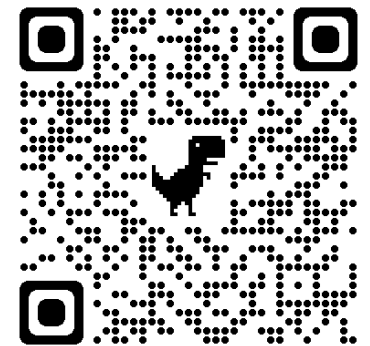


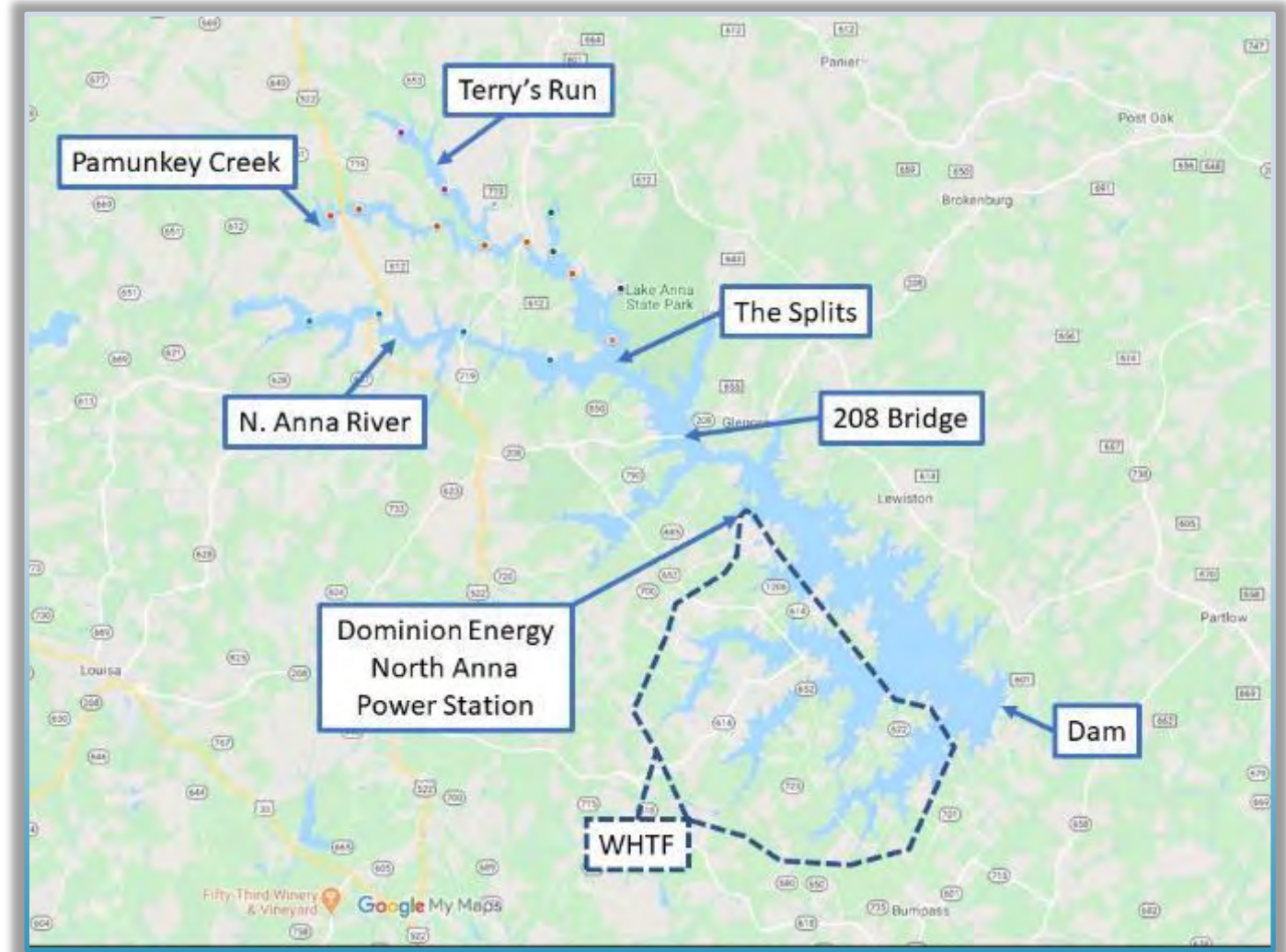
# Collaborative Strategies: Government and Citizen Efforts to Reduce Harmful Algal Blooms at Lake Anna

Virginia Water Monitoring Council Conference - 2024



# Lake Anna

- 17 ½ miles long / 1½ miles wide
- 200 miles of shoreline
- 9,600-acre Lake Anna Reservoir – a public recreational resource
- 3,400-acre Waste Heat Treatment Facility (WHTF) – a private facility operated by Dominion Energy



# Who is LACA?

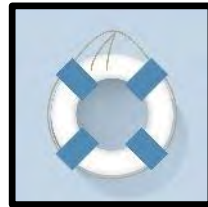
- LACA is a not-for-profit organization – a civic group of homeowners, business owners and interested individuals
- We have several standing committees that execute actions approved by a Board of Directors



Environmental  
Preservation



Water  
Quality



Emergency  
Services  
& Safety



Land Use



Fireworks



Marketing &  
Membership



Newsletter



# LACA's Mission

to further the preservation and conservation of Lake Anna and its watershed as a clean and beautiful resource, through education, advocacy and broad-based community involvement



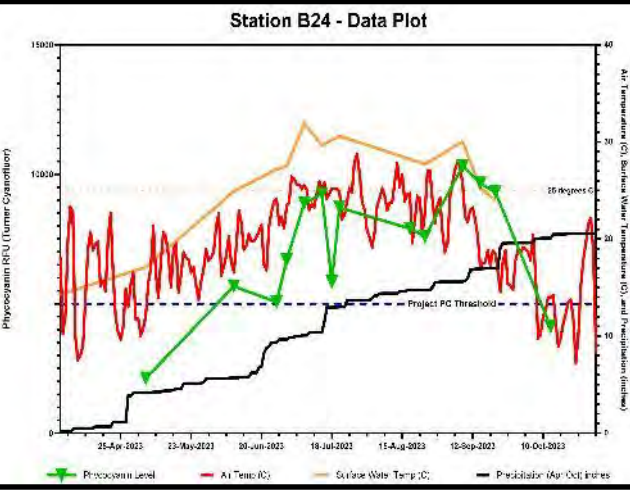
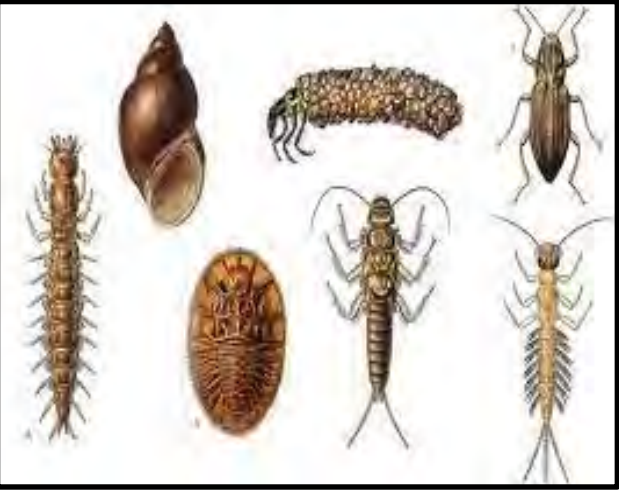
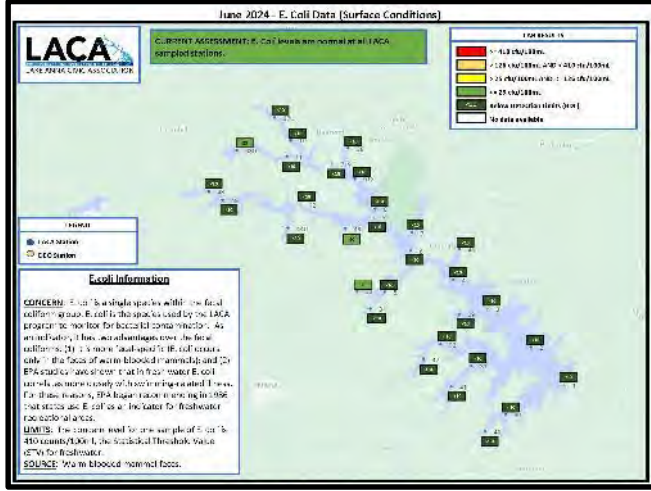
# Water Quality Committee Projects

Water Quality Monitoring

Cyanobacteria Monitoring

Macro-invertebrate Monitoring

Data Analysis



Supporting Academic Research





# VDH Cell Count History – Lake Anna, VA

Year	Tributary LACA Site # VDH Polygon	North Anna Branch			Damunkey Branch				Lake Anna			Lake Anna State Park	
		48 Upper	12 Mid	14 Lower	D24 Upper-Upper	11 Upper	719 Mid	612 Lower	10 Terry's Run	Y Upper	6 Mid		1-4 Lower
2018 70 days of advisories	AUG	121	217			332	336					286	
	SEP	2,260	400	172			655						265
	OCT											10,800	
2019 94 days of advisories	JUL	787	217			428	238		477				
	AUG	1,381	122	785		298	560		835	290			106
	SEP	104	418	262		105	215	301	215	287			
	OCT	376	231	128			243	159	105	137			
2020 92 days of advisories	JUL	167				538			143				
	AUG	103					138						
	SEP						128						
	OCT												2,115
2021 122 days of advisories	JUN				5,000	106							
	JUL	1,068	145			789							
	AUG	715	337	105	467	220	800	795					
	SEP	247	321	263	244	503	164	966					
2022 112 days of advisories	OCT	427	225		303	380	121	80					
	JUL	358	145		360	303	226	322					
	AUG	1,313	147	134		323	287	387	488				226
	SEP	298	155			302	384		220				
2023 126 days of advisories	OCT	163											
	JUN				142								
	JUL	460											
	AUG	748	100										
2024 100 days of advisories	SEP	350			180								
	OCT												
	JUN	116											
	JUL	377	130		534	282	258						
NOTES	AUG	878	460		112	361			176				
	SEP												
Numbers are potentially toxic cyanobacteria cell counts in thousands (000) Order - Nostocales ( <i>Raphidiopsis</i> , <i>Dolichospermum</i> , <i>Cylindrospermopsis</i> , <i>Cuspidothrix</i> , <i>Nostoc</i> , <i>Chrysochloris</i> , <i>Aphanizomenon klebahnii</i> ) Order - Chroococcales ( <i>Microcystis aeruginosa</i> ) Order - Nostocales & Leptolyngbyales ( <i>Raphidiopsis</i> & <i>Planktolyngbya limnetica</i> )													

- Historical data indicates two primary cyanobacteria orders at Lake Anna
  - *Nostocales* (*Raphidiopsis*, *Dolichospermum*, *Cylindrospermopsis*, *Cuspidothrix*, *Nostoc*, *Chrysochloris*, *Aphanizomenon klebahnii*)
  - *Chroococcales* (*Microcystis aeruginosa*)
- Lake Anna averaged 104 days of advisories per year over the period 2018-2023

# Dominant Species – Lake Anna



- Species of the *Nostocales* order can produce both hepatotoxins and neurotoxins
  - Lake Anna has not had an advisory due to toxin levels
  - Lake Anna's advisories have all based on cell counts exceeding VDH thresholds

- FY22
  - *\$3,500,000 shall be provided the Department of Environmental Quality, collaborating with the Department of Health, to conduct studies of Harmful Algal Blooms occurring in the Shenandoah River and Lake Anna...*
- FY24
  - *Out of the appropriation in this item, \$1,000,000 the second year from the general fund is provided to support cyanobacteria mitigation and remediation efforts at Lake Anna.*
- FY25
  - *Out of the appropriation in this item, \$500,000 the first year from the general fund is provided to support cyanobacteria mitigation and remediation efforts at Lake Anna.*



## Study Plan

- Phase 1
  - Data collection and evaluation
  - Source Identification
  - 2-year effort
- Phase 2
  - Identification of management strategies and practices
  - 1-year effort

## Study Partners

- Virginia Department of Health
- United States Geological Survey
- Interstate Commission on the Potomac River Basin
- Old Dominion University

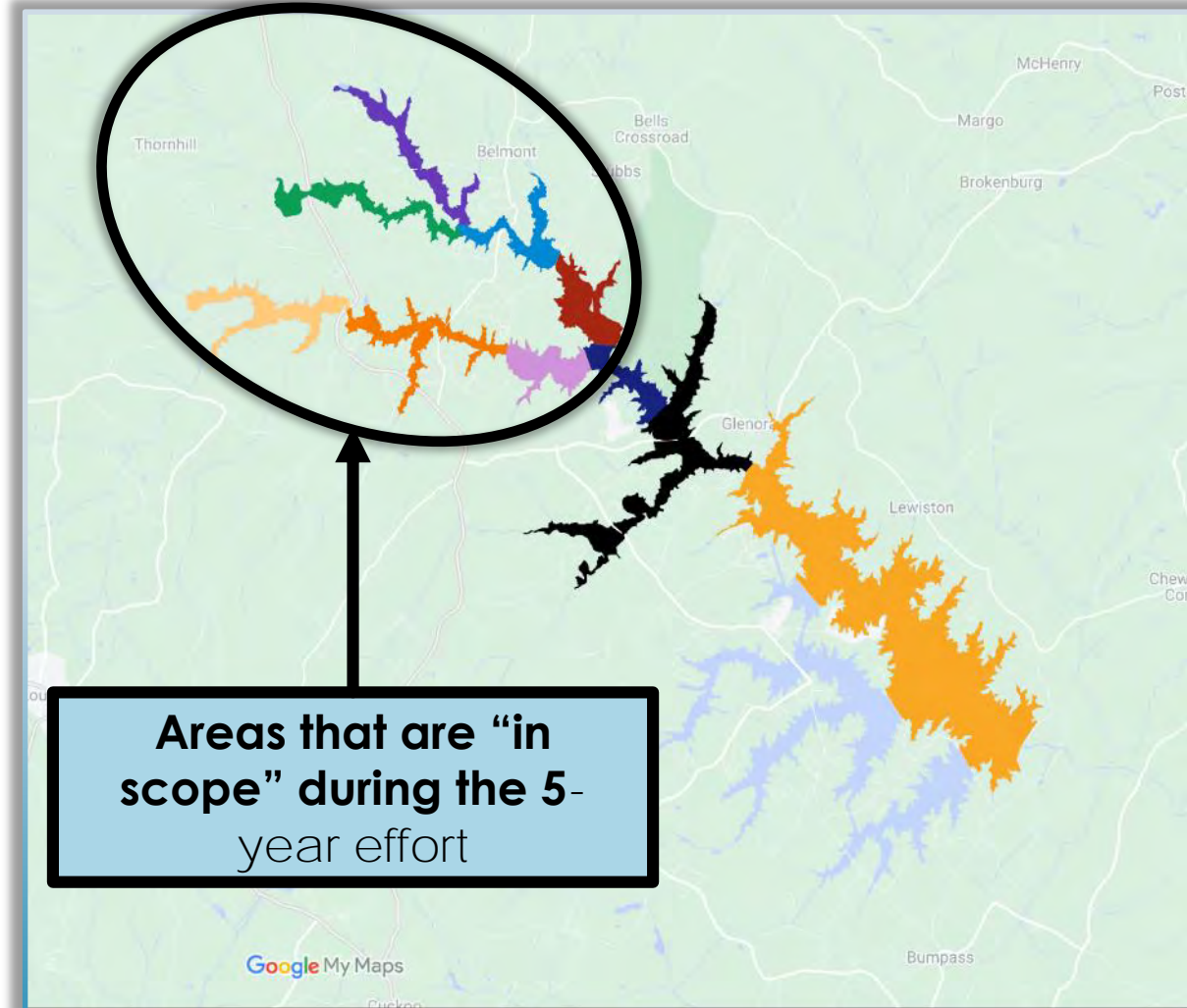
- Cyanobacteria monitoring effort established in 2020
- “Kick-the-HAB” fund-raising campaign (\$200,000+ raised)
  - 2022: Hydrogen-peroxide based algaecide demonstrations at four upper lake locations
  - 2023: Ultrasound demonstrations at four upper lake locations (ultrasound + hydrogen-peroxide based algaecide at 1 location)
  - 2024: Ultrasound demonstrations at three locations in the lower lake
  - 2022-2024: Frequent cyanobacteria sampling and microscopy
- Dupont (\$20k) & Dominion Energy (\$10k) Grants: Funded aquatic vegetation and native tree planting in 2023-2024

- Lake Anna Advisory Committee (LAAC)
  - Comprehensive study of upper North Anna River (2022)
  - Lake Anna Cyanobacteria Mitigation and Remediation Program (2024-2025)
- Louisa and Spotsylvania counties are engaged
  - Strong support for the phosphorus remediation activities
  - Working with Delegates and State Senators for increased and continued state funding
  - Submitting/supporting Community Project Funding requests through Congressional (House and Senate) offices



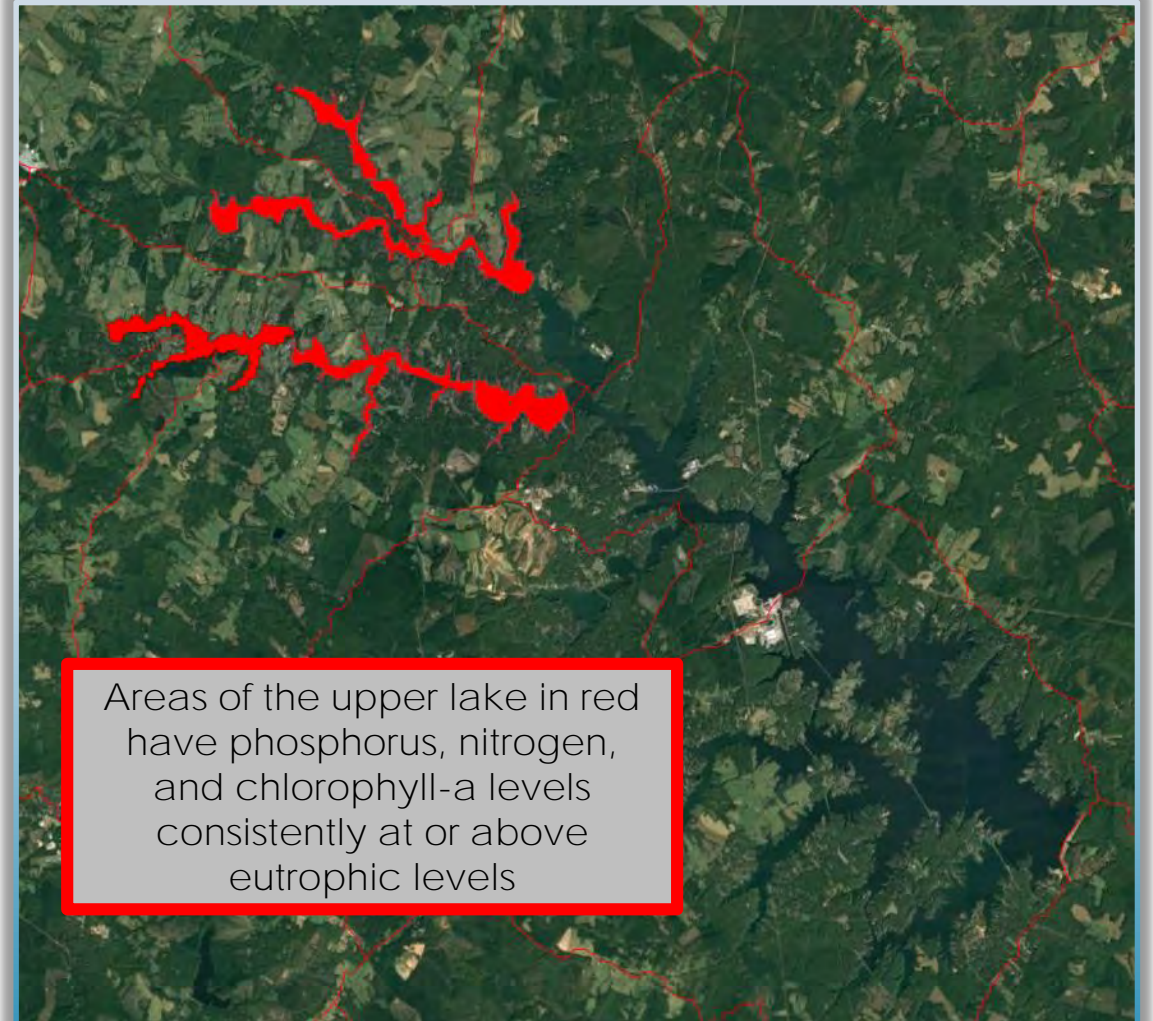
# Lake Anna Cyanobacteria Mitigation and Remediation Program

- Goal: Achieve a safe and naturally balanced phytoplankton biomass in the Lake Anna upper reservoir ecosystem.
- Objectives:
  - Reduce and sustain total phosphorus (TP) levels in the upper reservoir below 30 parts per billion.
  - Reduce and sustain total potentially toxic (PTOX) cyanobacteria cell counts in the upper reservoir below 50,000 PTOX cyanobacteria cells per milliliter.
- The Lake Anna Advisory Committee (LAAC) is managing the program



# Lake Anna has a Nutrient Issue

- 2005-2023 data shows northernmost areas of Lake Anna are eutrophic / hypereutrophic
- The 2022 LAAC study showed:
  - Phosphorus is primary source of HAB issues
  - 80% of phosphorus comes from the watershed
- Most best management practices (BMP) focus on long-term solutions
  - The 2022 LAAC study estimated the cost to increase wetlands and create retention ponds in the North Anna River watershed could cost more than \$250M
  - LACA is working to expand aquatic vegetation in the lake and is spearheading efforts for other traditional BMPs in the watershed
- A shorter-term solution is possible using well-researched chemical and biological products



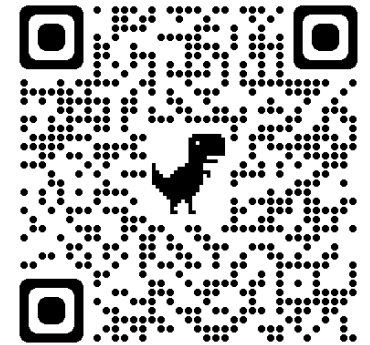
# Contact Information



Harry Looney

(571) 393-7920

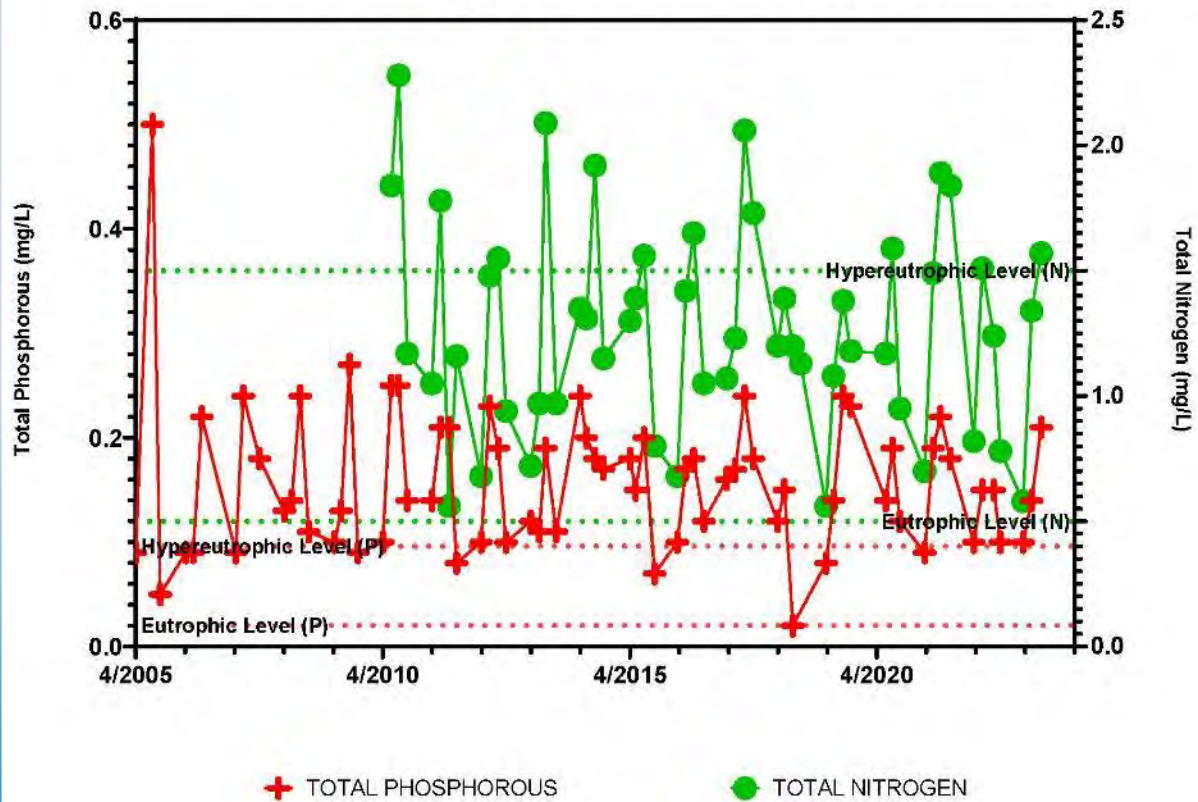
[harry.looney@lakeannavirginia.org](mailto:harry.looney@lakeannavirginia.org)



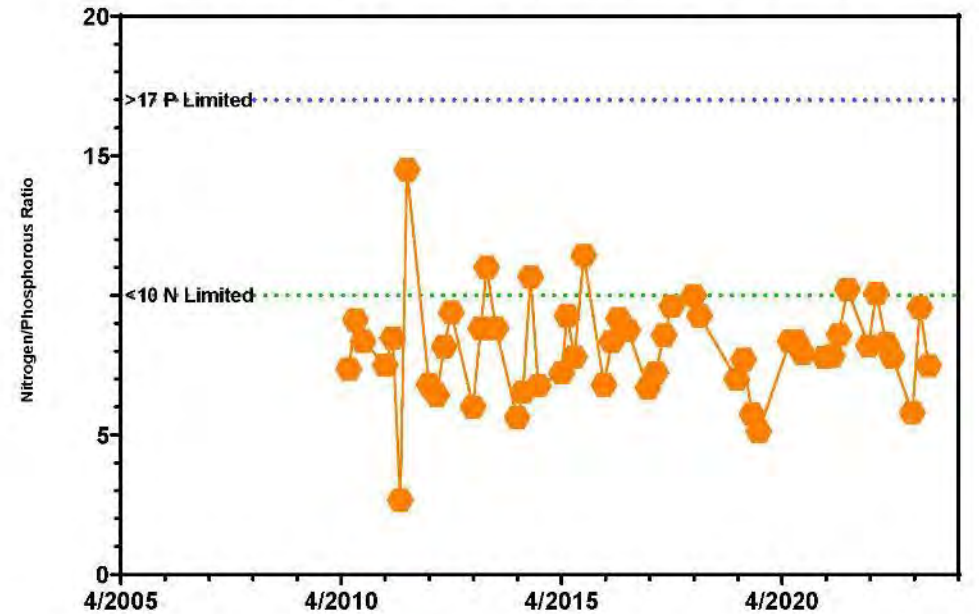


# Upper Pamunkey Station Data

### Station 38 (Upper Pamunkey) Nutrients

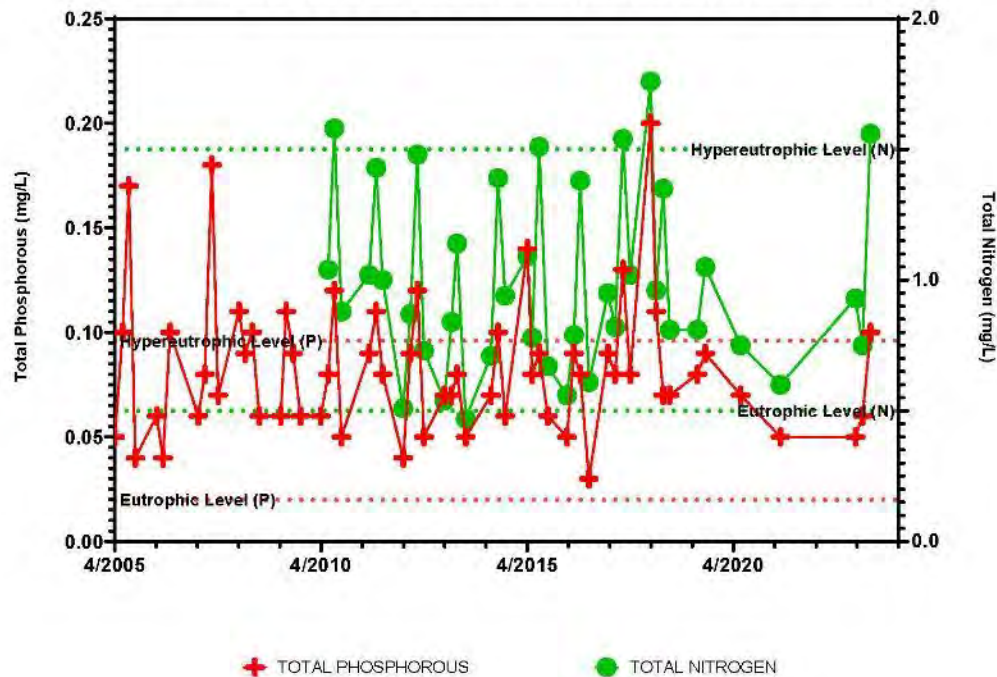


### Station 38 (Upper Pamunkey) N:P Ratio



# Upper North Anna Station Data

### Station 48 (Upper North Anna River) Nutrients



### Station 48 (Upper North Anna River) N:P Ratio

