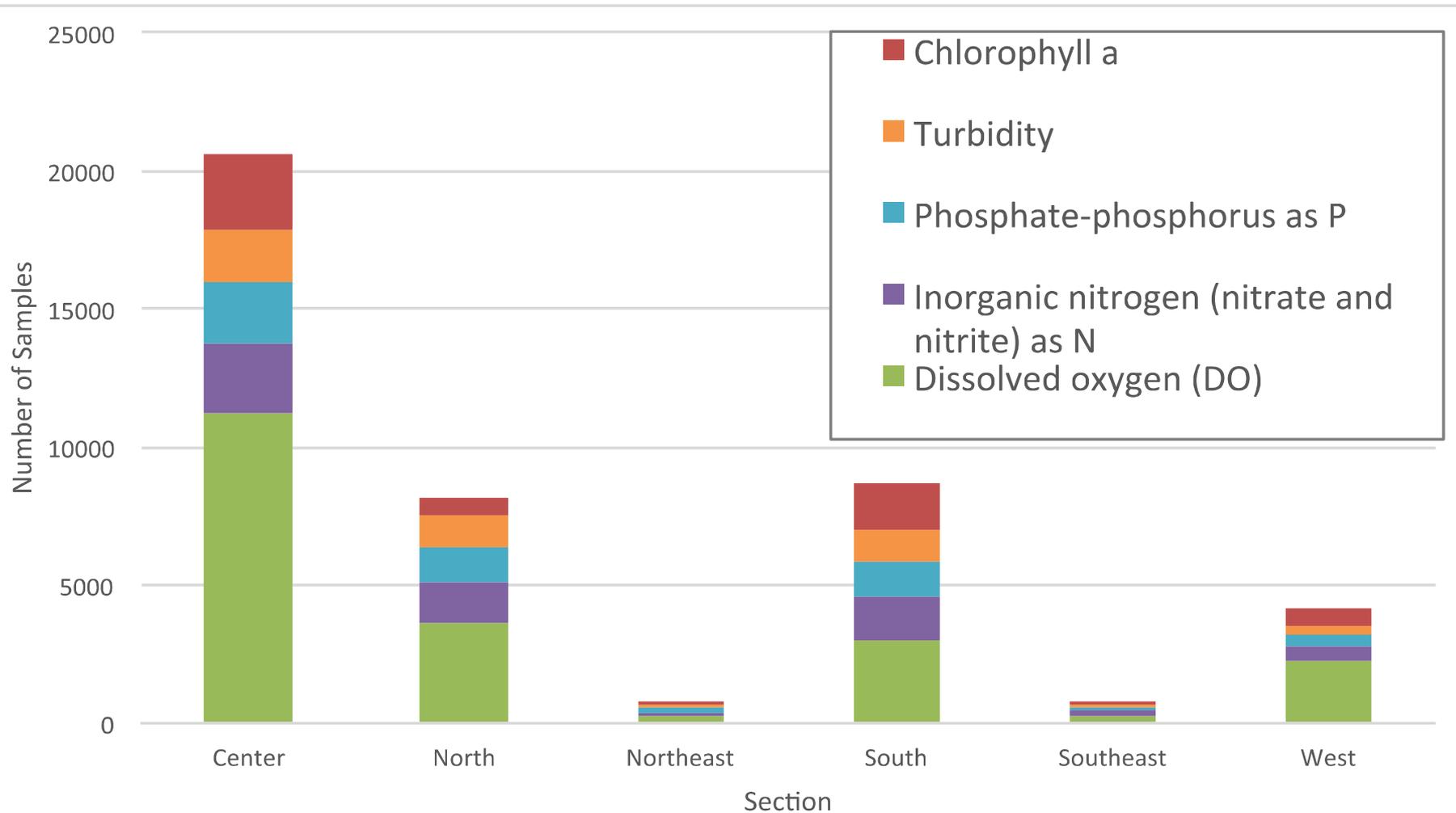


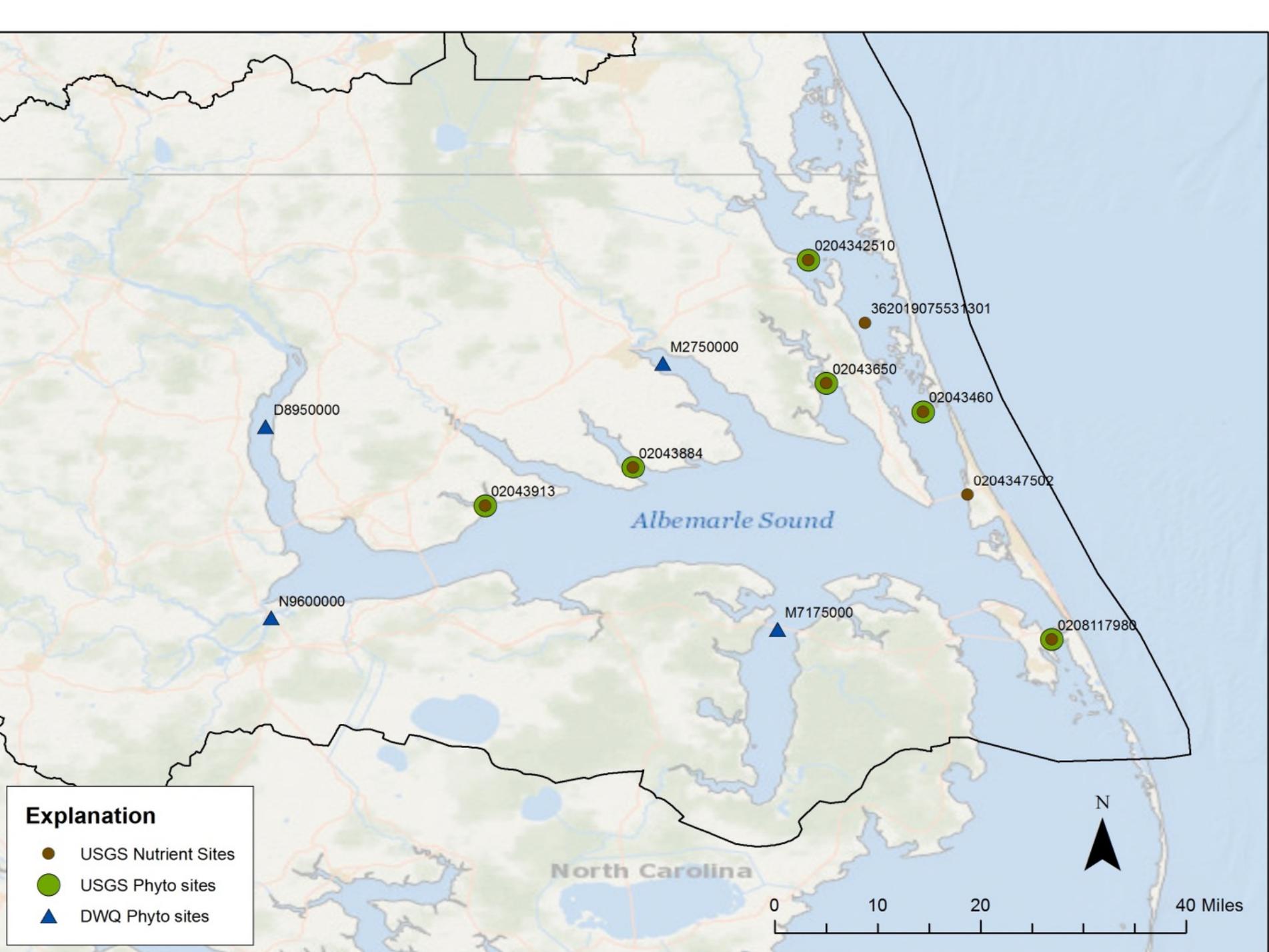


Multidimensional Scaling suggests phytoplankton communities are different in the Currituck Sound



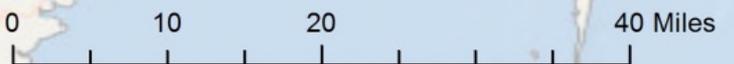
Nutrient Data for Albemarle Sound





Explanation

-  USGS Nutrient Sites
-  USGS Phyto sites
-  DWQ Phyto sites



Benefits of Albemarle Demonstration Project



- A better understanding of current monitoring programs in the region
- An improved understanding of how water quality varies spatially and temporally in the Albemarle Sound
- Identification of areas in the region with cyanobacteria blooms that aren't being monitored

Albemarle Demonstration project being used to build future work

- Working with UNC Coastal Studies Institute and US Army Corps of Engineers to expand continuous monitoring effort in the Albemarle Sound
- Working with Duke Masters' students to analyze historic datasets and develop visualization tools
- Working with partners to identify funds that can be used to address monitoring gaps in the Albemarle Sound



The NMN is a design that can be used to improve regional monitoring



- The design facilitates partnerships for improving estuarine monitoring
- The design identifies potential data gaps that monitoring networks can address

Huge thanks to our partners!

- Albemarle-Pamlico National Estuary Partnership
- Division of Water Resources
 - Estuarine Monitoring Team
 - Environmental Sciences Section
- Division of Marine Fisheries
 - Elizabeth City Office
- Coastal Studies Institute
- US Fish and Wildlife Service
- US Army Corps of Engineers – Duck FRF
- Eastern North Carolina/Southeast Virginia Ecoteam
- Every person who took the time to report about their monitoring program – Thank you!

For more information:

National Monitoring Network:

<http://acwi.gov/monitoring/network/design>

Albemarle Demonstration Project:

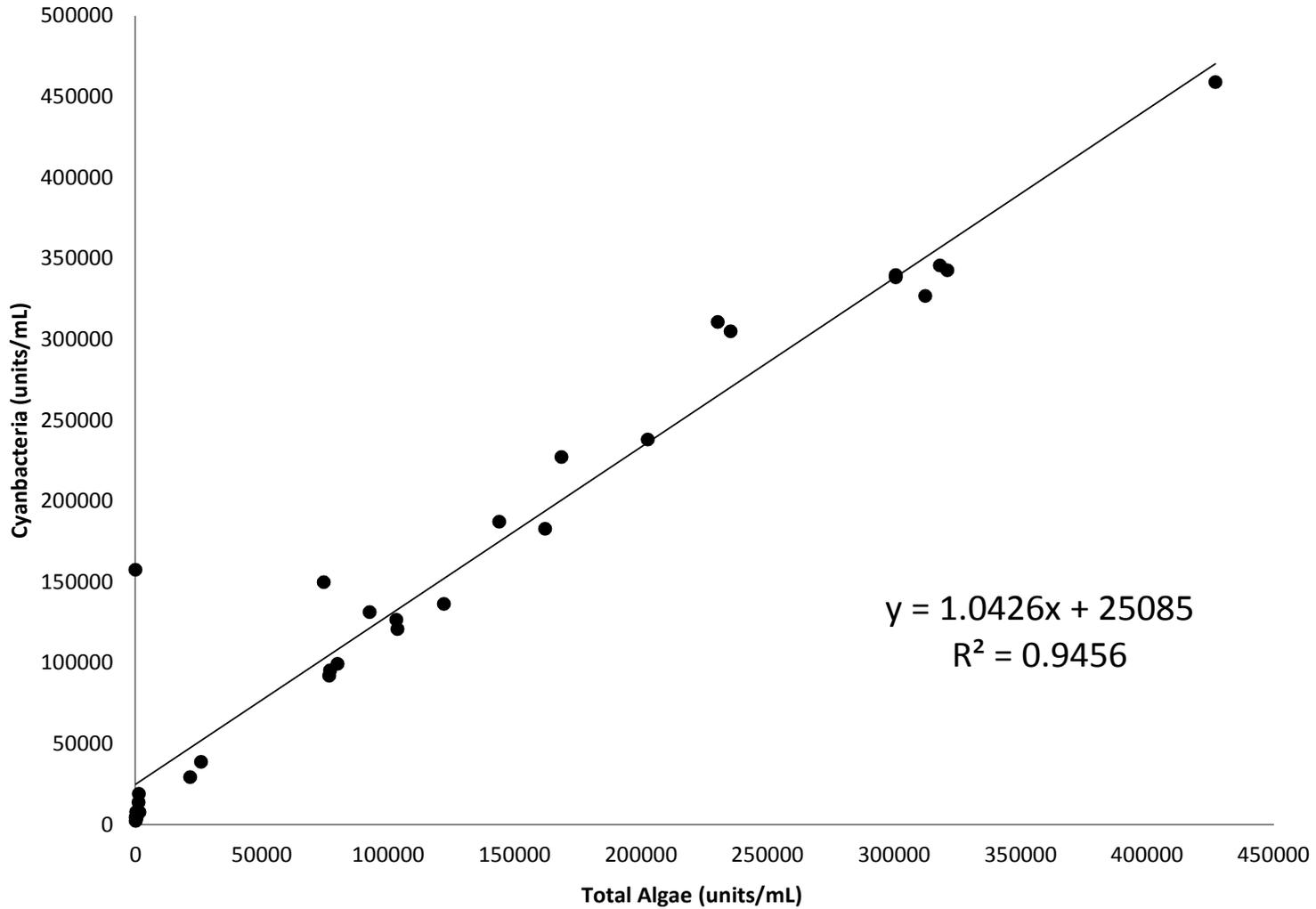
Michelle Moorman

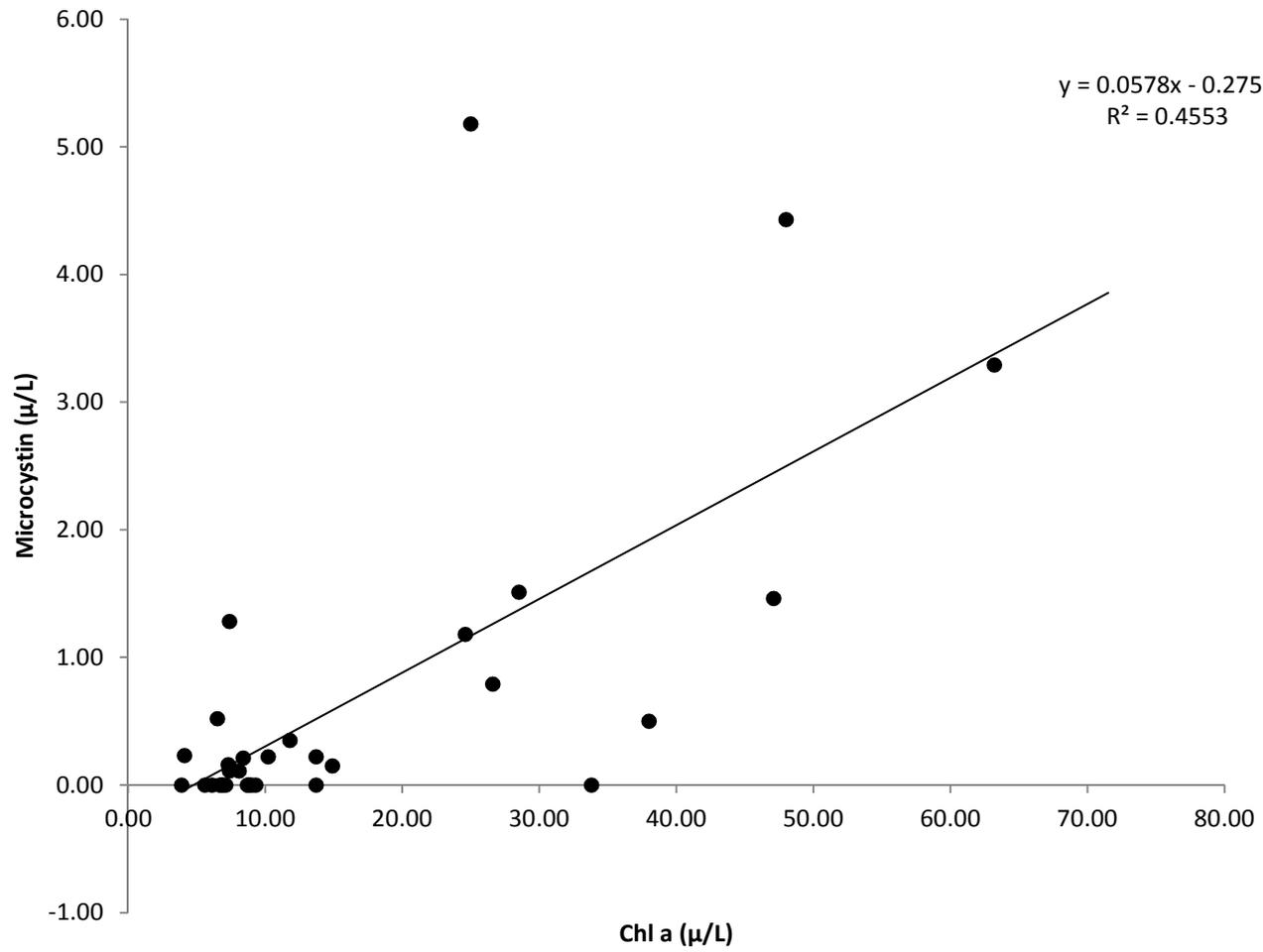
mmoorman@usgs.gov

919-571-4013

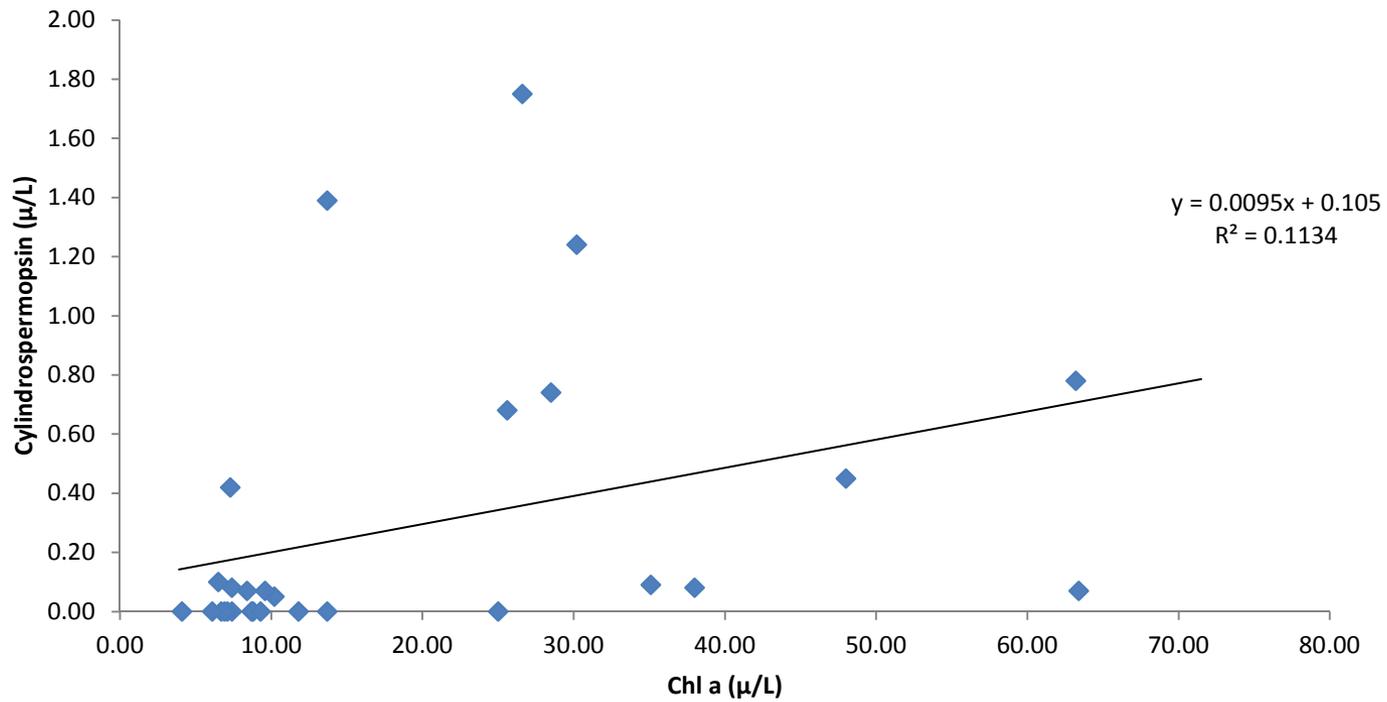


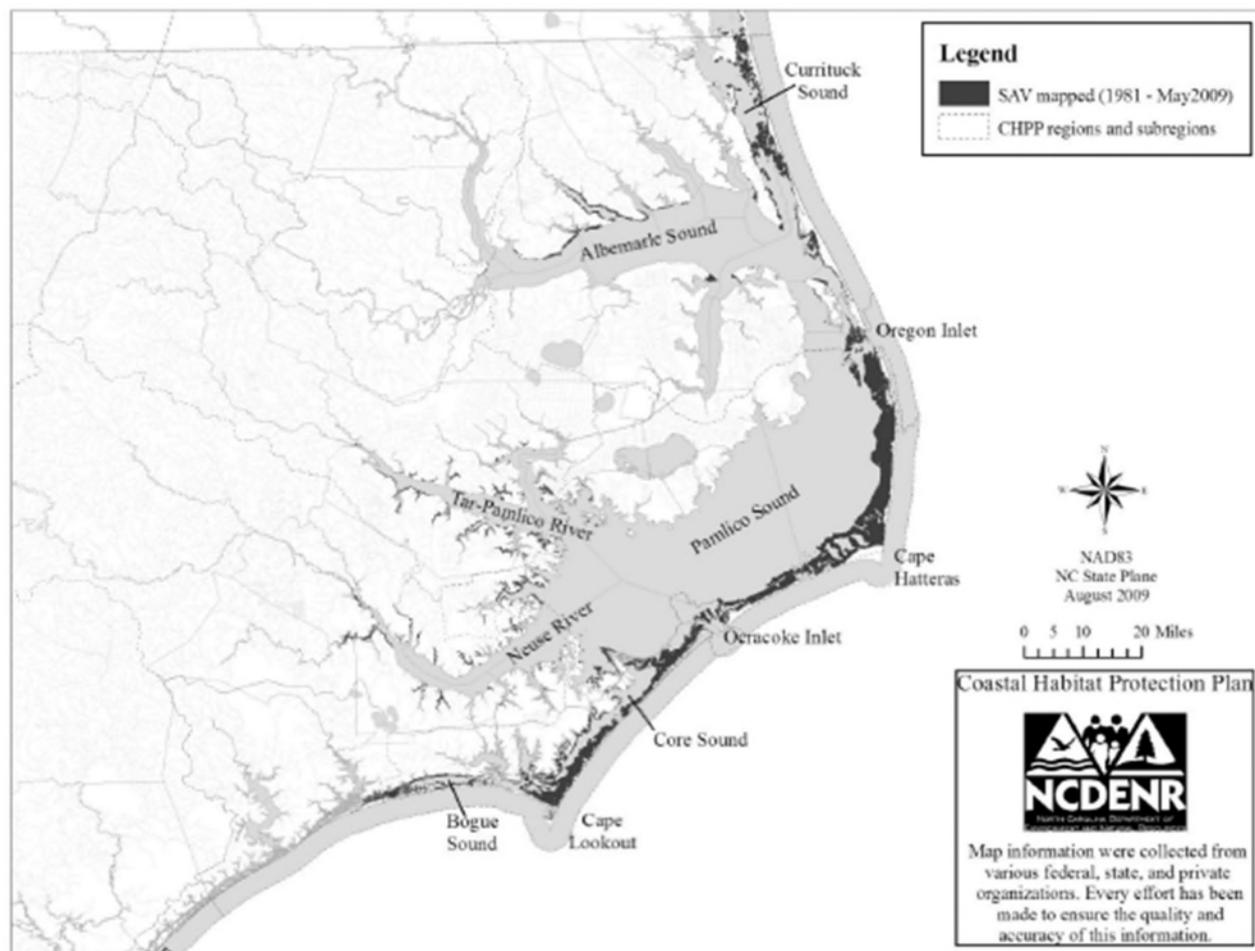
Relationship between Total Algal Density and Cyanobacteria



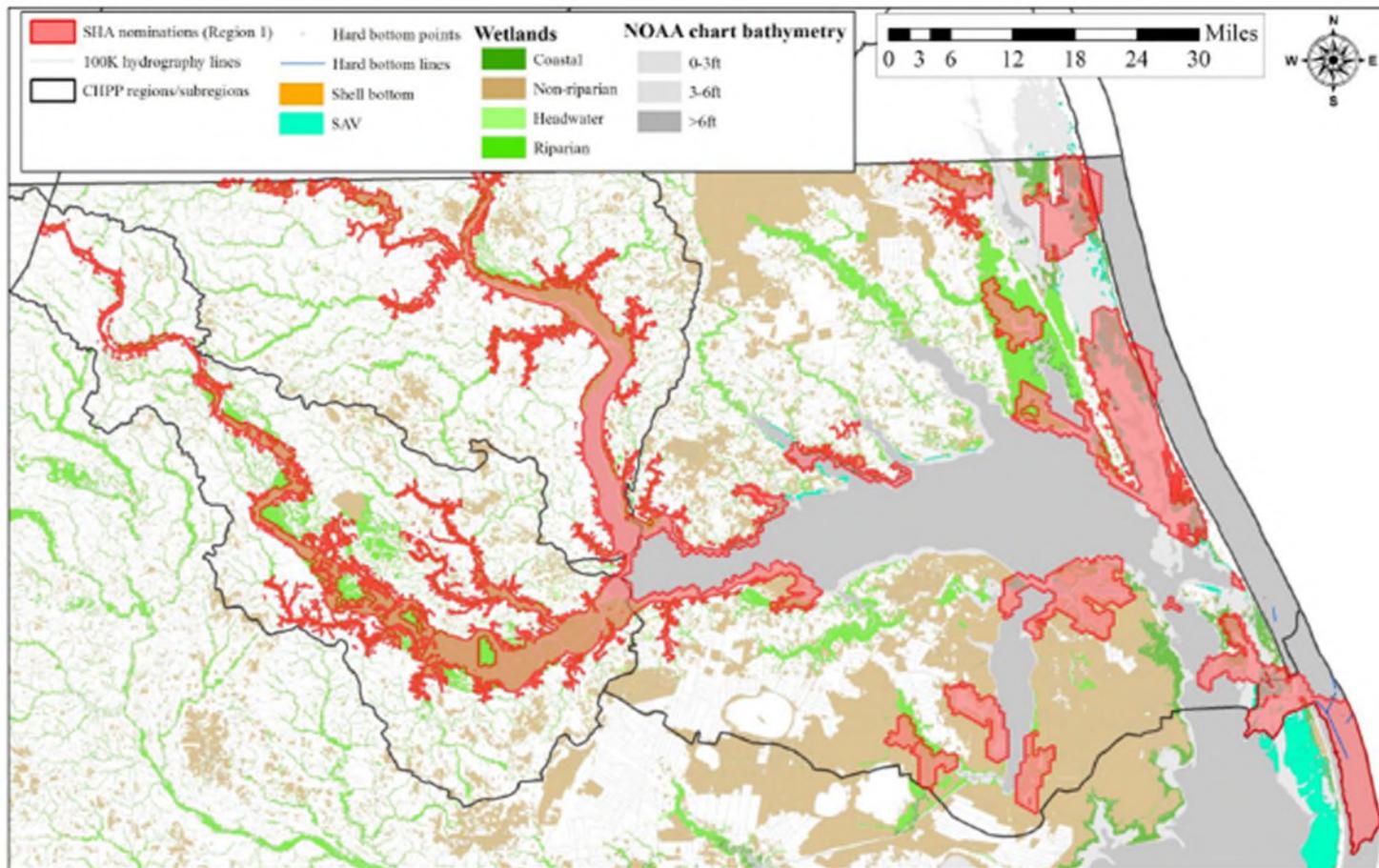


Relationship between Chl *a* and Cylindrospermopsin

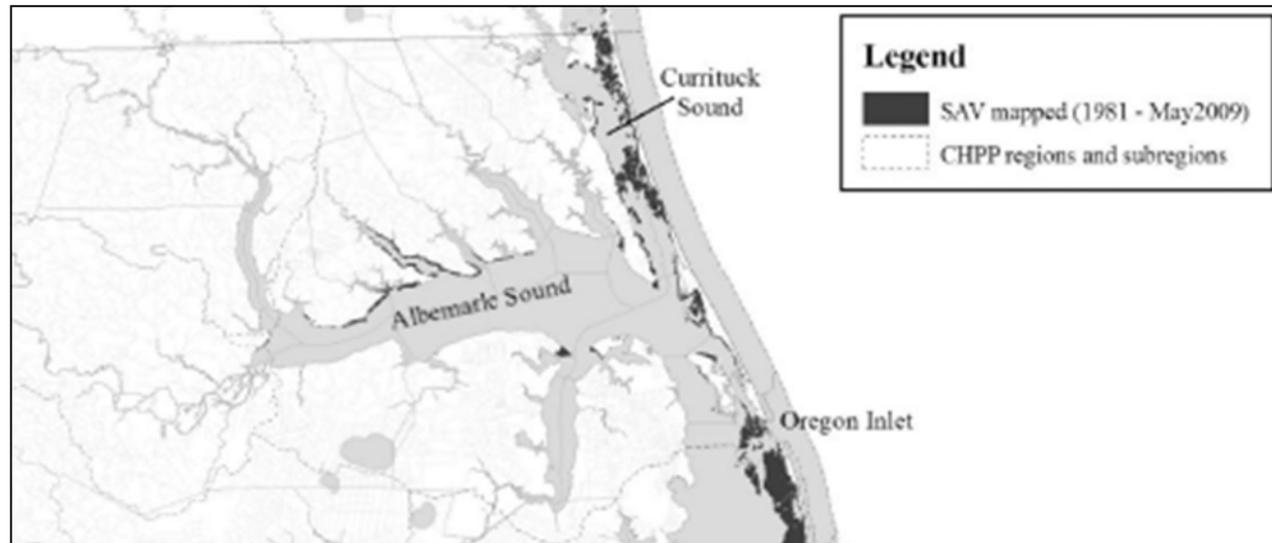




Map 4.1. Location of mapped submerged aquatic vegetation (SAV) habitat in coastal North Carolina (1981-2009). See “Distribution” section for mapping efforts included. Note: Absence of SAV beds in a given area does not suggest actual presence/absence of SAV because surveys have not been conducted in all areas.



Map 8.1. Strategic Habitat Area nominations presented and approved by the Marine Fisheries Commission in January 2009.



- Continuous monitoring of DO, temp, salinity, water level, and turbidity to understand temporal dynamics
- Probabilistic sampling of nutrients in sediment and water
- Synoptic study of endocrine disrupting chemicals (EDCs)
- Deriving historical shoreline erosion rates for the sound
- Developing spatial turbidity models from remotely sensed data
- Model development to improving understanding of how physical and chemical parameters in the system impact biological endpoints (i.e. SAV distribution, oyster restoration success, spawning success, algal blooms)