

NCSU - Lake Gaston Vegetation Management Plan Update April 6th, 2022



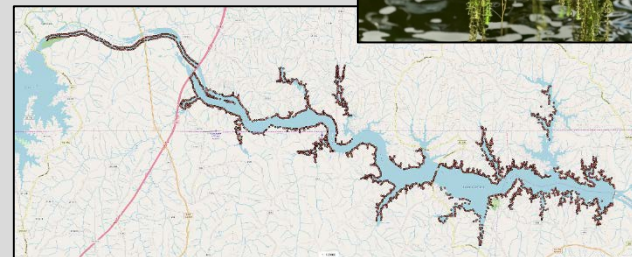
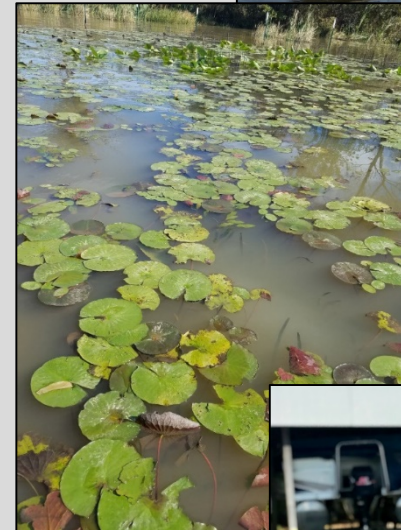
Jessica R. Baumann

Extension Associate, Lake Gaston

AQUATIC PLANT MANAGEMENT

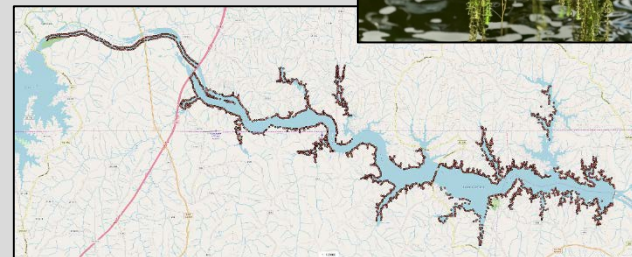
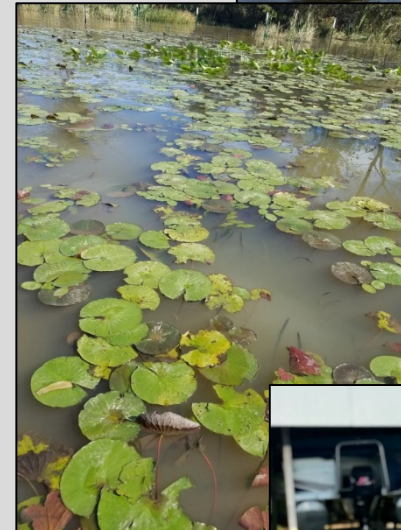
Outline

- **2021 Overall Vegetation Survey**
- **Hydrilla**
 - **2021 Hydrilla Treatments / Survey**
 - **2022 Proposed Treatments**
- **Lyngbya**
 - **2021 Lyngbya Treatments**
 - **2021 Lyngbya Survey**
 - **2022 Proposed Treatments**



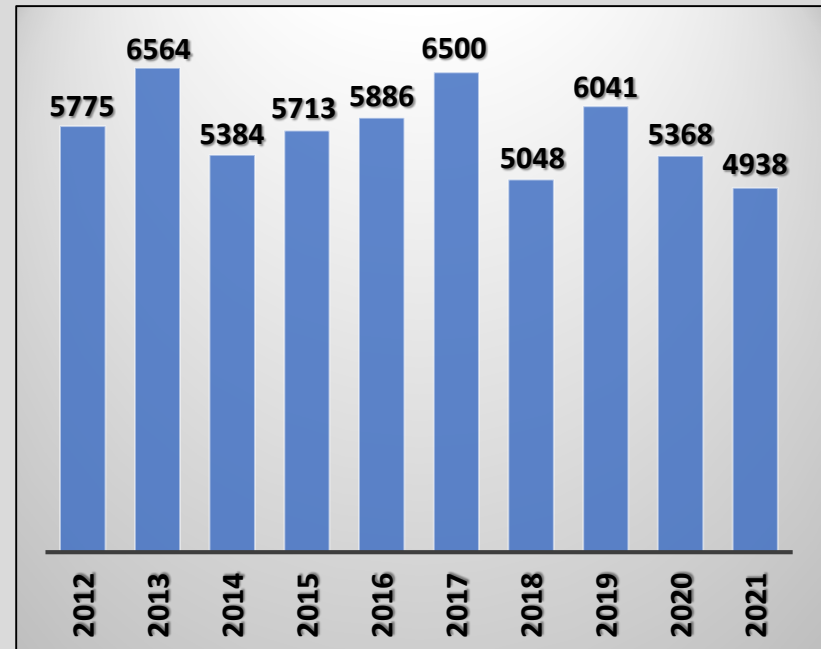
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- **Hydrilla**
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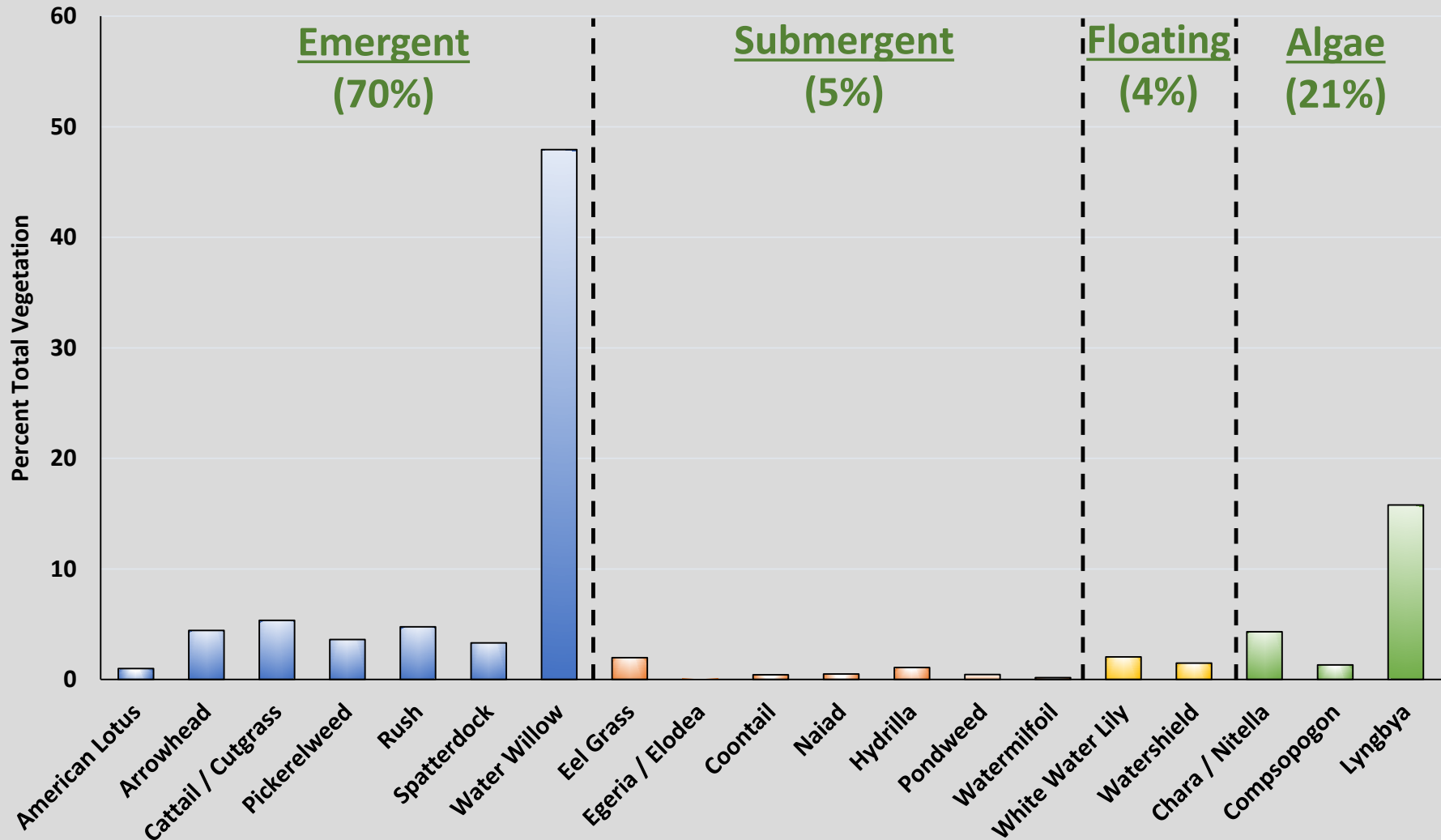


Fall Volunteer Survey

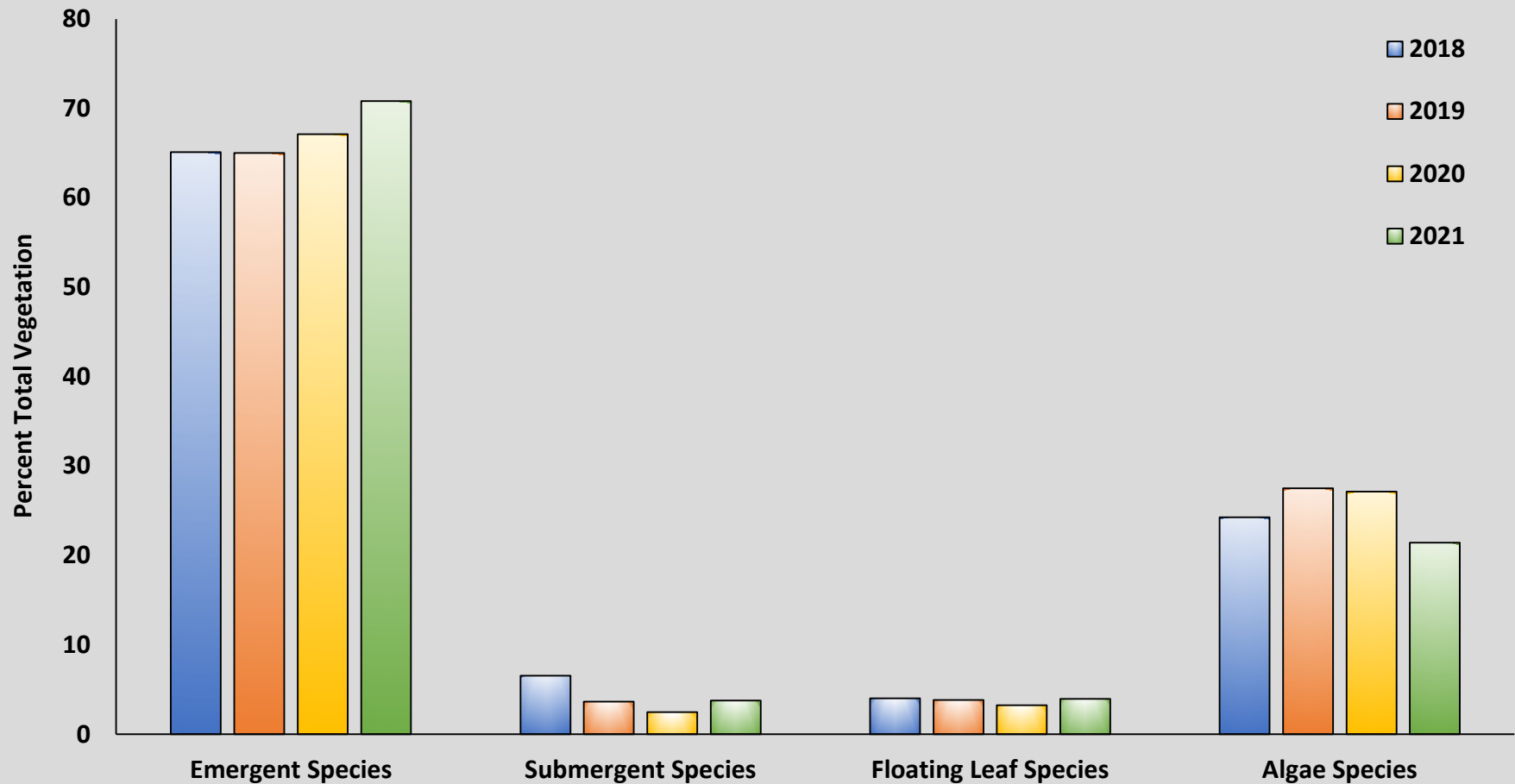
- **70+ Volunteers**
 - *The more volunteers the better!*
 - *Don't have to be associated with LGA or NCSU*
- **Conducted from Sept. 1st to Nov. 11th**
- **4,938 Points Collected**



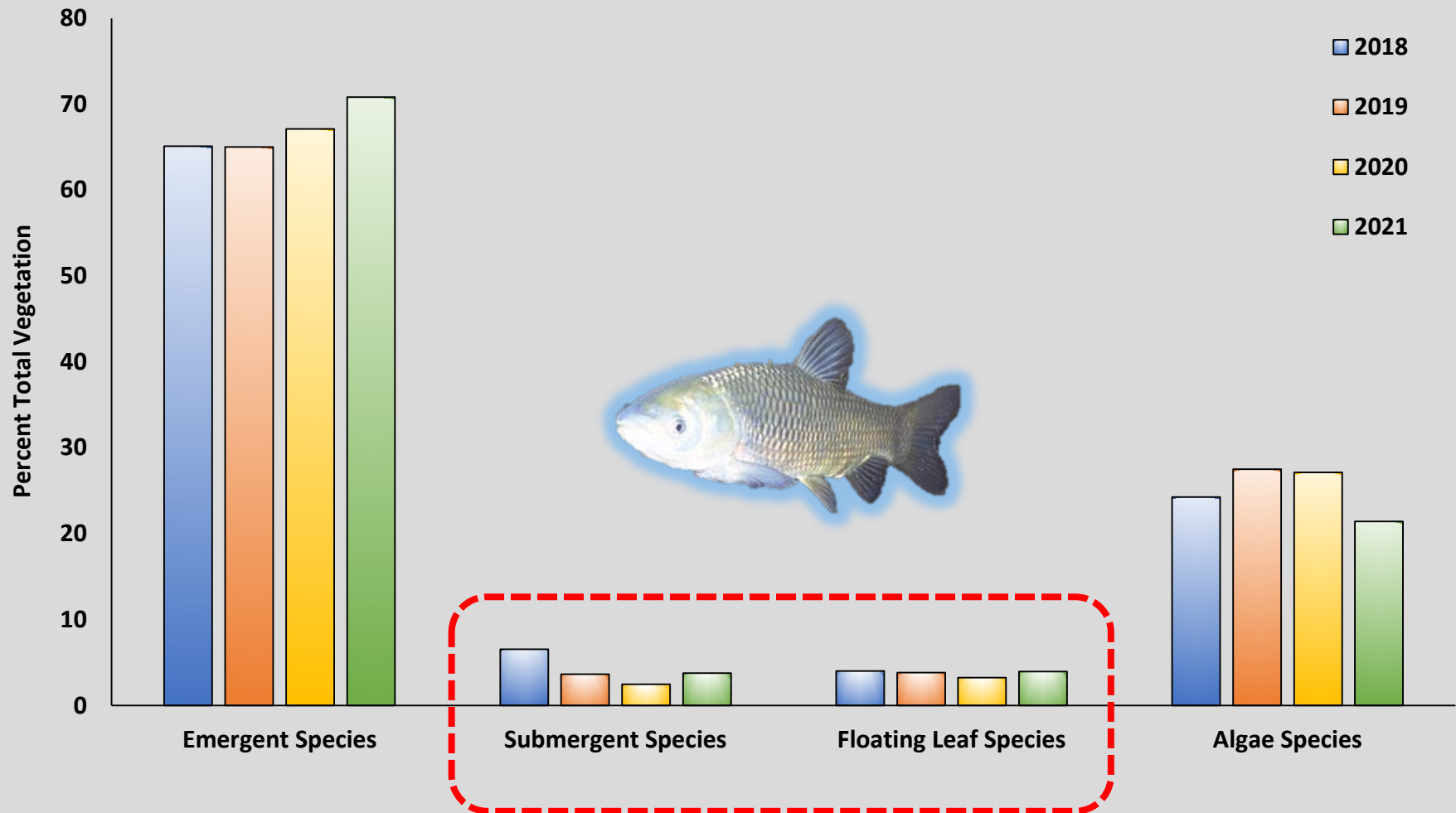
2021 Aquatic Plant Community



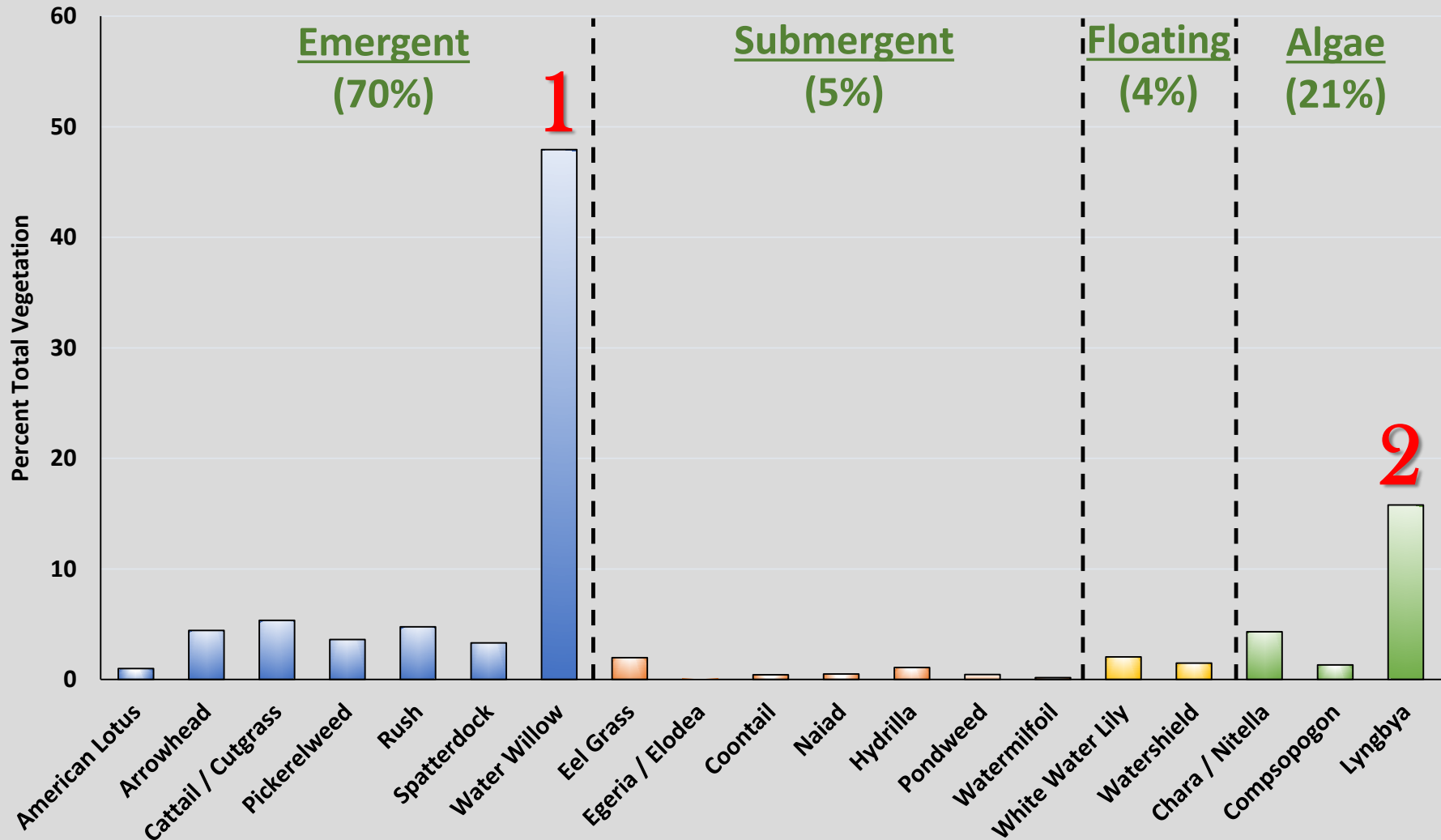
2021 Aquatic Plant Community



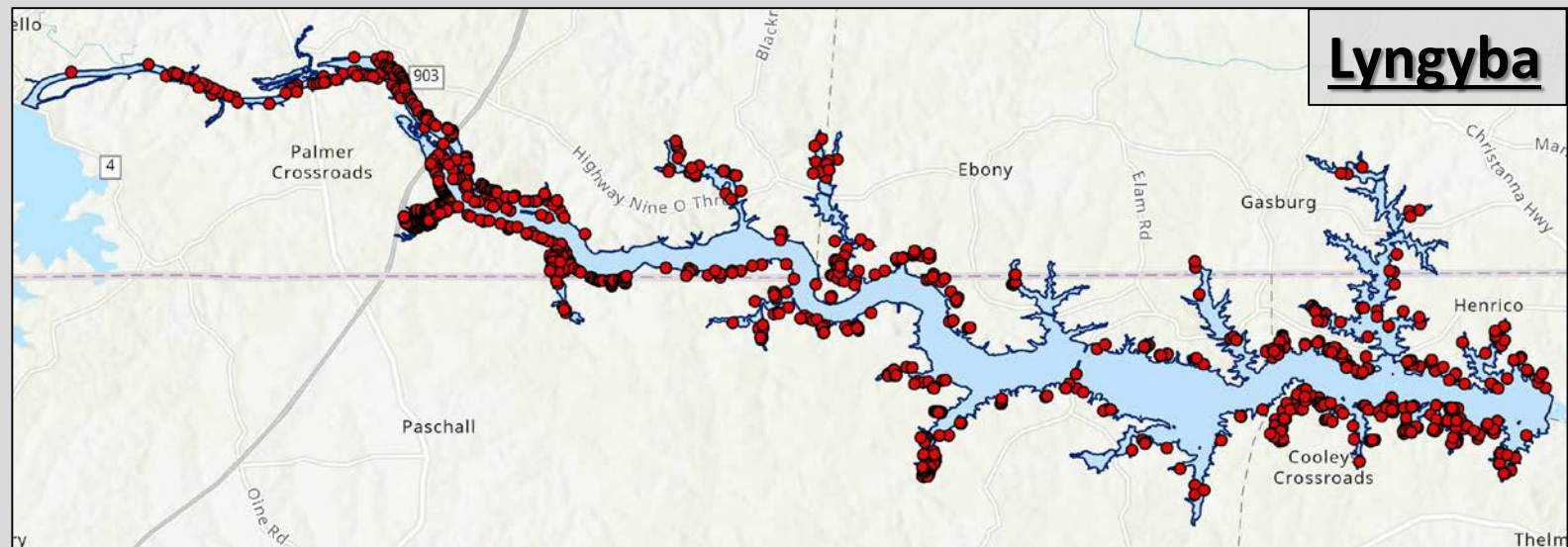
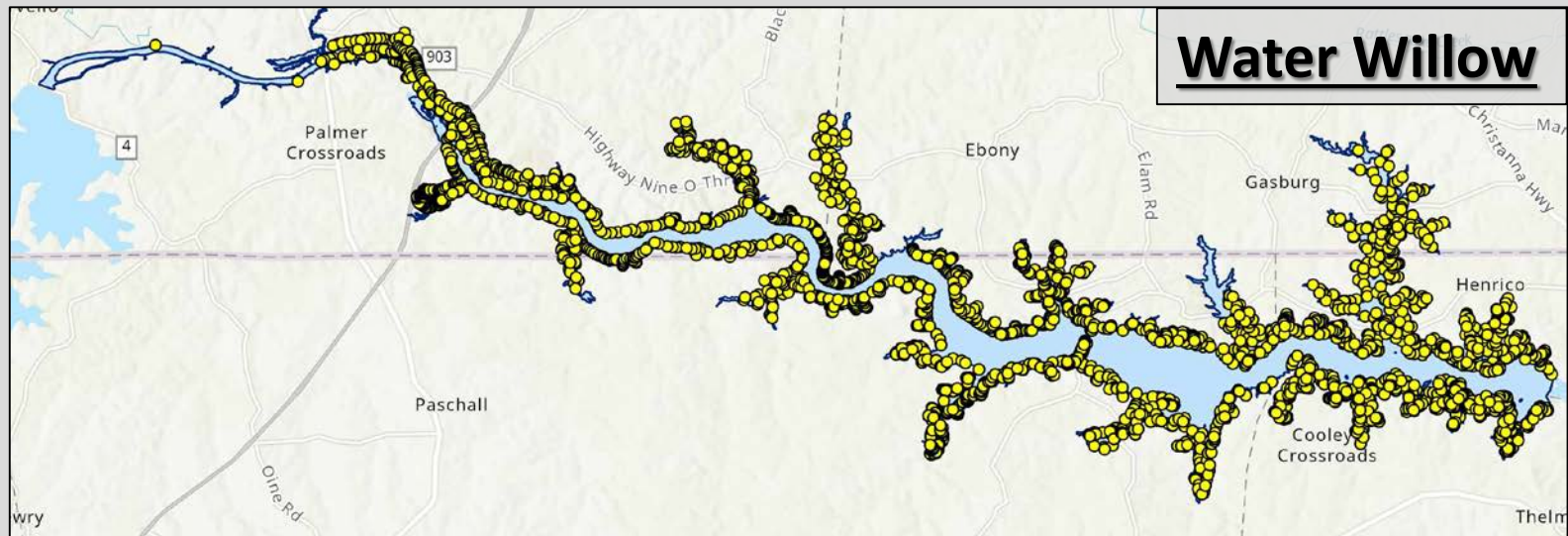
2021 Aquatic Plant Community



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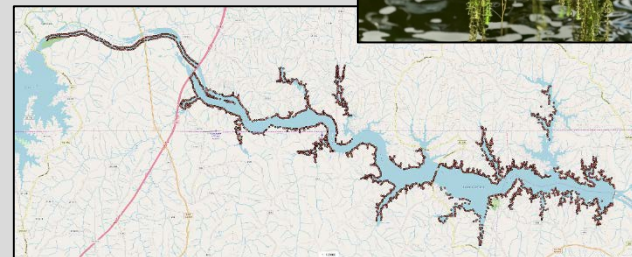
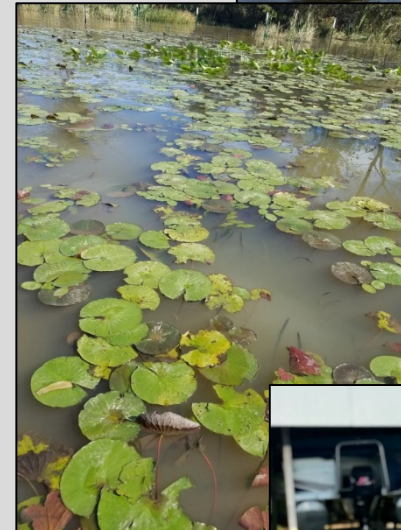


2021 Aquatic Plant Community



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 - 2022 Proposed Treatments
- Future Research Needs



Treatment Planning Process

NC STATE UNIVERSITY



**Lake Gaston
Technical Guidance Group**



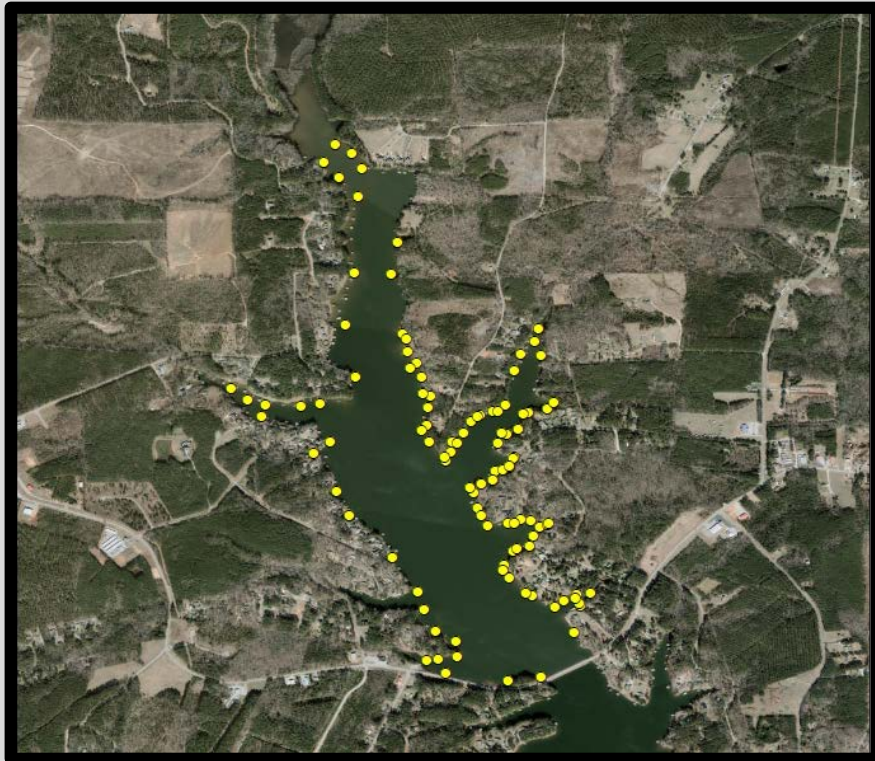
**Lake Gaston
Stakeholders Board**



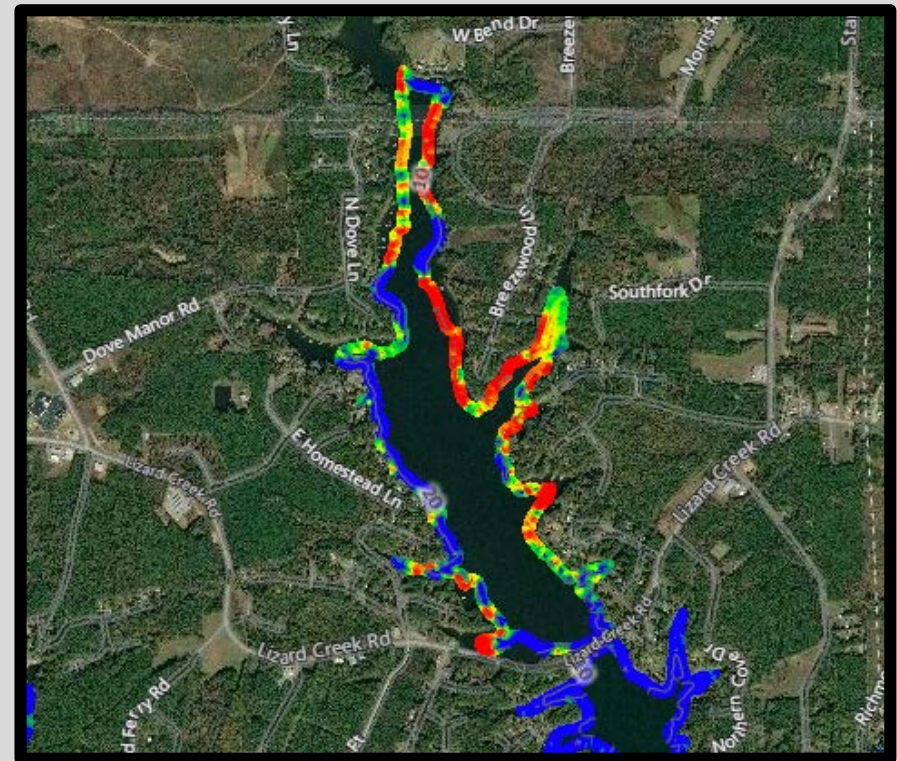
**Lake Gaston
Weed Control Council**

Hydrilla Management

Acreage Estimates



Vegetation Survey
Presence Data

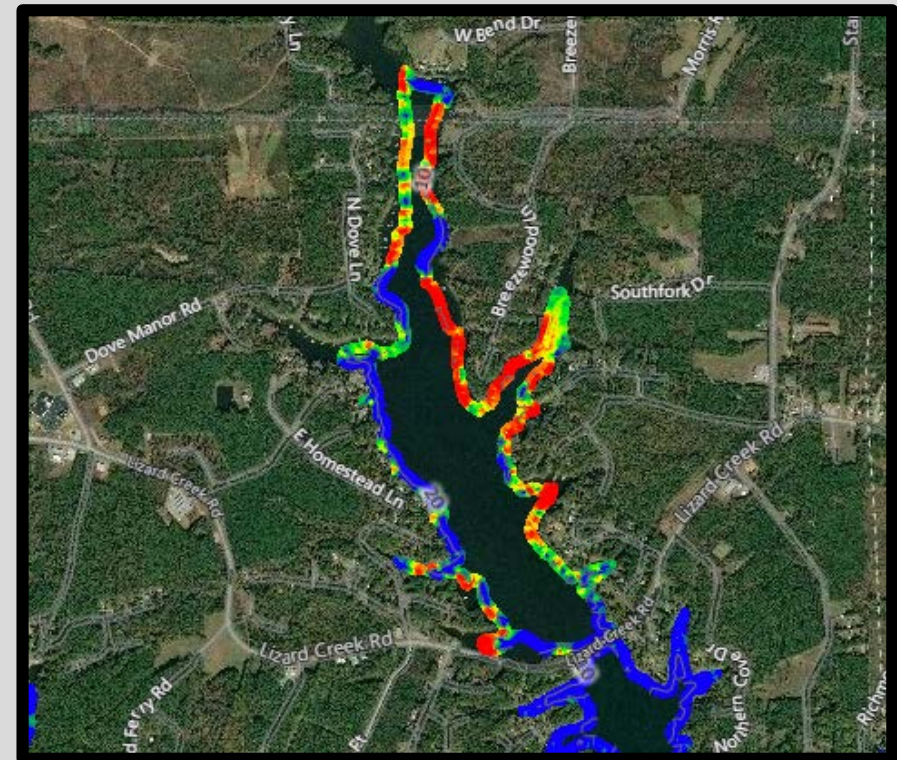


Sonar Survey
Volume Data

Hydrilla Management

Acreage Estimates

- Entire Shoreline Sampled
- Dual Track Sonar
- September and October
- Data uploaded to BioBase
 - Calculate BioVolume



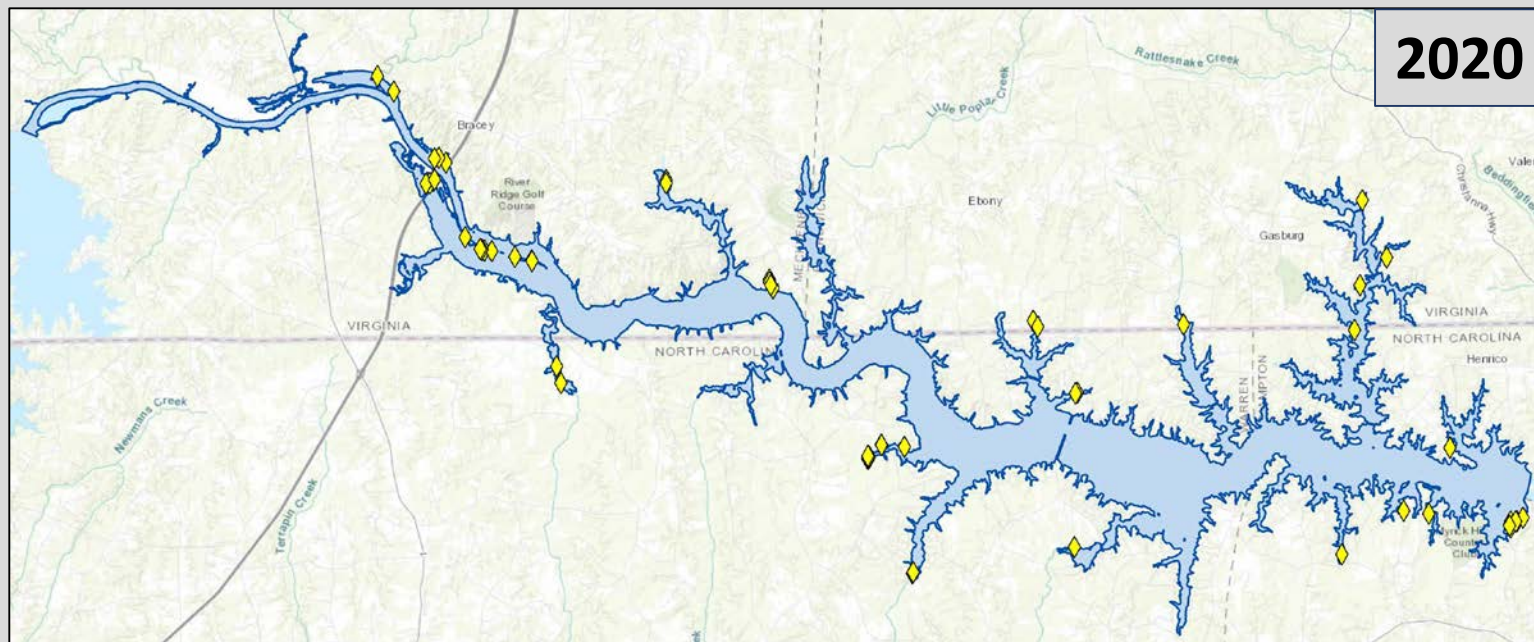
Sonar Survey
Volume Data

Hydrilla Treatments

2020 Survey Results

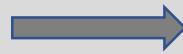
Total Vegetation: 1 %

Estimated Hydrilla Acreage: 104 acres



Hydrilla Treatments

2020 Survey Results



2021 TAG Recommendation

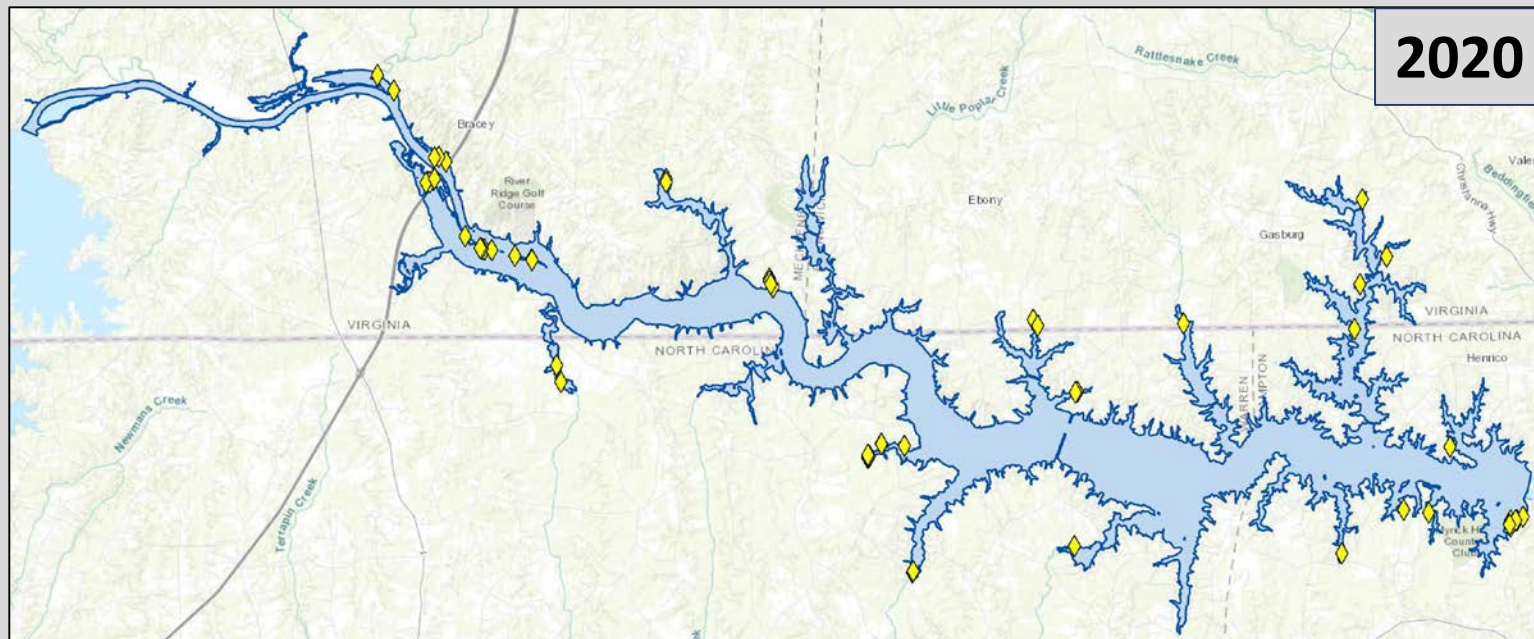
Total Vegetation: 1 %

Maximum Treatment Acres: 104 acres

Estimated Hydrilla Acreage: 104 acres

Planned Treatment Acres: 0 acres

Grass Carp Stocking: 0 GC

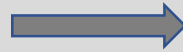


Hydrilla Treatments

2020 Survey Results

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2021 TAG Recommendation

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Planned Treatment Acres: 0 acres

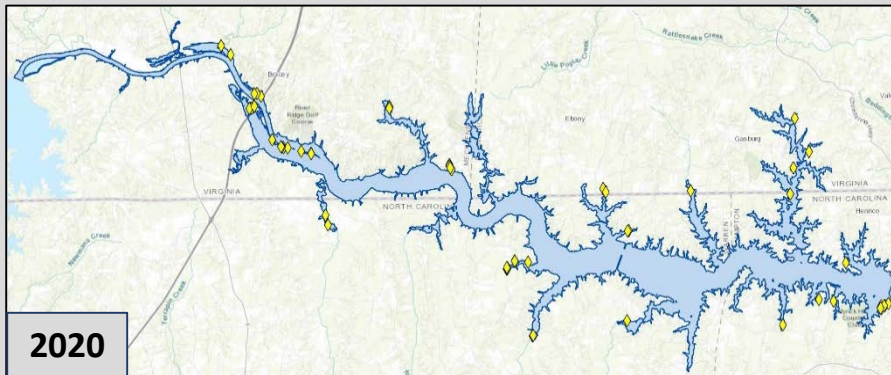
Grass Carp Stocking: 0 GC



2021 Hydrilla Treatments

Treated Acreage: WCC Spot Treatments

Grass Carp Stocking: 0 GC



Hydrilla Treatments

2021 Survey Results



Hydrilla Treatments

2021 Survey Results

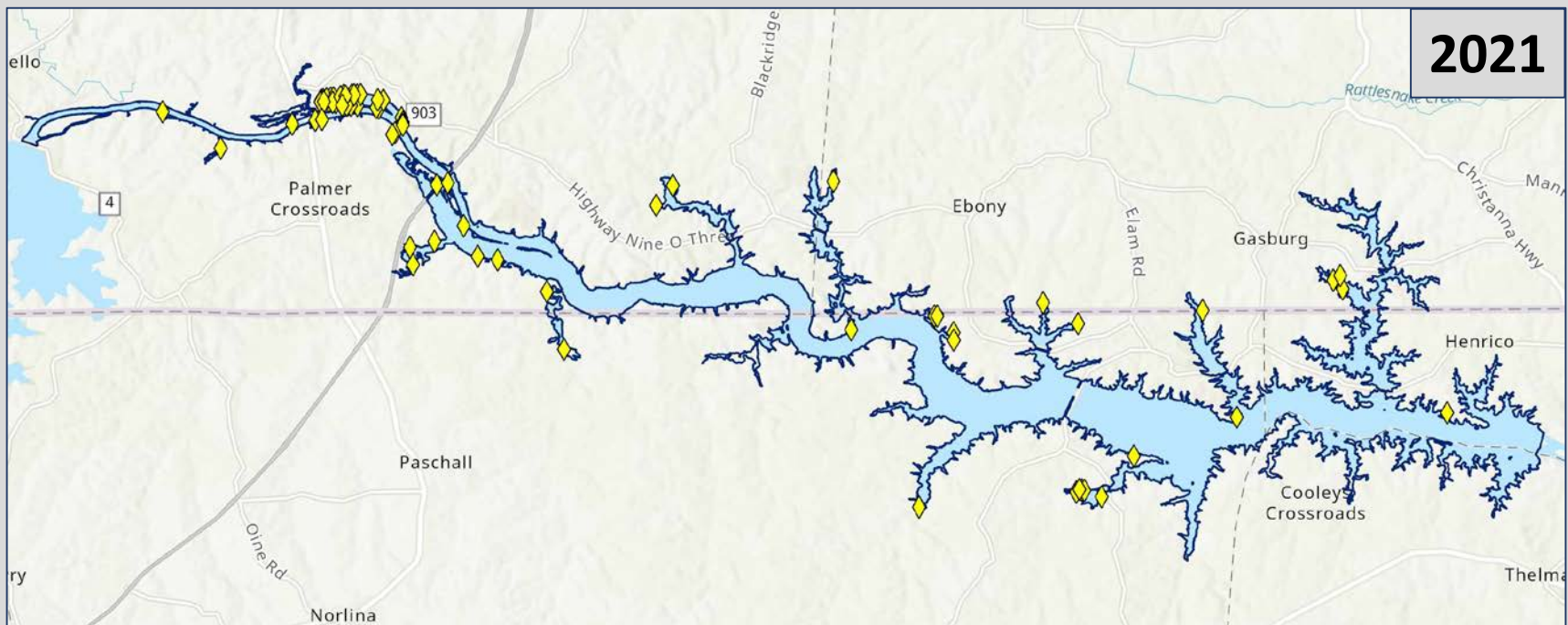


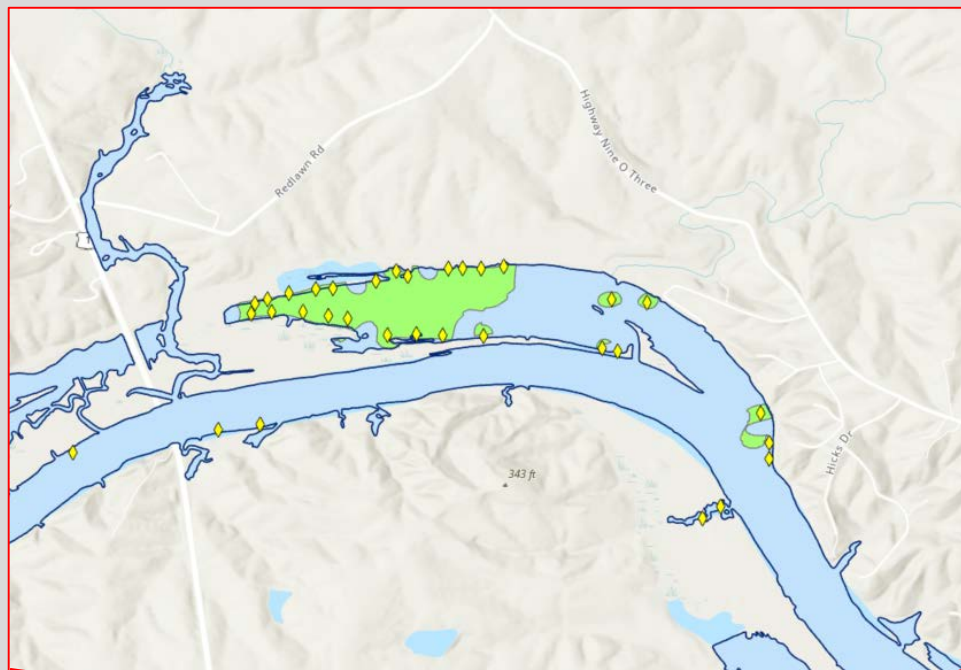
Hydrilla Treatments

2021 Survey Results

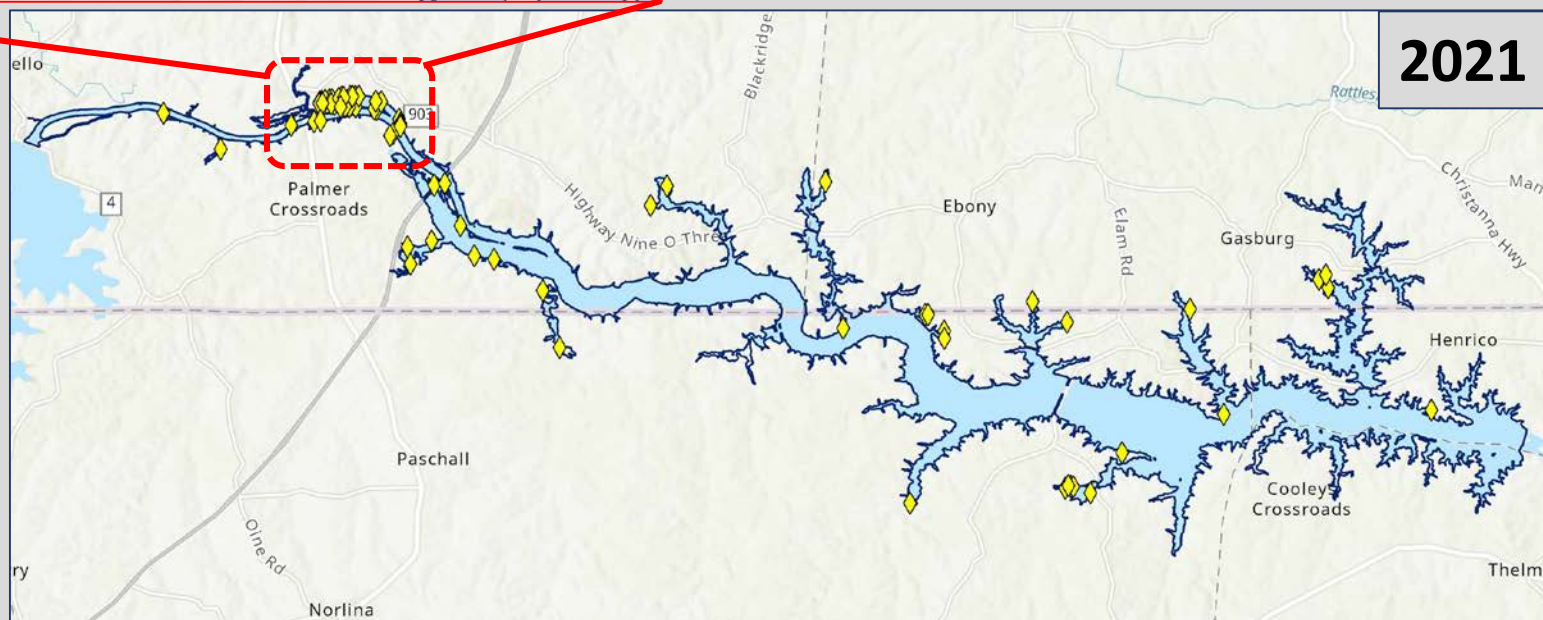
Total Vegetation: 1.4 %

Estimated Hydrilla Acreage: 154 acres





**86 Estimated Acres
at Beachwood**



2021

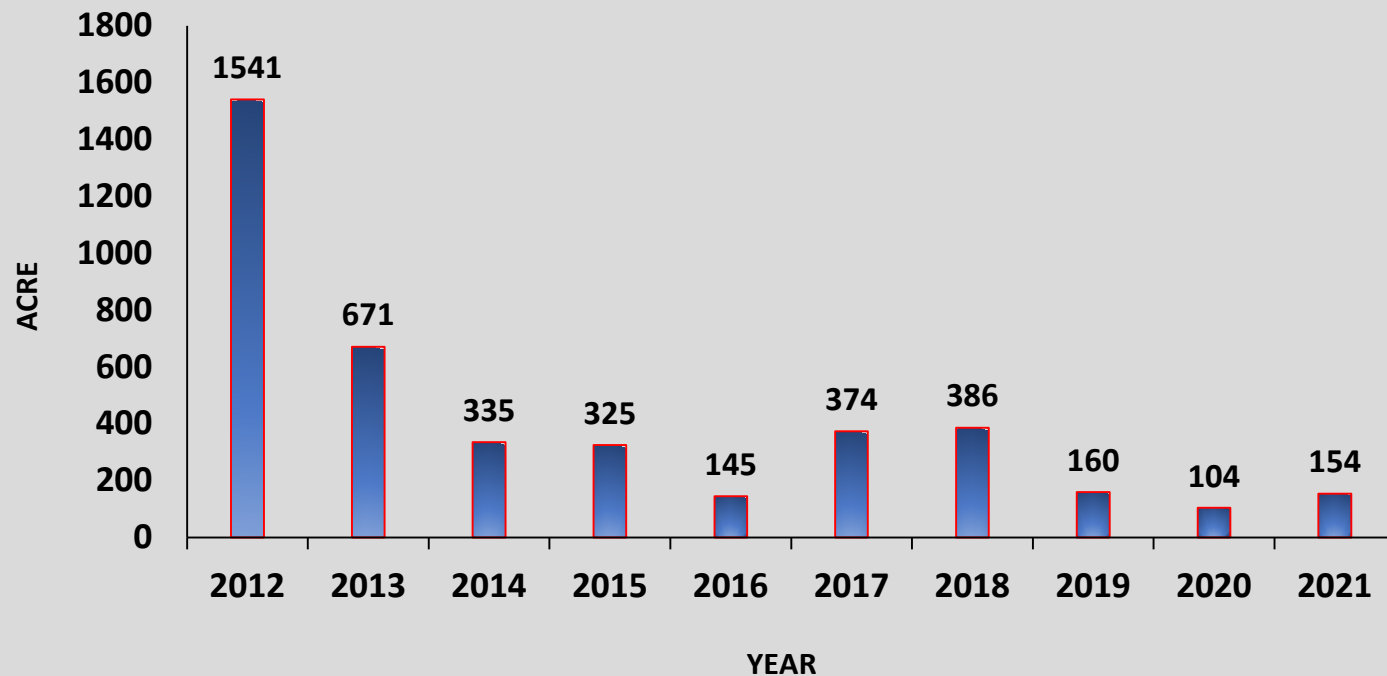
Hydrilla Treatments

2021 Survey Results

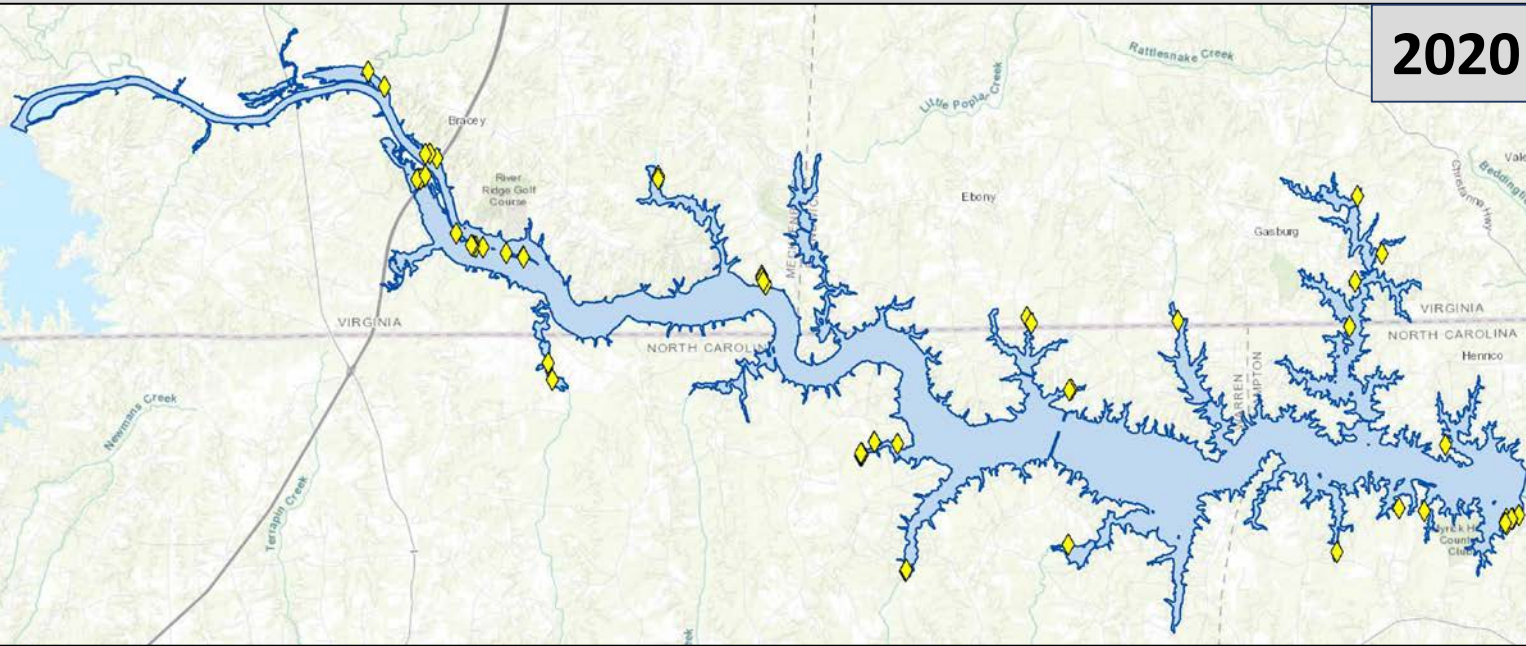
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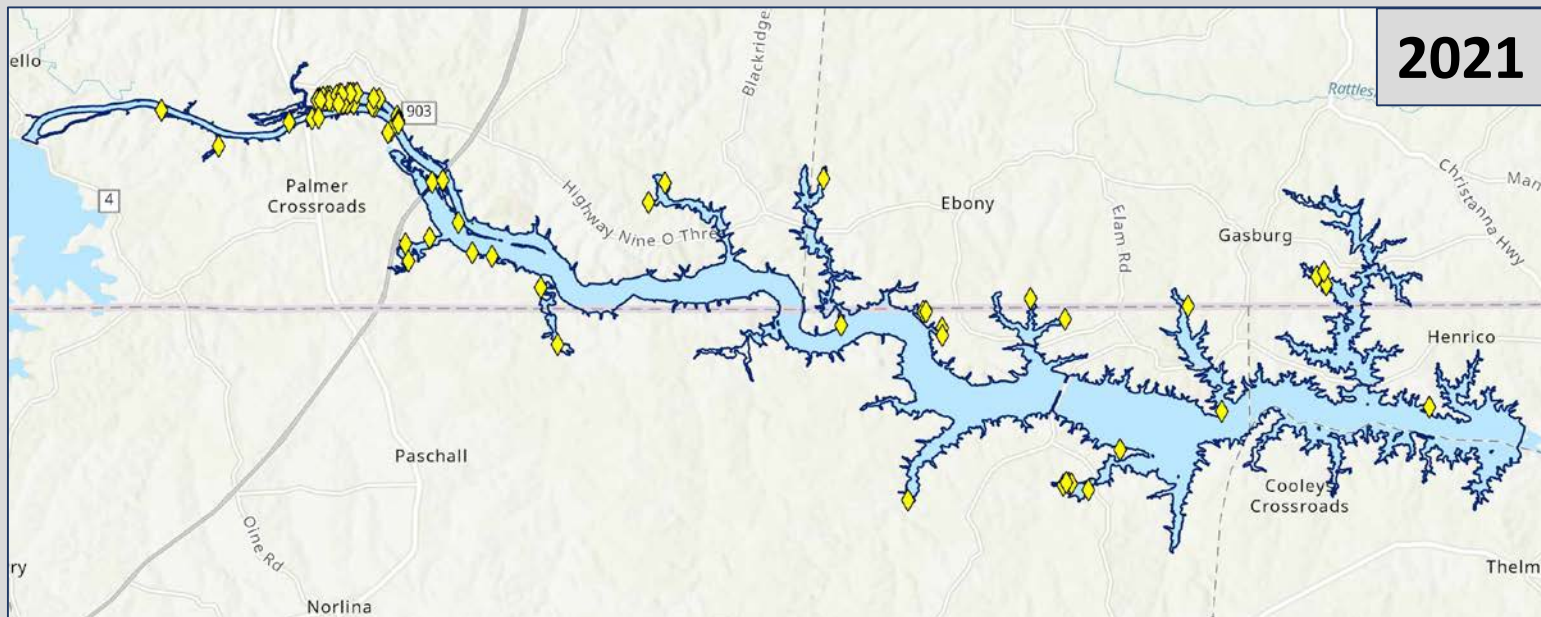
Hydrilla Acreage



2020



2021



Hydrilla Treatments

2021 Survey Results



- Sonar/Vegetation Surveys
 - Current Hydrilla Situation



Hydrilla Treatments

2021 Survey Results



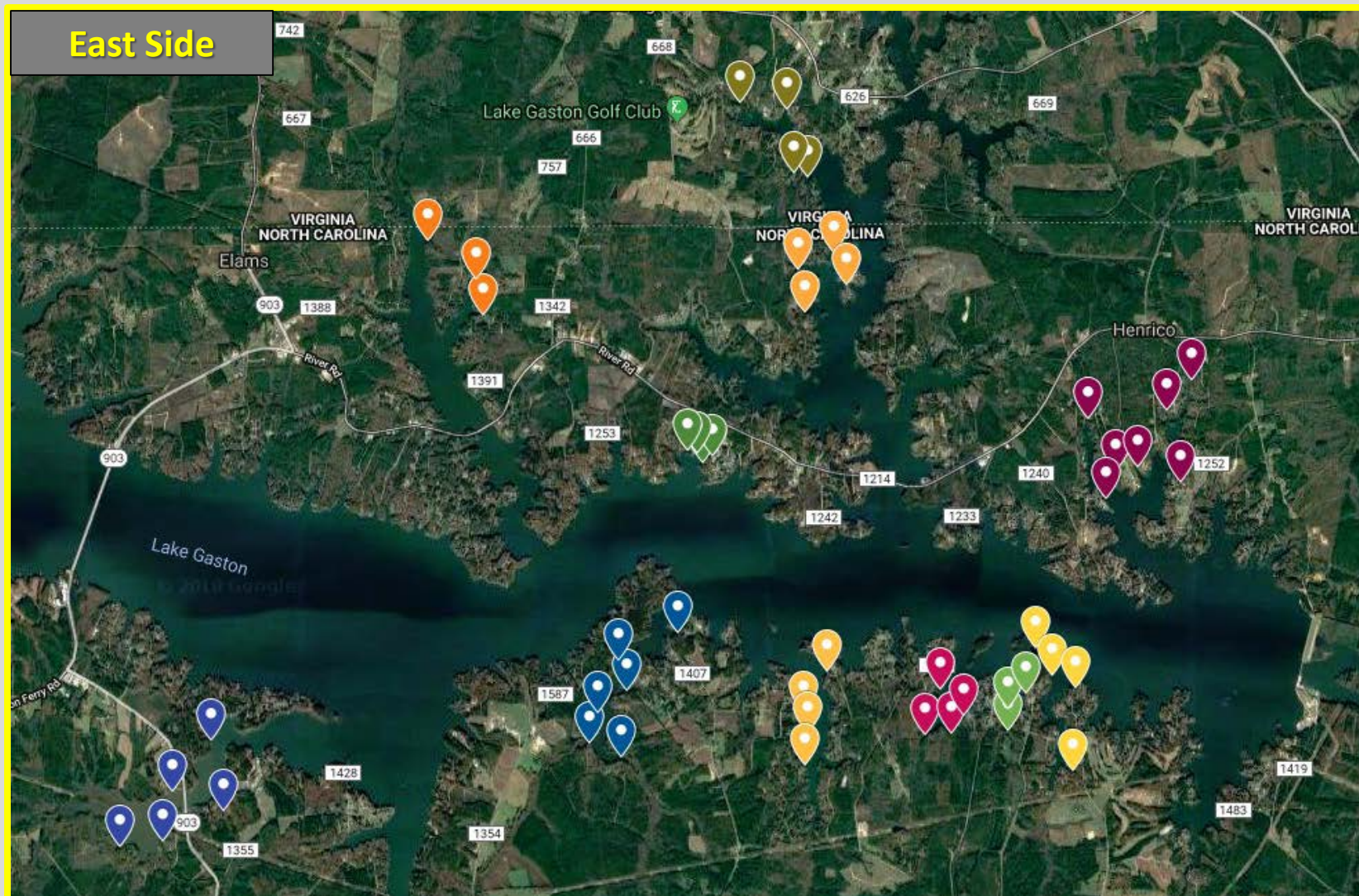
- Tuber Surveys
 - Future Hydrilla Situation

Tuber Survey

- Sampled December 2021
- 18 Total Creeks
 - Based on historical hydrilla presence
 - 3 – 6 sample sites per creek
- Samples are Collected Using Core Sampler
- Samples Rinsed Over Screen to Exposed Tubers
- Total of 30 - 50 core samples per sample site
- Tuber Densities Calculated per Site
 - Sites are averaged per creek



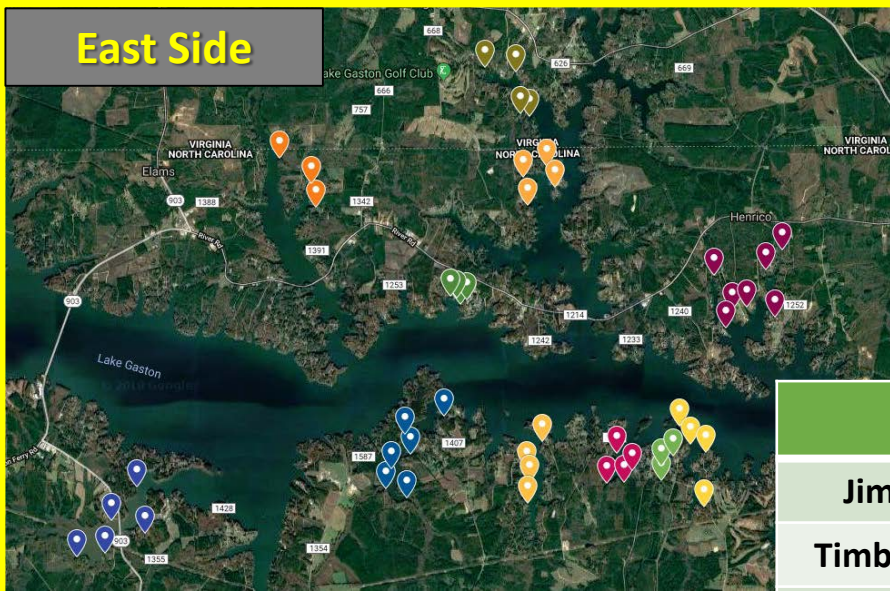
Tuber Survey



Tuber Survey



East Side



Tuber Density (m2)

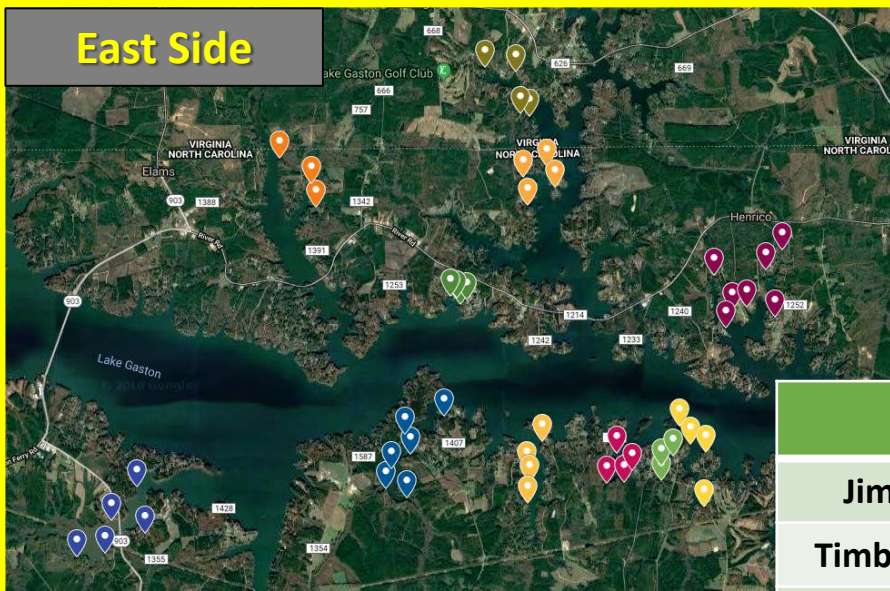
	2012	2020	2021	Last Detection
Jimmies Creek	36.41			
Timberline Shores	3.08			
Cold Springs Branch	34.95			
Lakeview	124.37			
Lizards Creek	58.93*			
Big Stone House	31.25			
Pretty Creek	38.72			
Poe Creek	125.40			
Woodland Hurst	135.67			
Sledge Creek	8.22			
<i>Hamlin</i>	446.08			



Tuber Survey



East Side



- Low detection rates

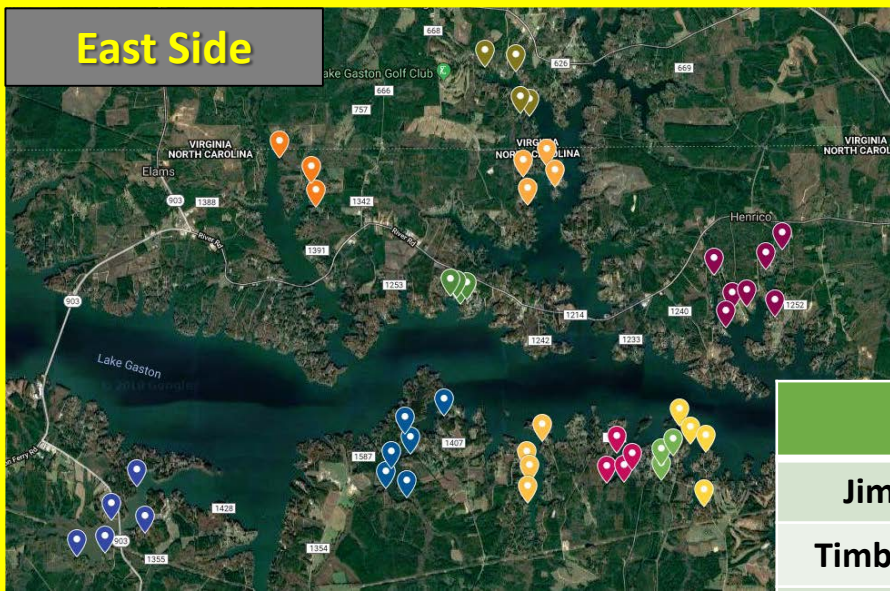
Tuber Density (m2)

	2012	2020	2021	Last Detection
Jimmies Creek	36.41	0	0	
Timberline Shores	3.08	0	0	
Cold Springs Branch	34.95	0	0	
Lakeview	124.37	0	0	
Lizards Creek	58.93*	0	24.39	
Big Stone House	31.25	0	0	
Pretty Creek	38.72	0	0	
Poe Creek	125.40	0	0	
Woodland Hurst	135.67	0	0	
Sledge Creek	8.22	0.82	0	
<i>Hamlin</i>	<i>446.08</i>	0	0	

Tuber Survey



East Side



- Low detection rates
- However, monitoring still needed

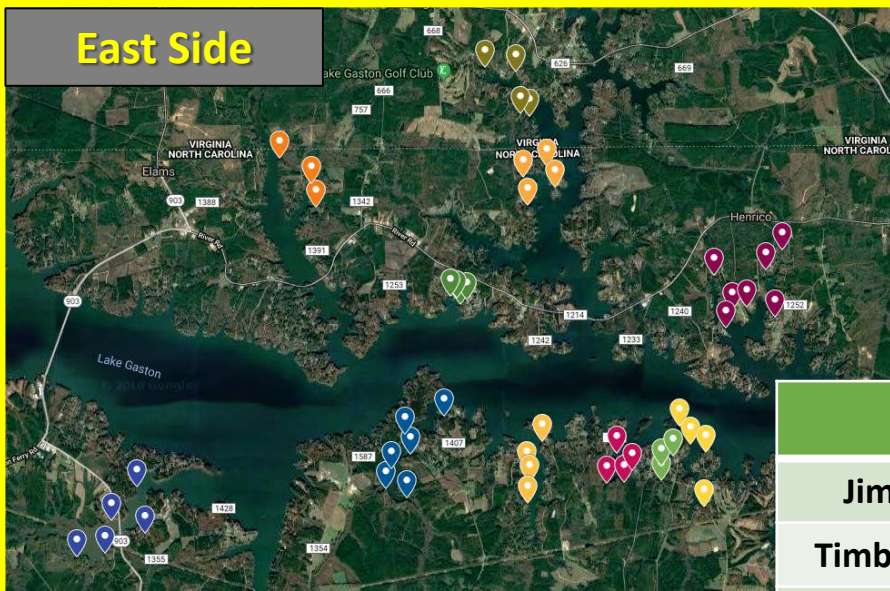
Tuber Density (m2)

	2012	2020	2021	Last Detection
Jimmies Creek	36.41	0	0	5 yrs
Timberline Shores	3.08	0	0	3 yrs
Cold Springs Branch	34.95	0	0	2 yrs
Lakeview	124.37	0	0	7 yrs
Lizards Creek	58.93*	0	24.39	0 yrs
Big Stone House	31.25	0	0	5 yrs
Pretty Creek	38.72	0	0	5 yrs
Poe Creek	125.40	0	0	2 yrs
Woodland Hurst	135.67	0	0	3 yrs
Sledge Creek	8.22	0.82	0	1 yrs
<i>Hamlin</i>	<i>446.08</i>	0	0	2 yrs

Tuber Survey



East Side

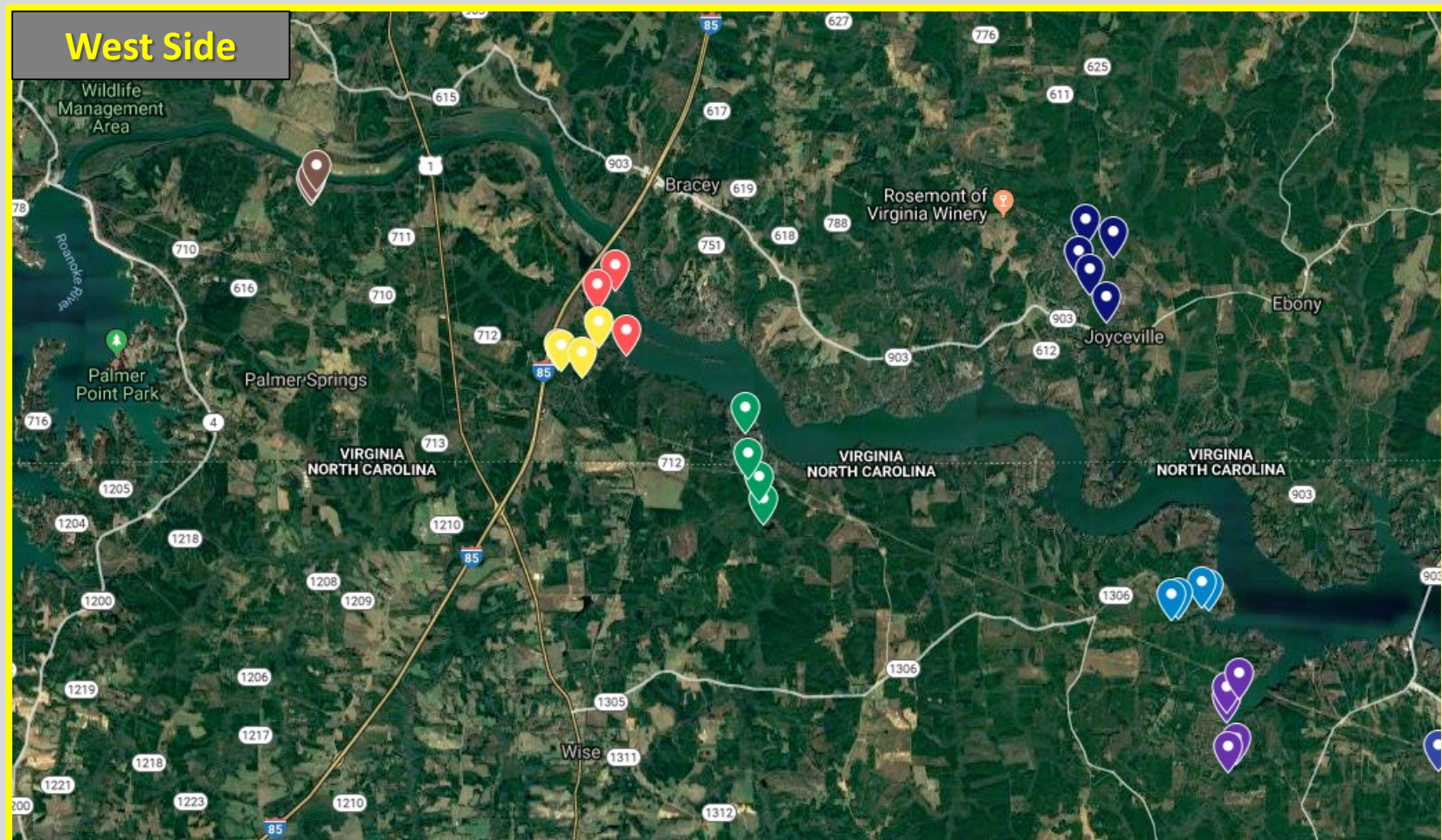


- Low detection rates
- However, monitoring still needed
- Successful Management!

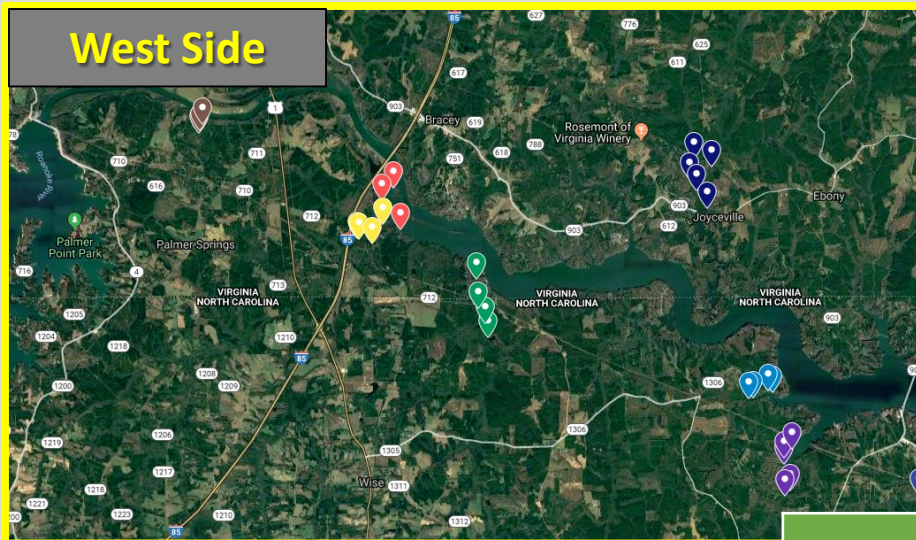
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Tuber Survey



Tuber Survey

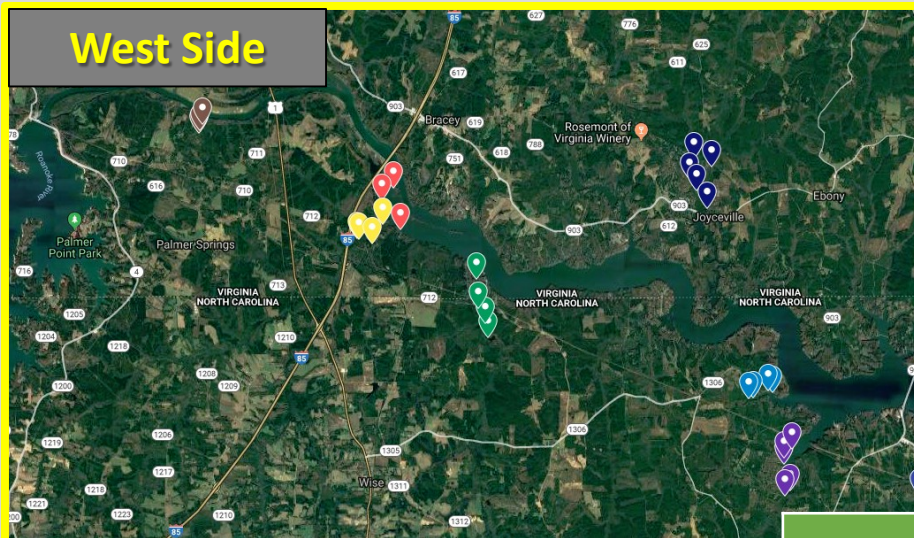


Tuber Density (m2)

	2012	2020	2021	Last Detection
Hubquarter	292.73			
Lyons Creek	293.96			
Poplar Creek	89.63			
Hawtree	38.03			
Smith Creek	8.22			
Flats	119.23			
<i>Cotton Creek</i>	<i>217.90</i>			



Tuber Survey

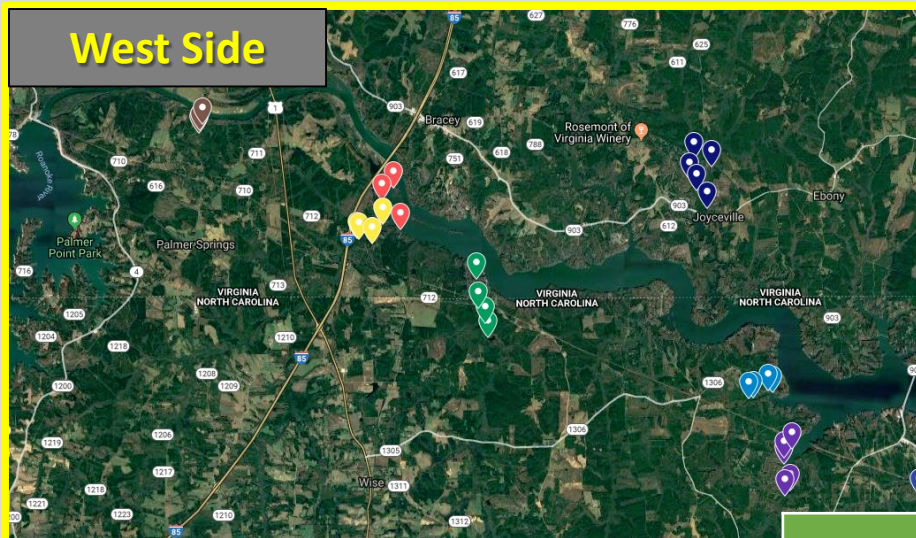


Tuber Density (m2)

	2012	2020	2021	Last Detection
Hubquarter	292.73	1.64	0	
Lyons Creek	293.96	0	0	
Poplar Creek	89.63	8.22	0	
Hawtree	38.03	6.58	4.93	
Smith Creek	8.22	0	0	
Flats	119.23	0	0	
<i>Cotton Creek</i>	<i>217.90</i>	42.48	0*	

- Slightly higher detection rates than East side sites
- Monitoring still needed

Tuber Survey



Tuber Density (m2)

- Slightly higher detection rates than East side sites
- Monitoring still needed
- Successful Management!

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Hubquarter	292.73	1.64	0	1 yr
Lyons Creek	293.96	0	0	2 yrs
Poplar Creek	89.63	8.22	0	1 yr
Hawtree	38.03	6.58	4.93	0 yrs
Smith Creek	8.22	0	0	6 yrs
Flats	119.23	0	0	3 yrs
<i>Cotton Creek</i>	<i>217.90</i>	42.48	0*	1 yr

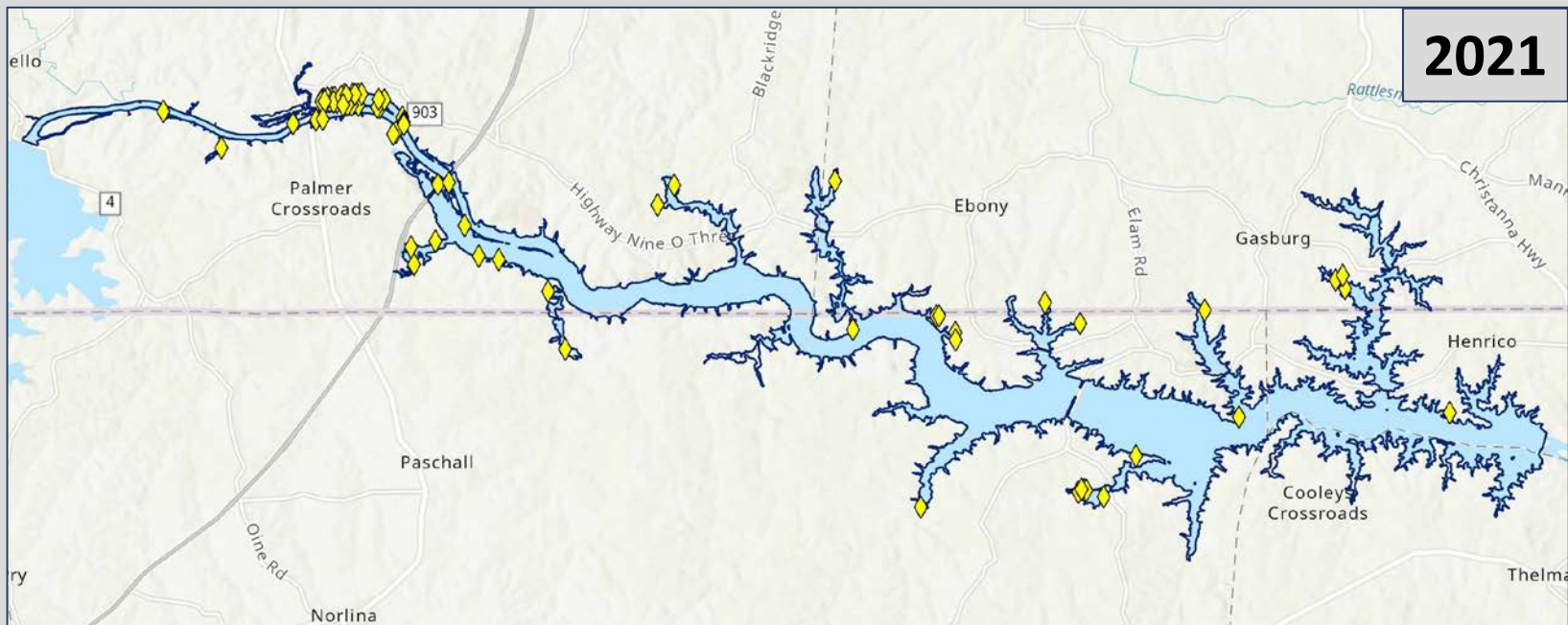
Hydrilla Treatments

2021 Survey Results



2022 Recommendation

Estimated Hydrilla Acreage: 154 acres
Low Tuber Bank Density



2021 Survey Results



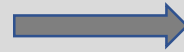
Maximum Treatment Acres: 154 acres

Possible Treatment Areas
Beachwood Flats
Lizard Creek



Hydrilla Treatments

2021 Survey Results



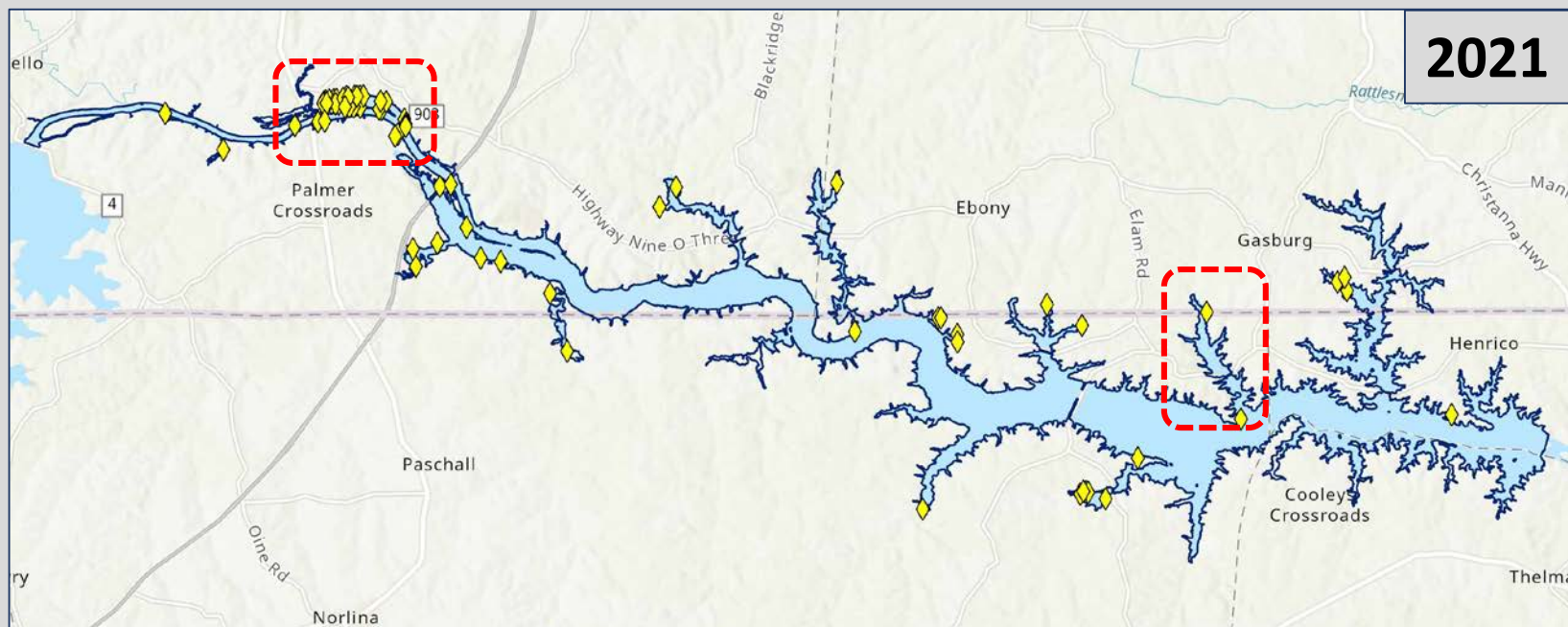
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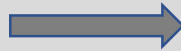
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Hydrilla Treatments

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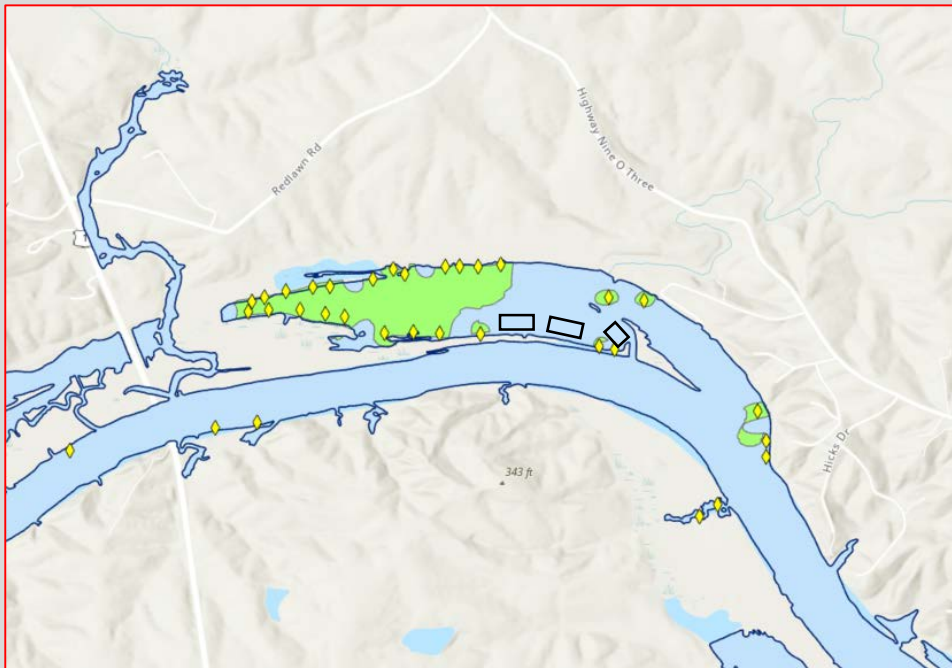
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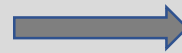


Area to Treat

- **Cages**

Hydrilla Treatments

2021 Survey Results



2022 Recommendation

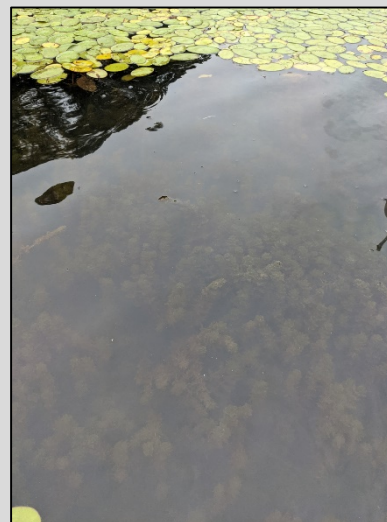
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Possible Treatment Areas

Beachwood Flats

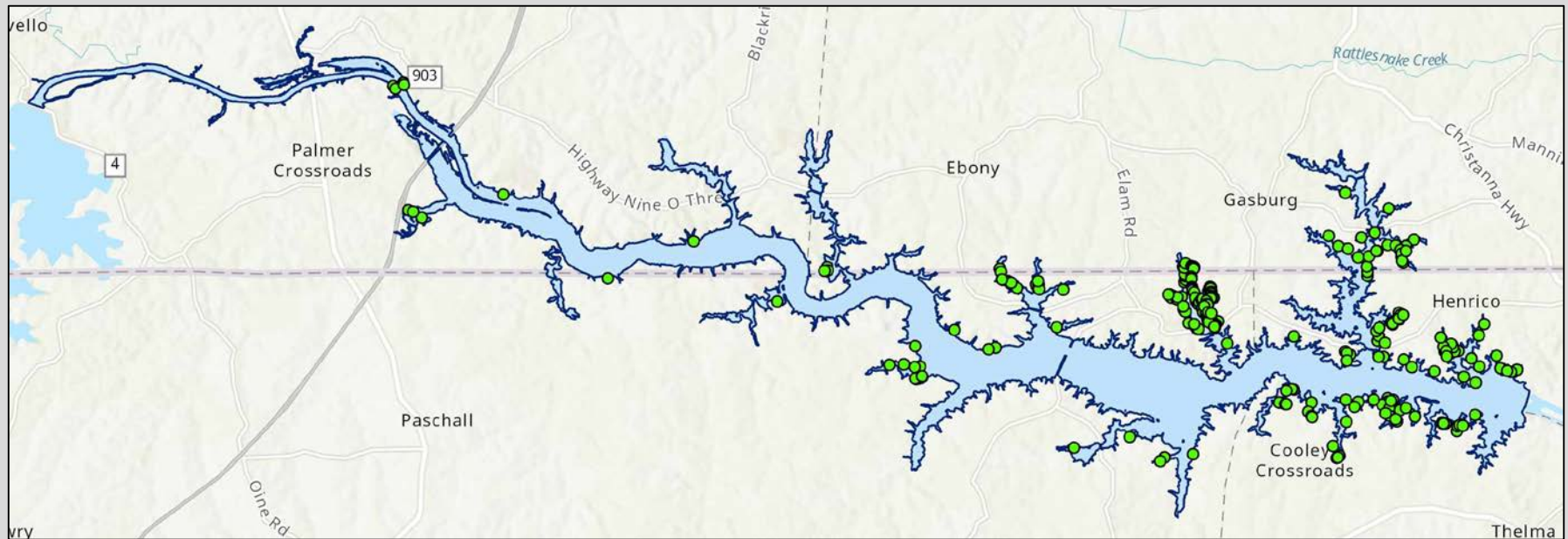
Lizard Creek



- Tuber Bank Density
- Chara Refuge

	2014	2015	2016	2017	2018	2019	2020	2021
Lizard Creek	58.93	30.15	3.29	0.00	49.34	18.91	0.00	24.39

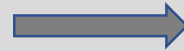
2021 Aquatic Plant Community



Chara Distribution

Hydrilla Treatments

2021 Survey Results



2022 Recommendation

Total Vegetation: 1.4 %

Maximum Treatment Acres: 154 acres

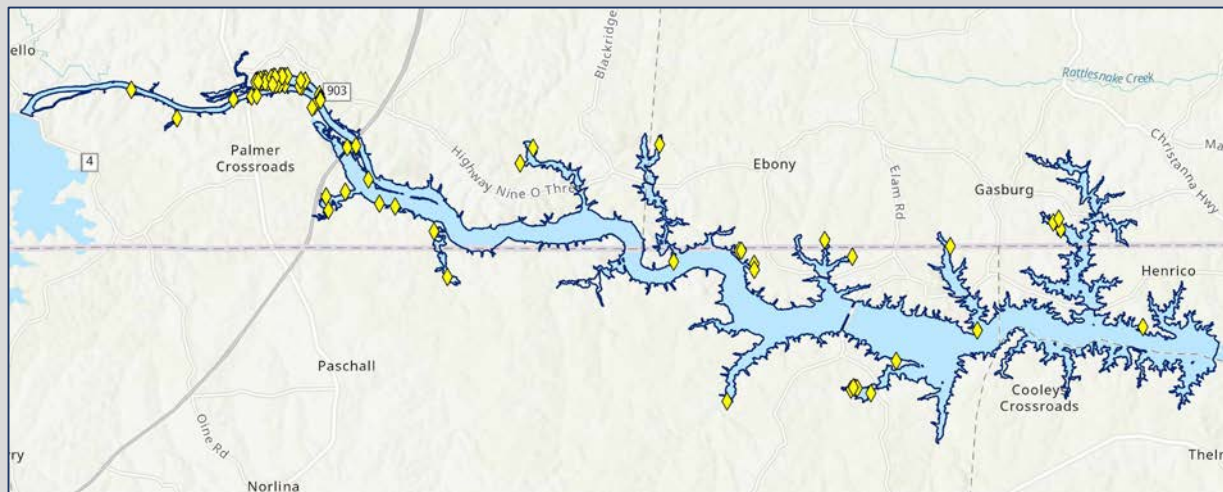
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Possible Treatment Areas

Beachwood Flats

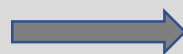
Lizard Creek

Grass Carp Stocking Number:



Hydrilla Treatments

2021 Survey Results



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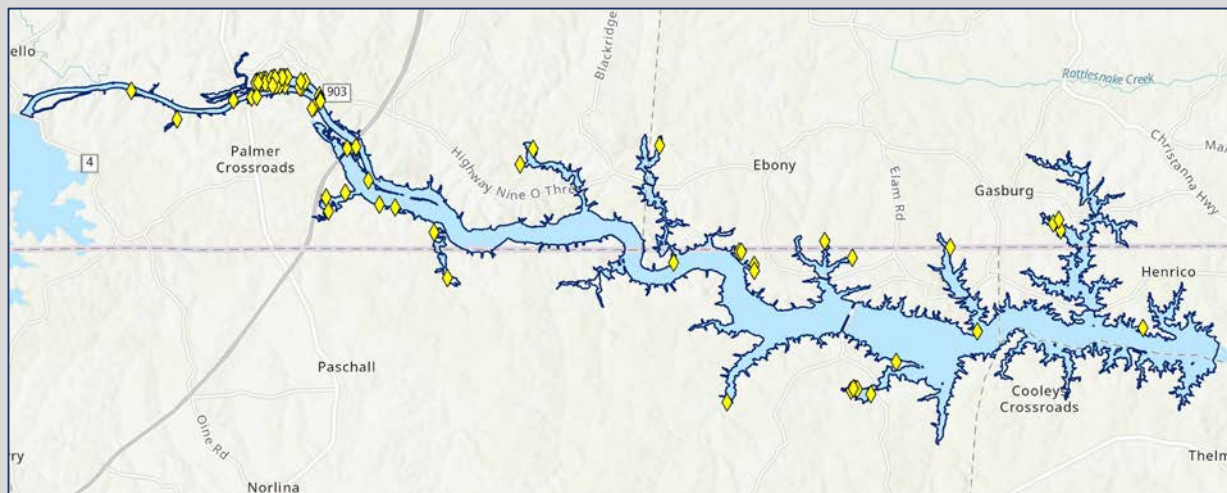
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Possible Treatment Areas

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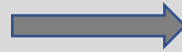
Lizard Creek

Grass Carp Stocking Number: 0



Hydrilla Treatments

2021 Survey Results



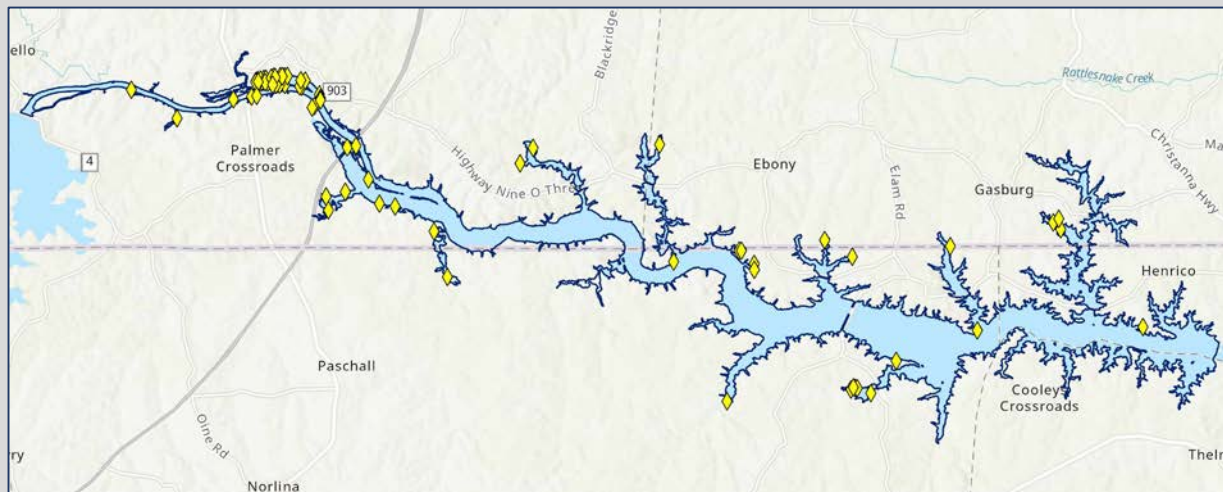
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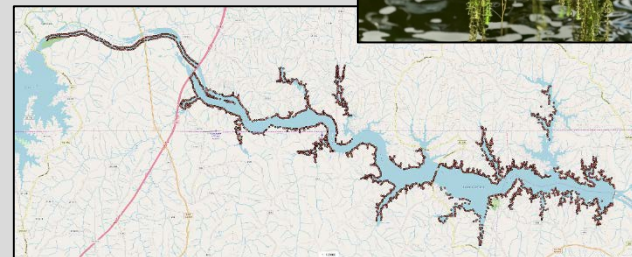
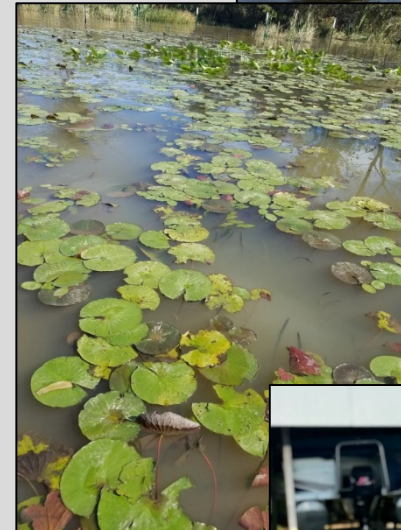
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Lyngbya

- Filamentous Cyanobacteria
- Negative Effects:
 - Ecosystem Dynamics
 - Recreational Usage
 - Overall Aesthetics
- Surface Mats Prevalent During Summer Months
- Stinks!



Lyngbya

- Filamentous Cyanobacteria
- Negative Effects:
 - Ecosystem Dynamics
 - Recreational Usage
 - Overall Aesthetics
- Surface Mats Prevalent During Summer Months
- Stinks!
- Little Biological Knowledge



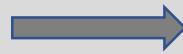
Lyngbya

- Filamentous Cyanobacteria
- Negative Effects:
 - Ecosystem Dynamics
 - Recreational Usage
 - Overall Aesthetics
- Surface Mats Prevalent During Summer Months
- Stinks!
- Little Biological Knowledge
- No Established Management Protocol
--- Yet! 😊



Lyngbya Treatments

2020 Survey Results



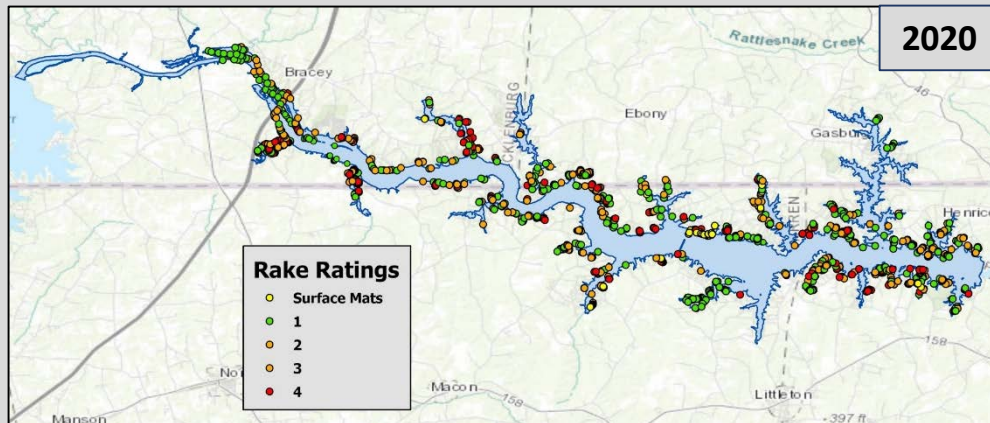
2021 TAG Recommendation

Total Vegetation: 30 %

Estimated Lyngbya Acreage: 1,194 acres

Treatment Acres: 300

**Captain XTR + AMP
Cutrine Ultra + AMP**



2021 Lyngbya Treatments

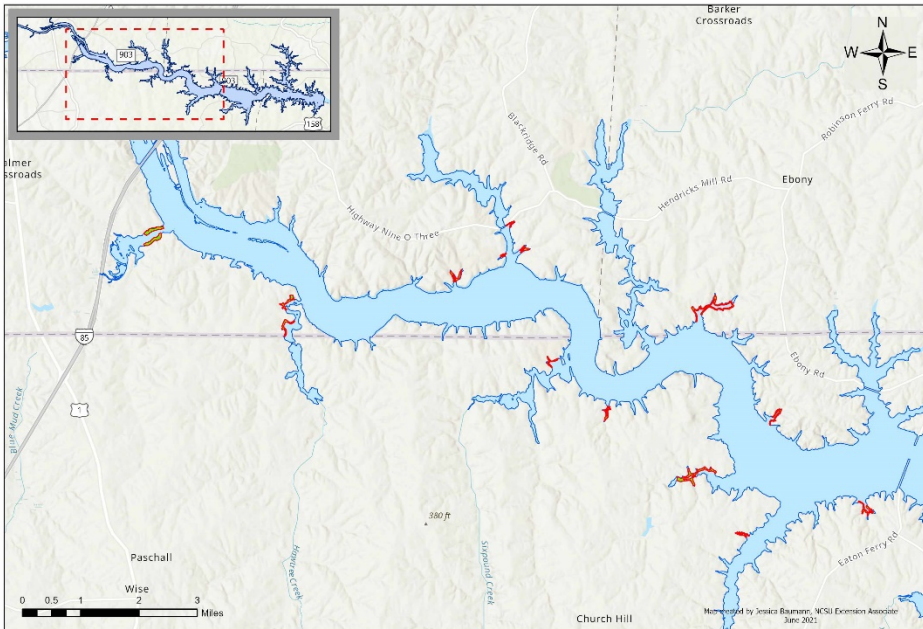
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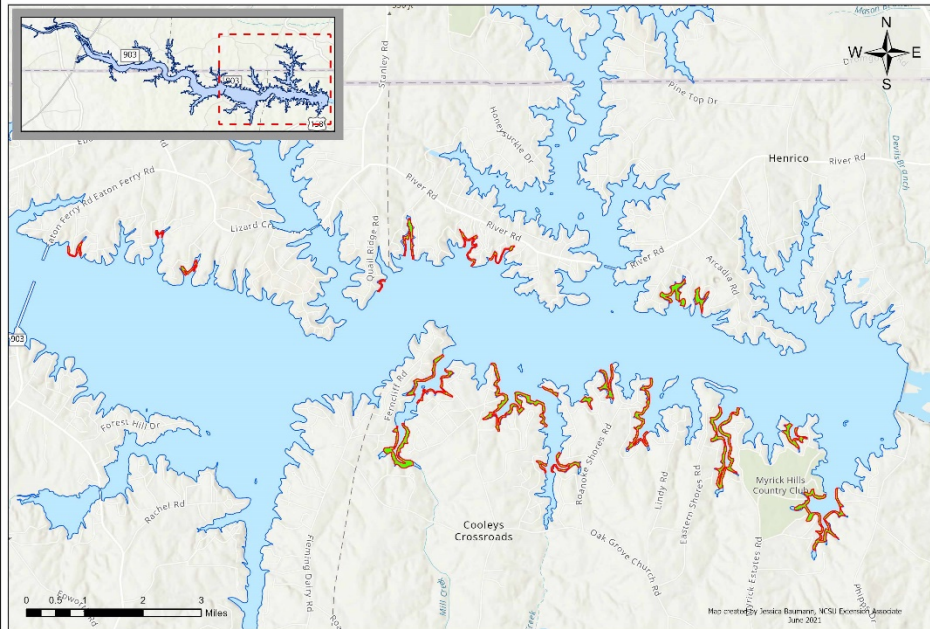
Lyngbya Treatments

2021 Lyngbya Treatments

**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



Monthly Applications (April – September)

Two Treatment Combinations

Varying Treatment Acreage
1 – 26 acres

Varying Copper Rates
0.25 – 0.80 ppm

Lyngbya Treatments

2021 Lyngbya Treatments



New Applicator

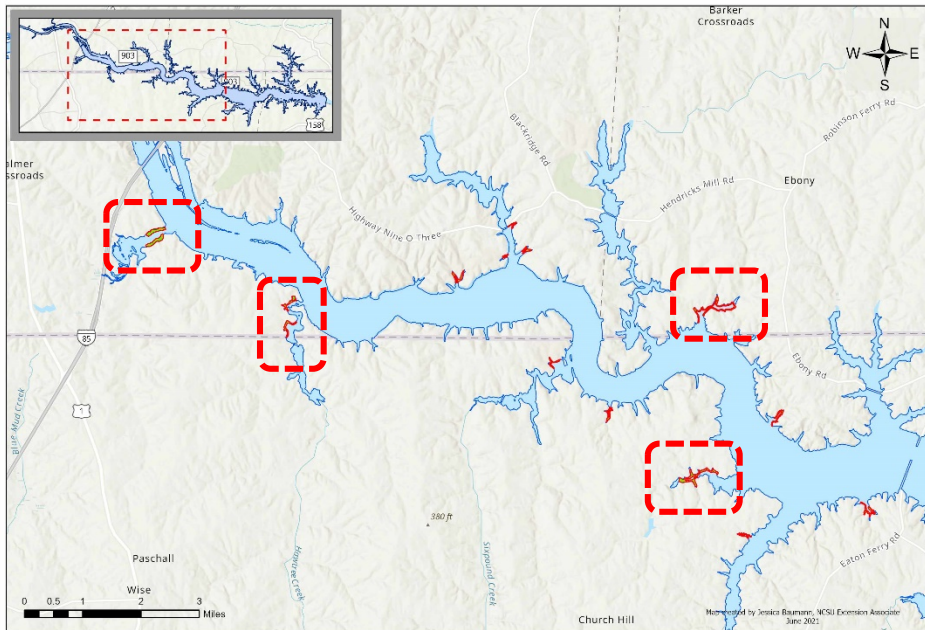
- Airboats
 - No hand spray applications
- New patented application system
 - Targets the mats along the bottom



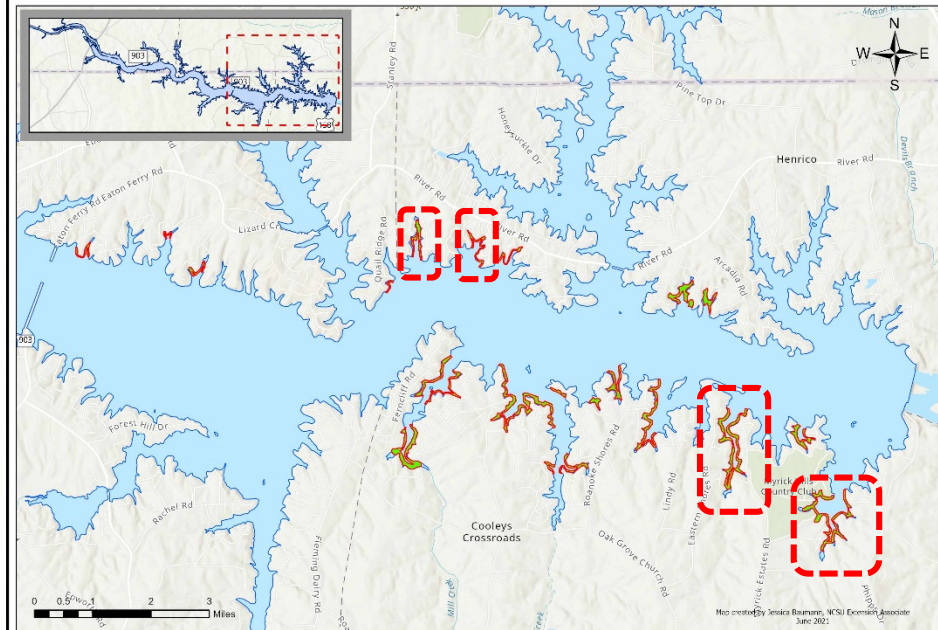
Lyngbya Treatments

2021 Lyngbya Treatments

**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



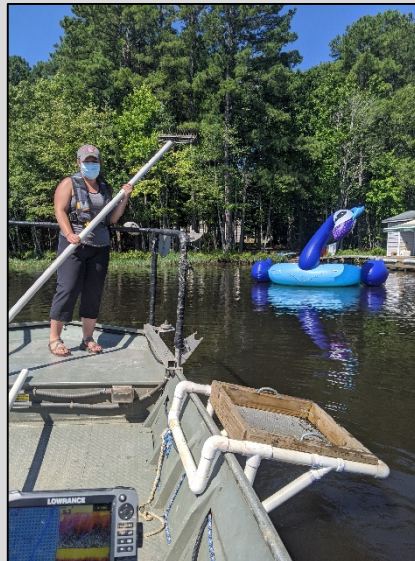
Two Treatment Combinations - Evaluation

- Experimental Plots (Both Treatments / Control)
- 1st year treatment area
- Multi-year treatment areas
- Large and Small treatment areas

Lyngbya Treatments

Methods of Evaluation:

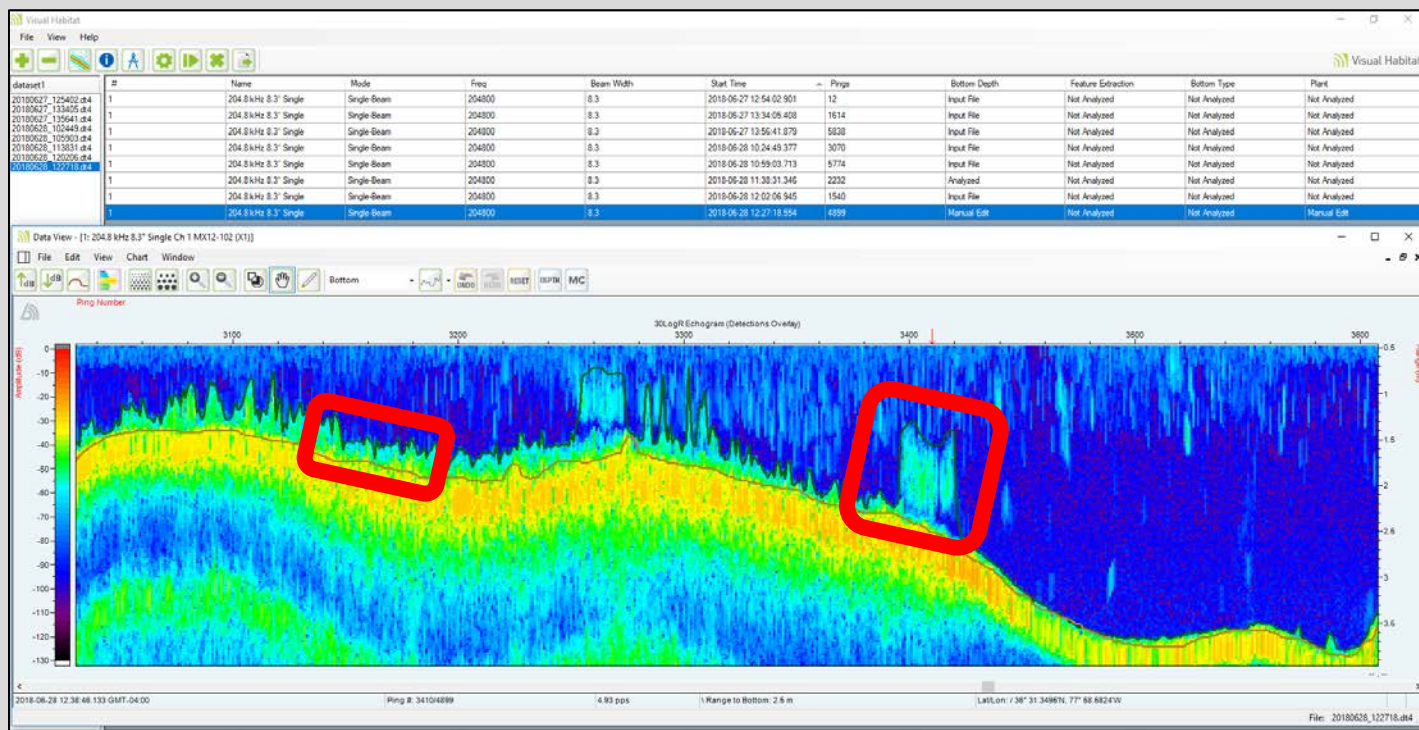
- Monthly Biosonic Scans (March – December)
- Viability Samples (December)



Lyngbya Treatments

Methods of Evaluation:

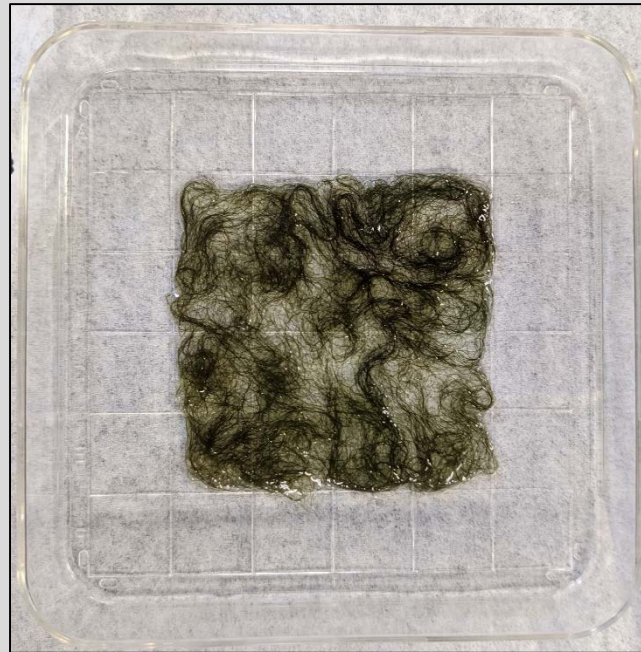
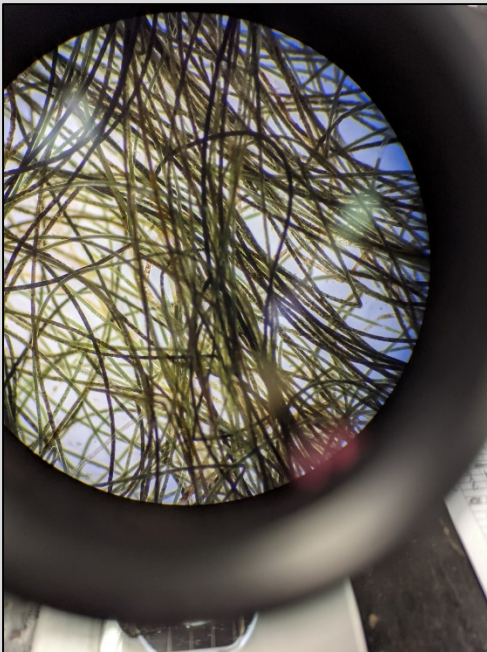
- **Monthly Biosonic Scans (March – December)**
 - Scanning whole treatment area
 - Capturing changes for across entire treatment area



Lyngbya Treatments

Methods of Evaluation:

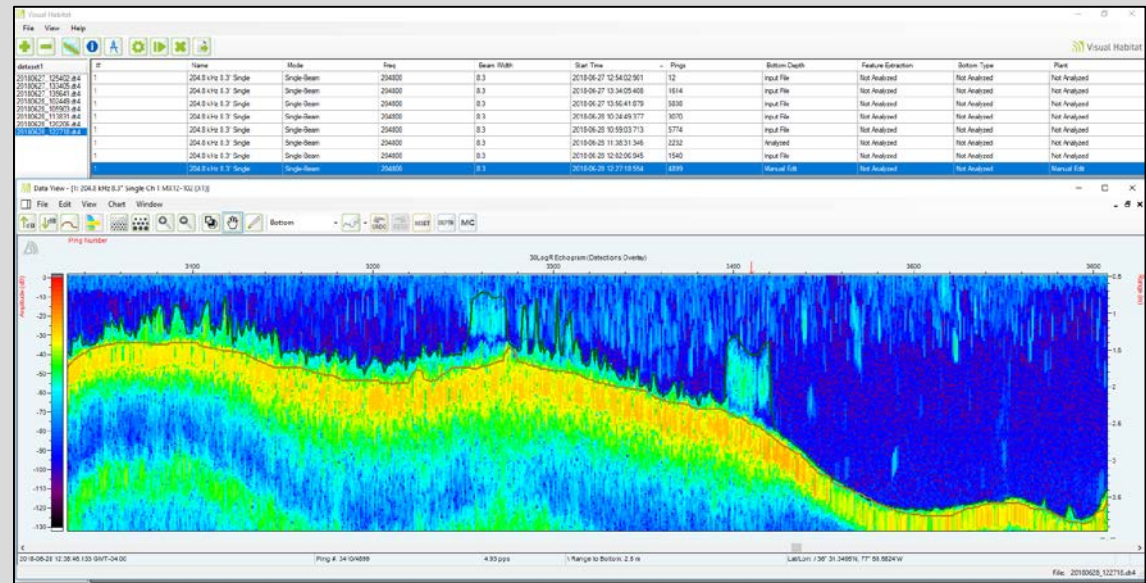
- Monthly Biosonic Scans (March – December)
- **Viability Samples (December)**



Lyngbya Treatments

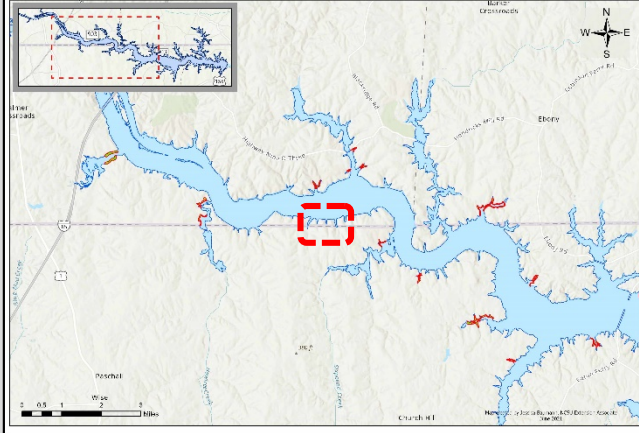
Methods of Evaluation:

- **Monthly Biosonic Scans (March – December)**
- **Viability Samples (December)**

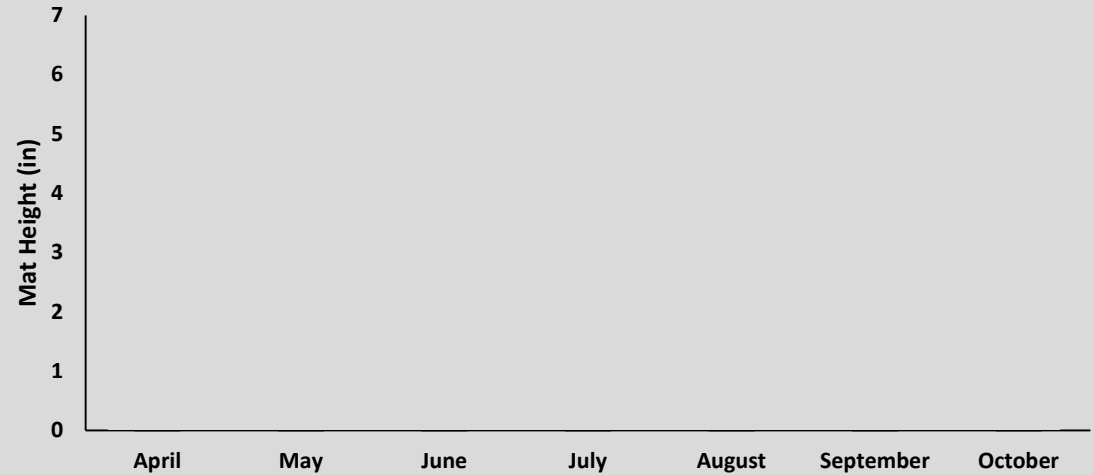


2021 Lyngbya Treatments

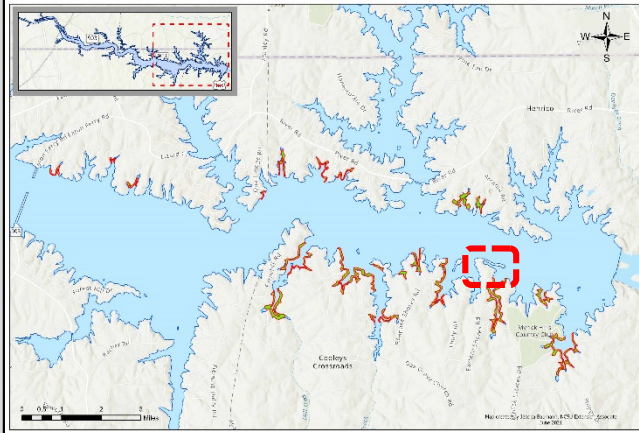
**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



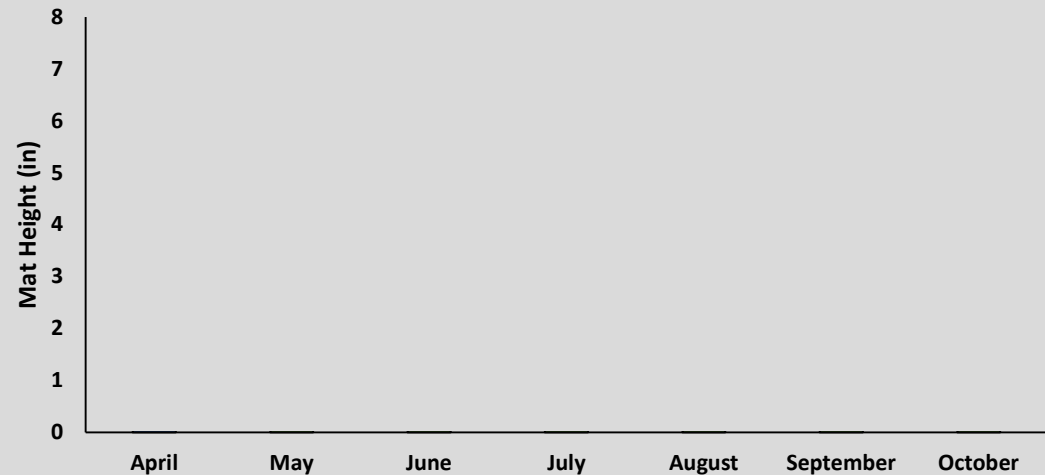
Upper Control



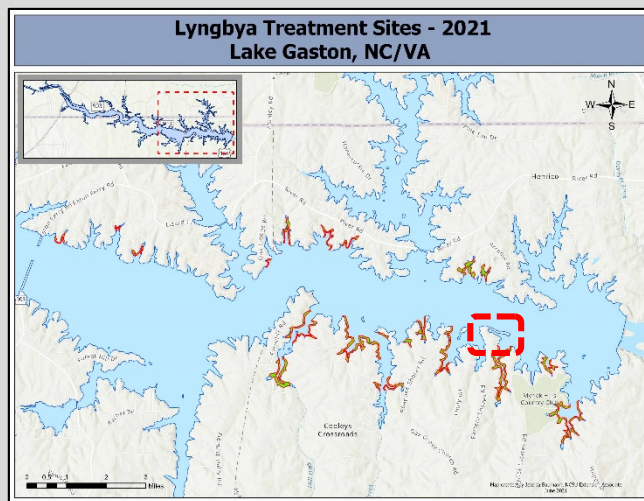
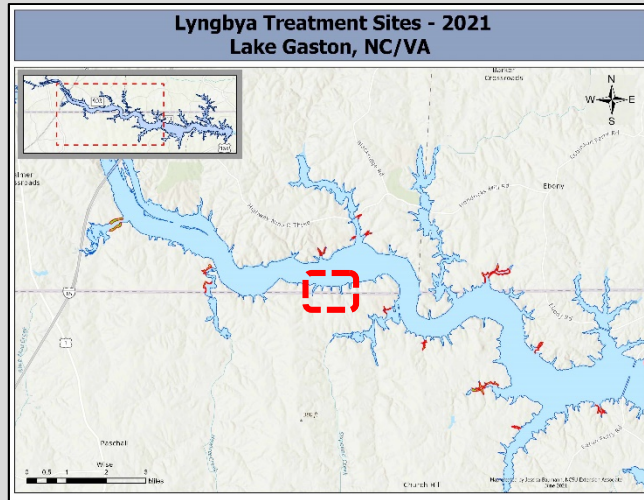
**Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA**



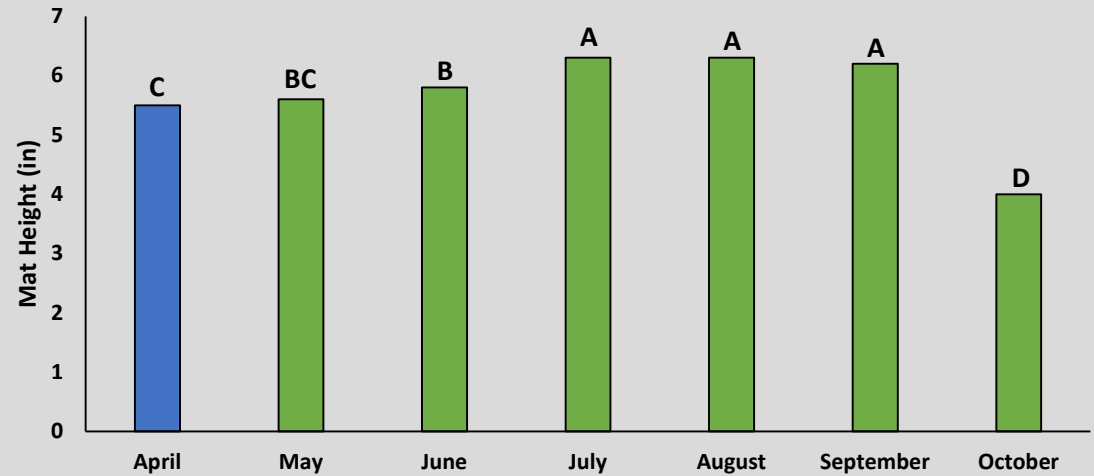
Lower Control



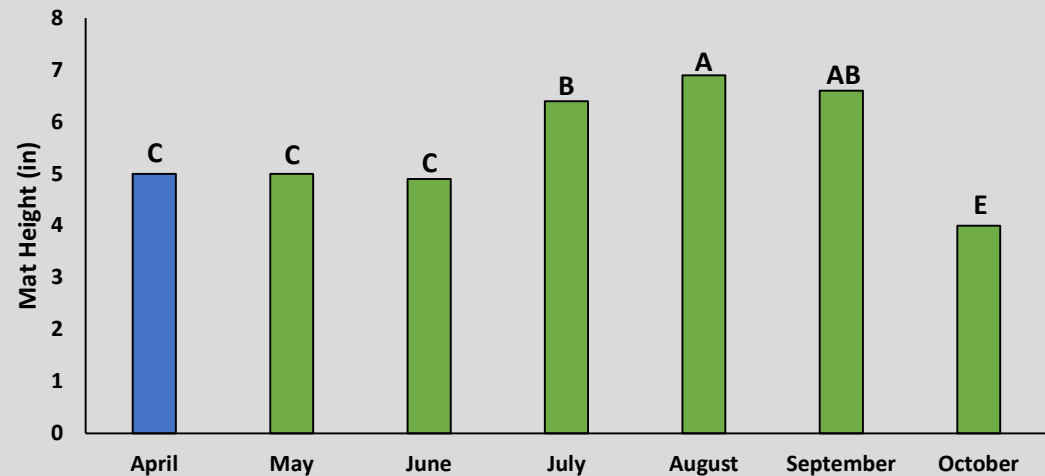
2021 Lyngbya Treatments



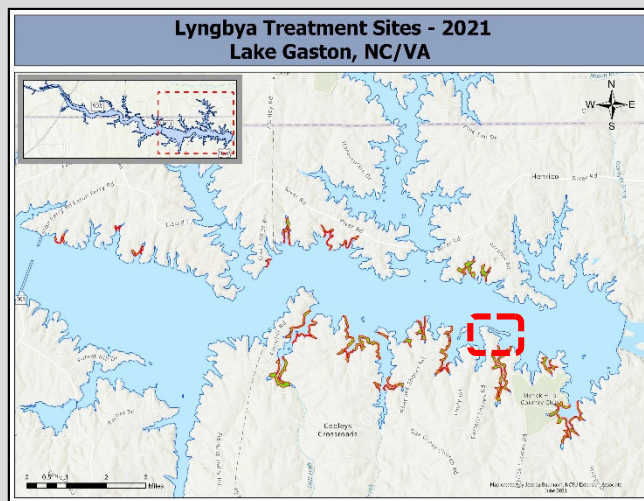
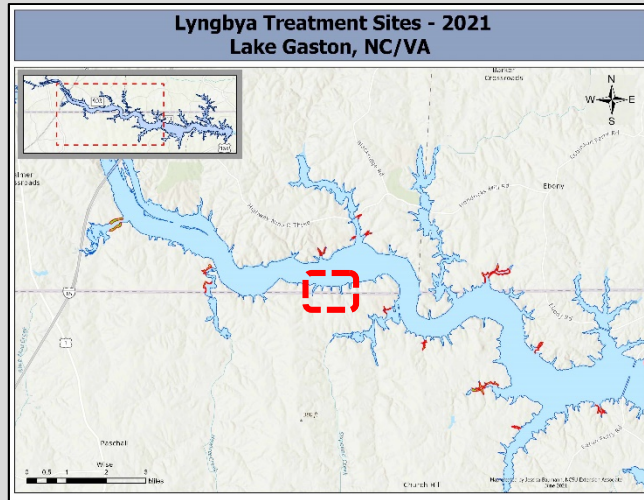
Upper Control



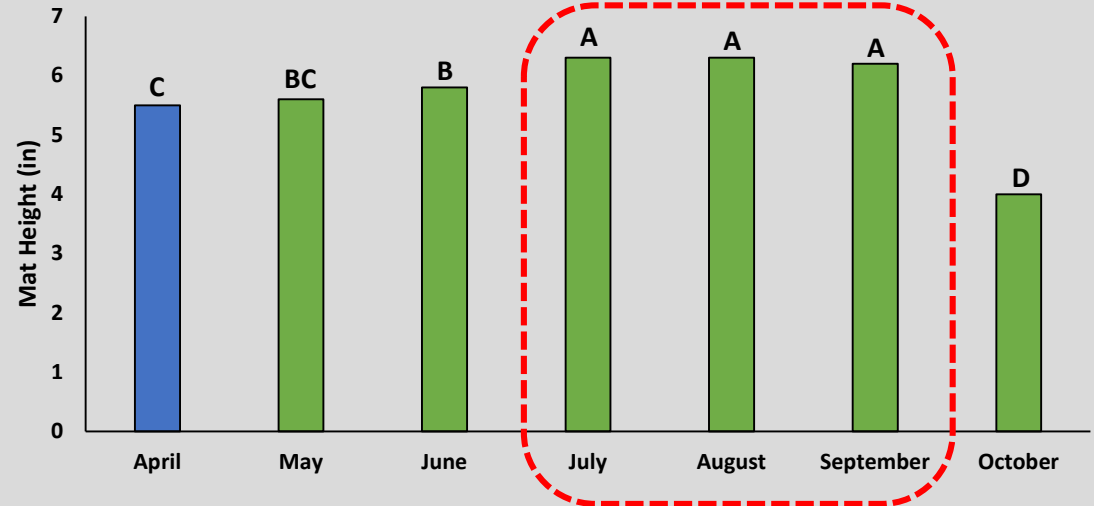
Lower Control



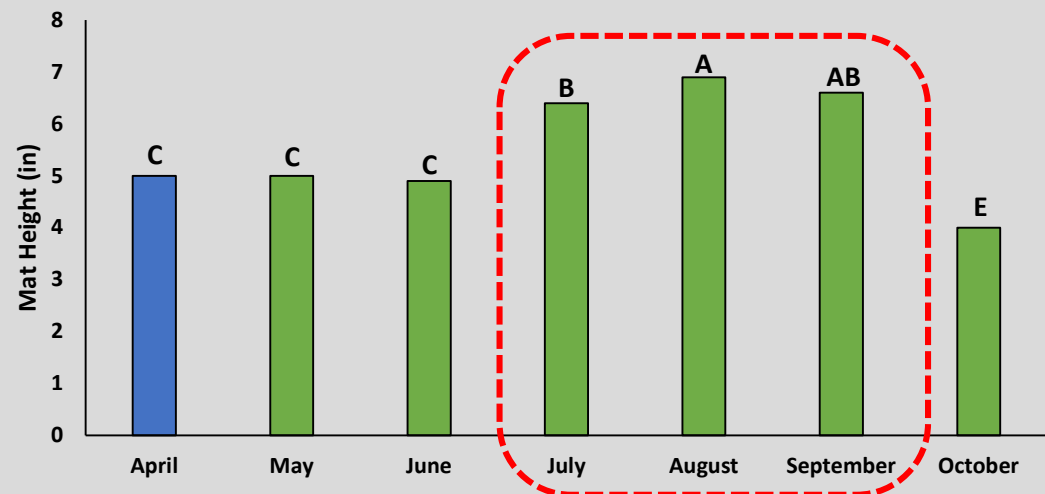
2021 Lyngbya Treatments



Upper Control

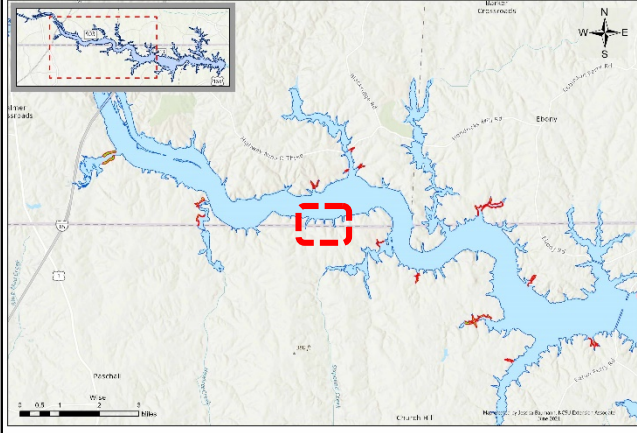


Lower Control

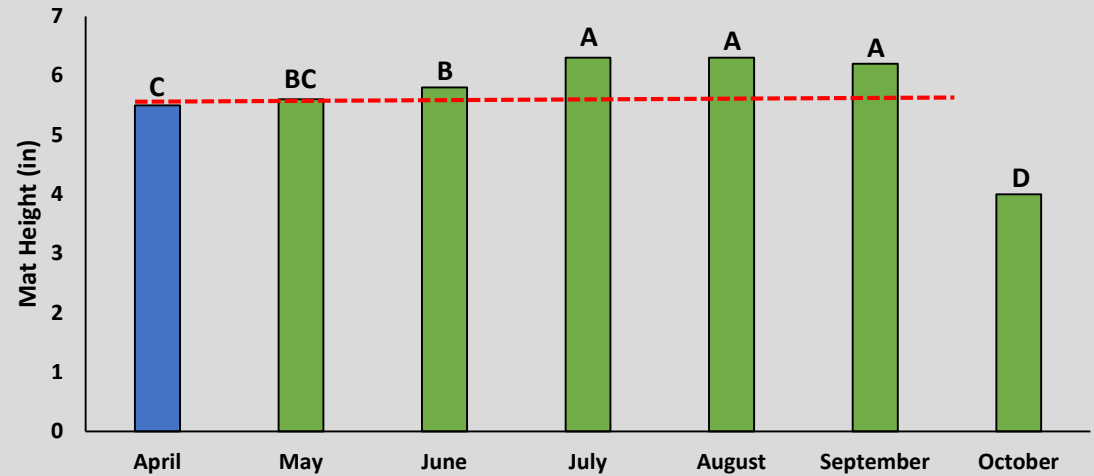


2021 Lyngbya Treatments

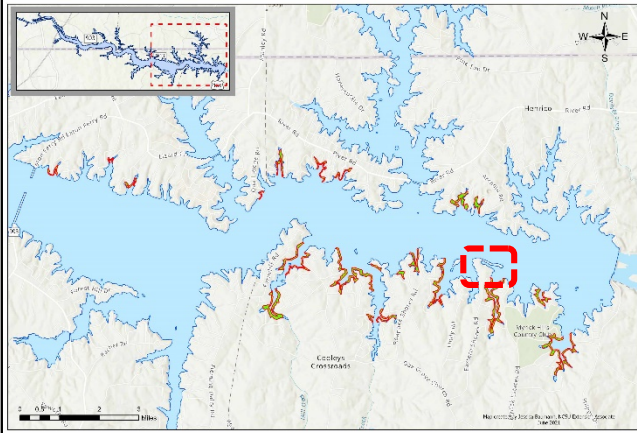
Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA



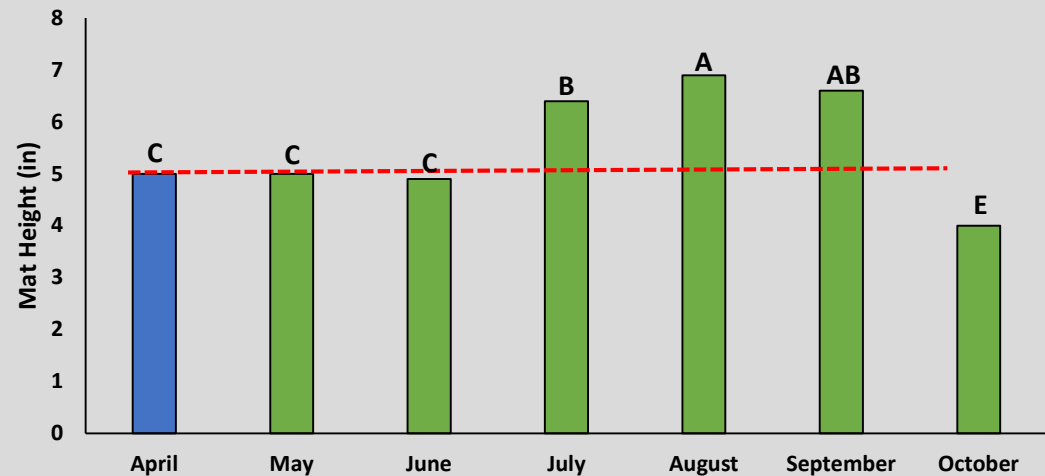
Upper Control



Lyngbya Treatment Sites - 2021
Lake Gaston, NC/VA



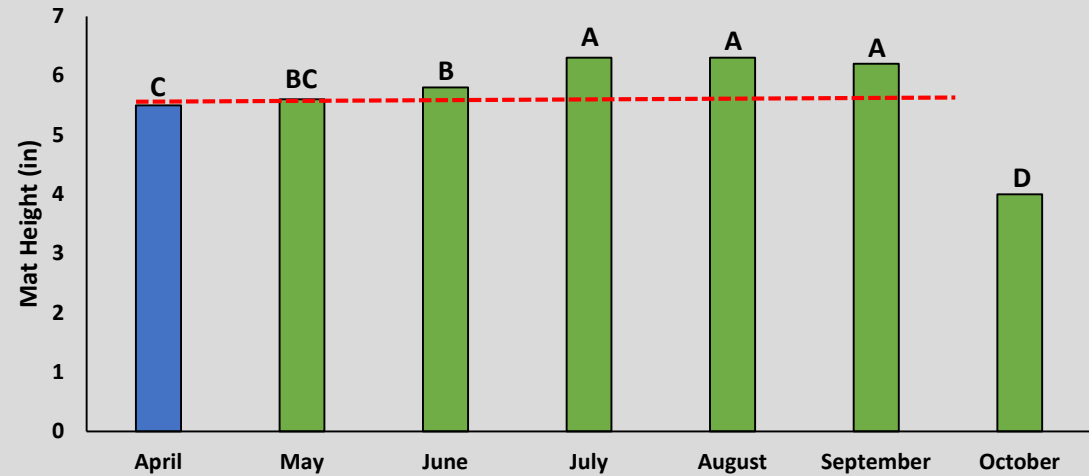
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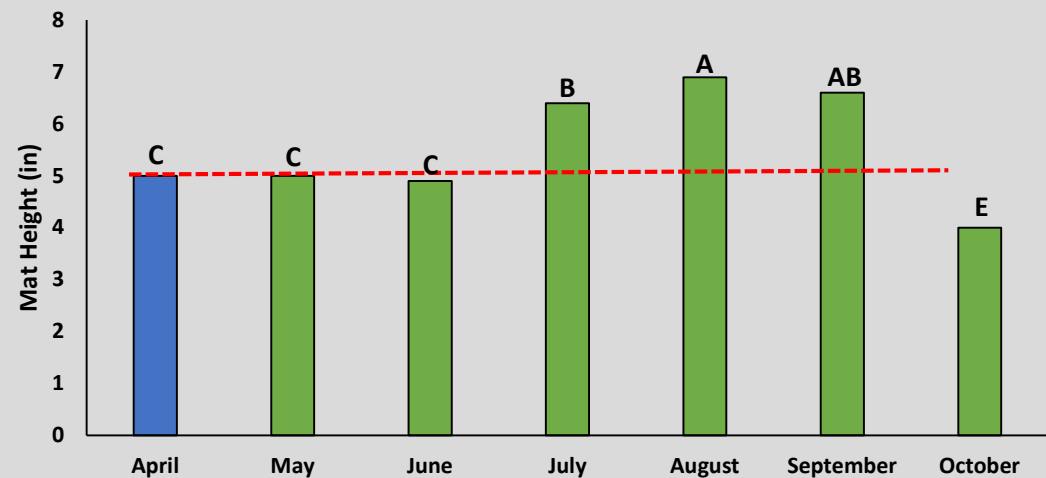
2021 Lyngbya Treatments



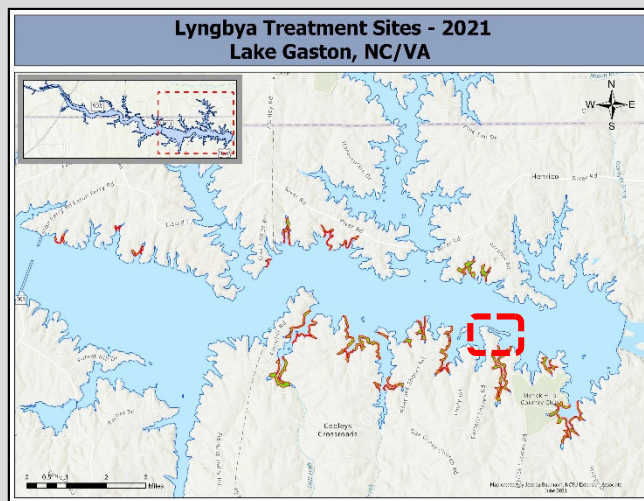
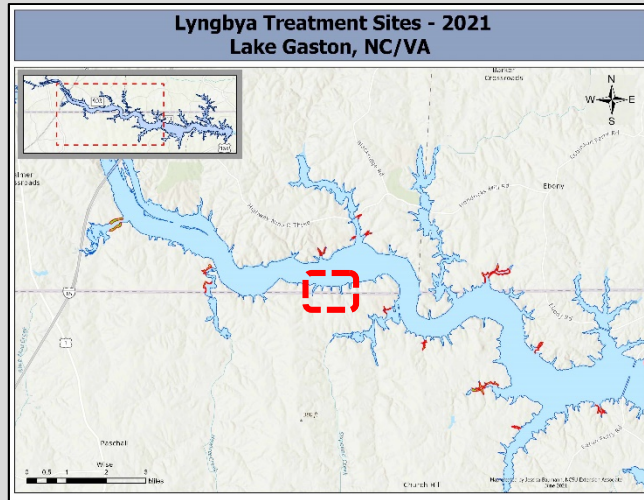
Upper Control



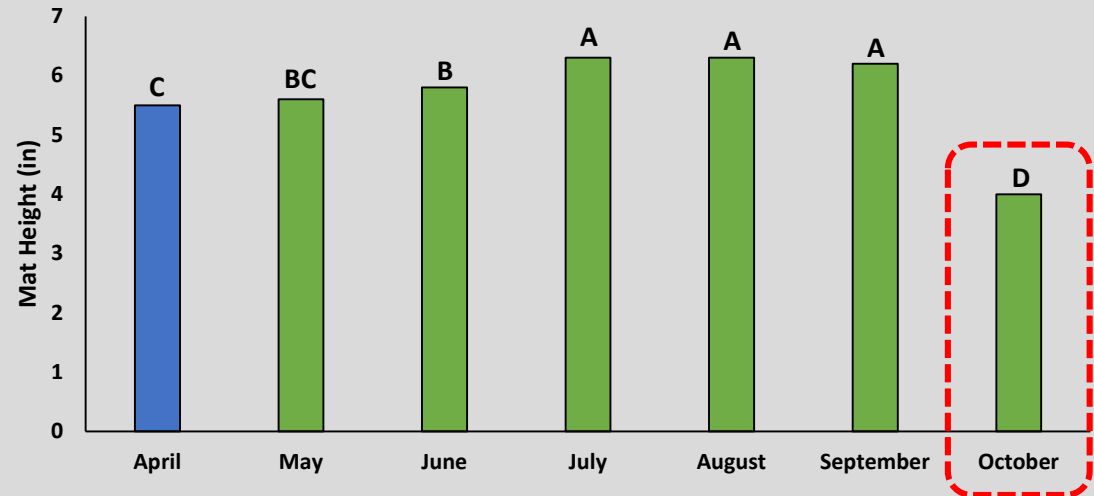
Lower Control



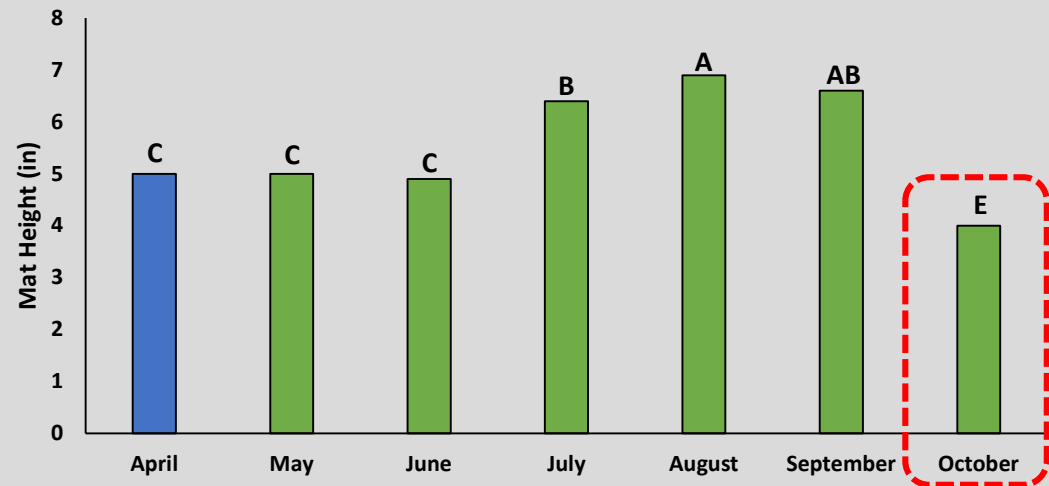
2021 Lyngbya Treatments



Upper Control

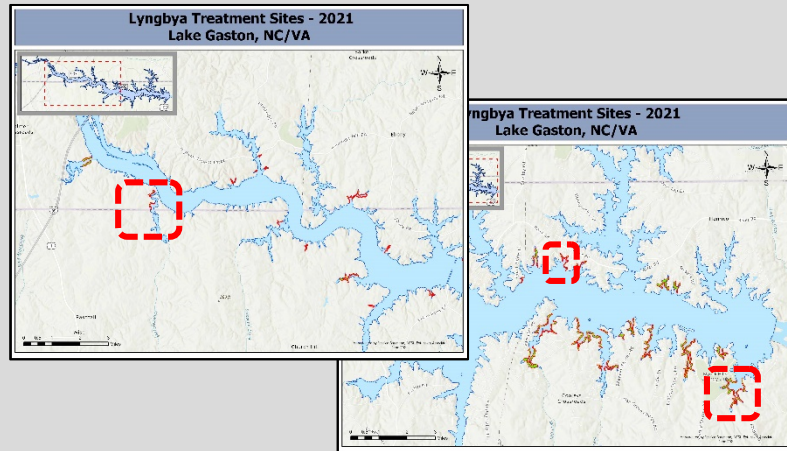


Lower Control

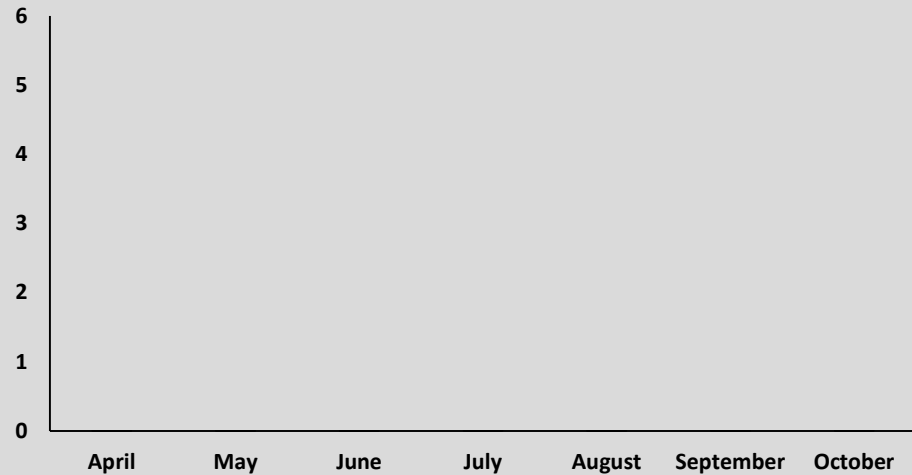


2021 Lyngbya Treatments

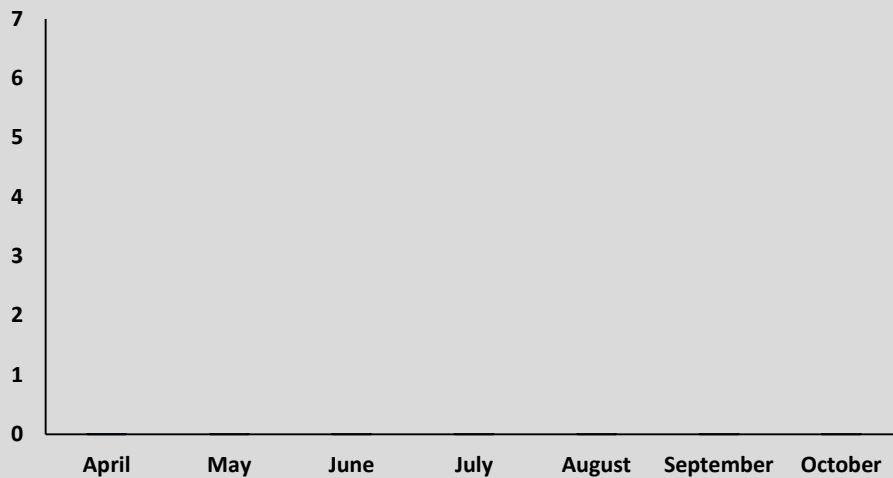
Captain XRT + AMP



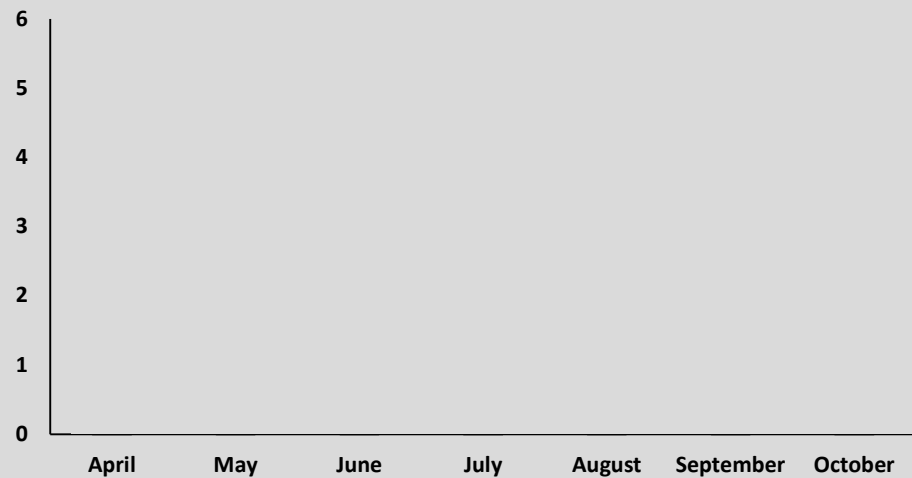
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

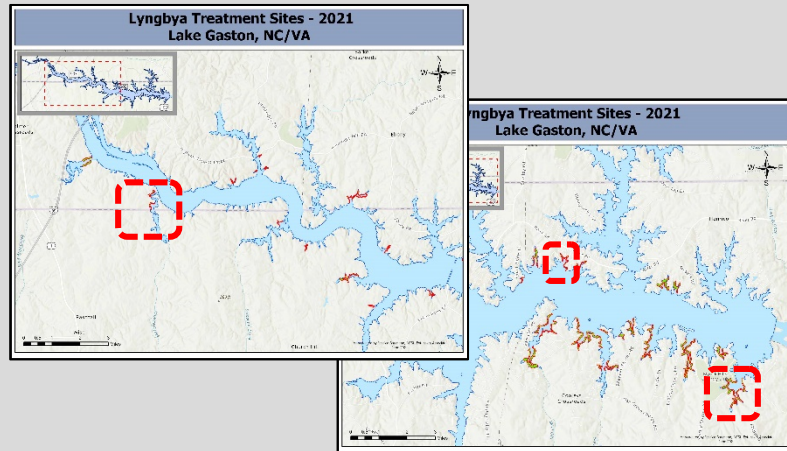


Lees Creek – Multi-year

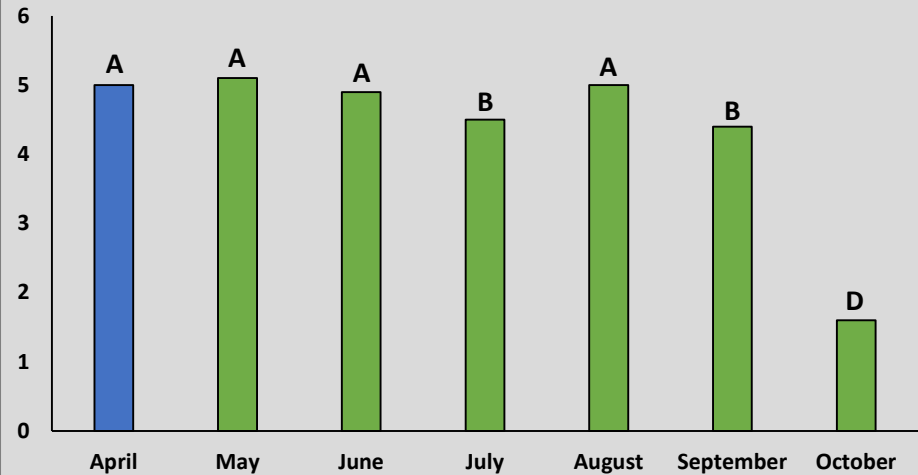


2021 Lyngbya Treatments

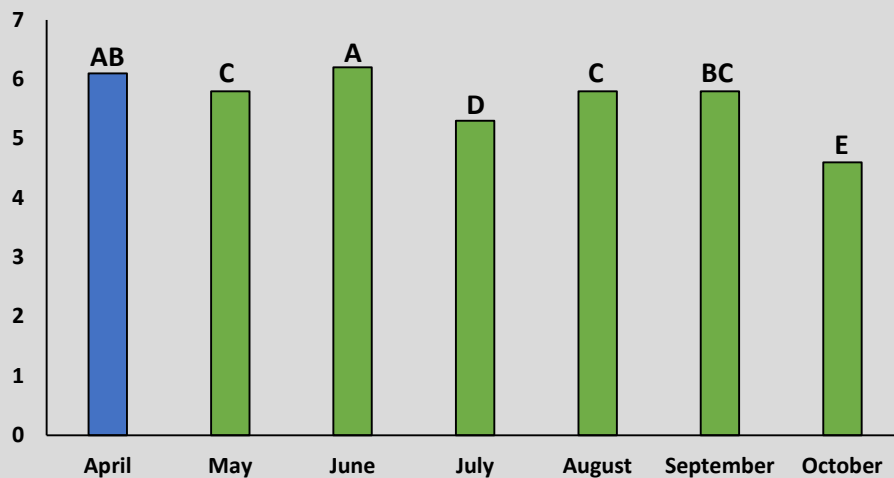
Captain XRT + AMP



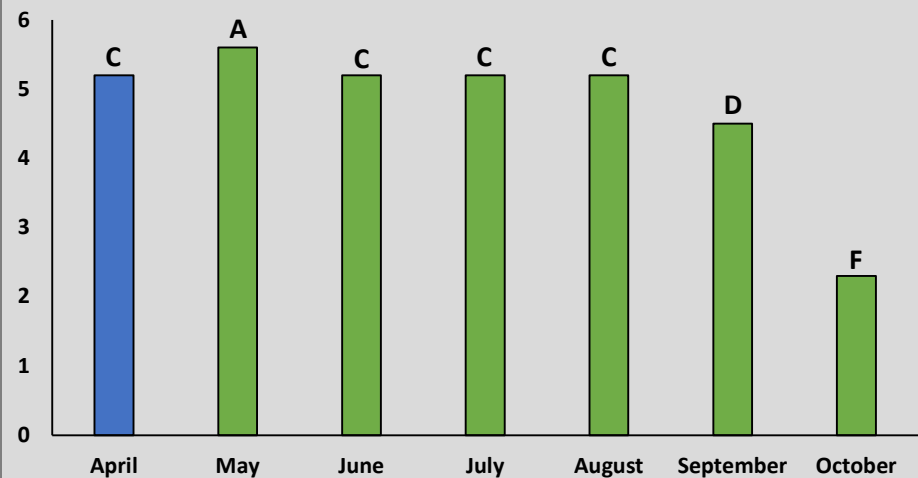
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

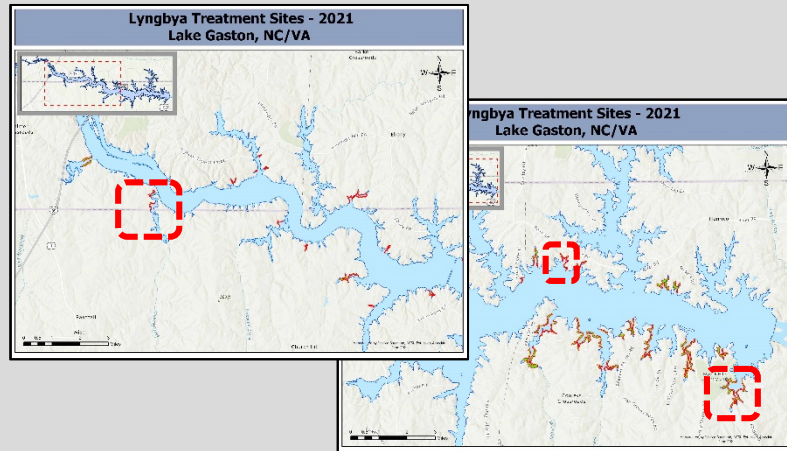


Lees Creek – Multi-year

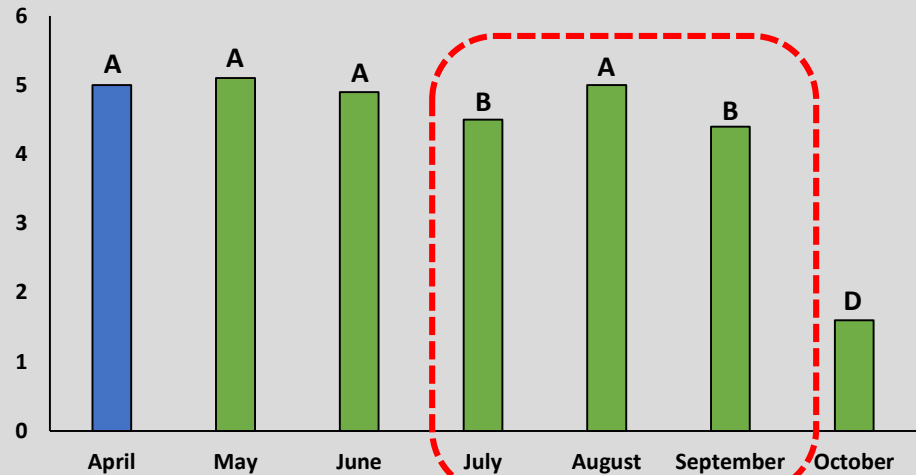


2021 Lyngbya Treatments

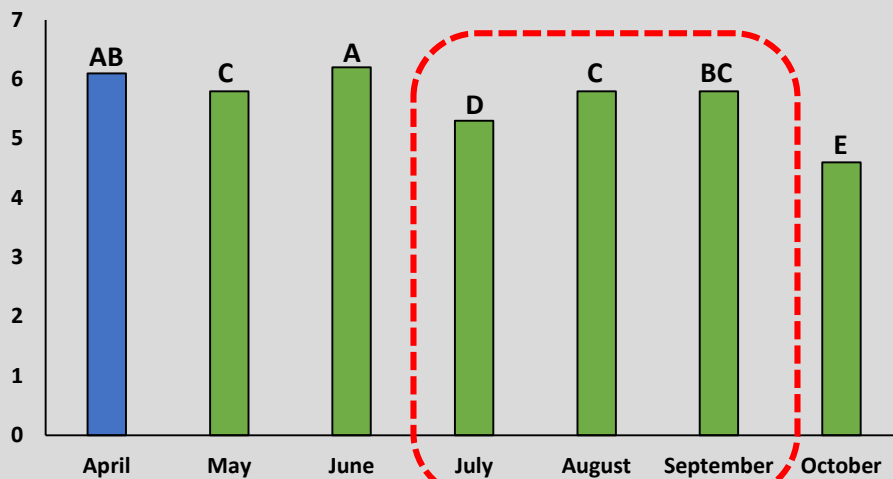
Captain XRT + AMP



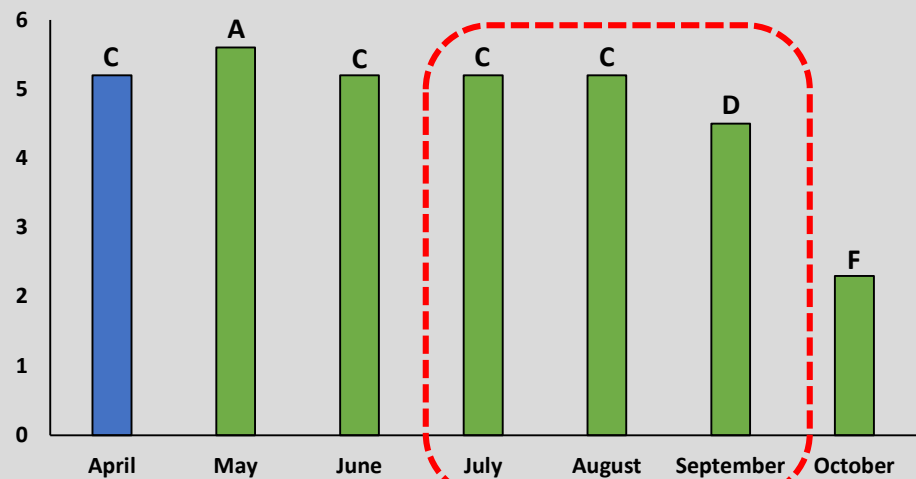
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

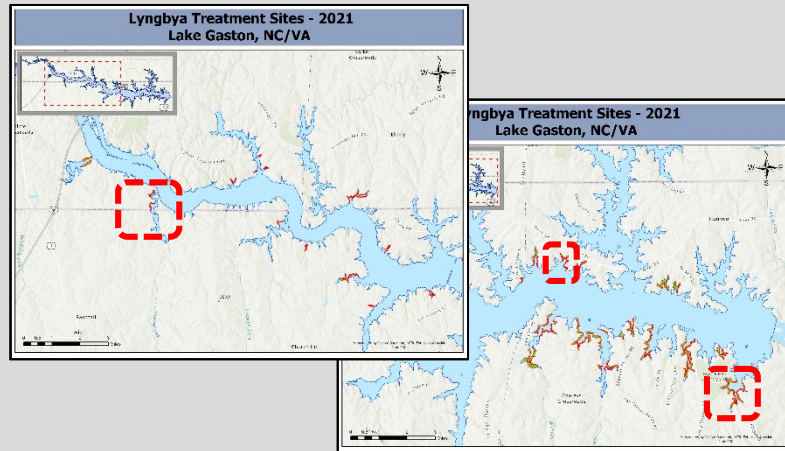


Lees Creek – Multi-year

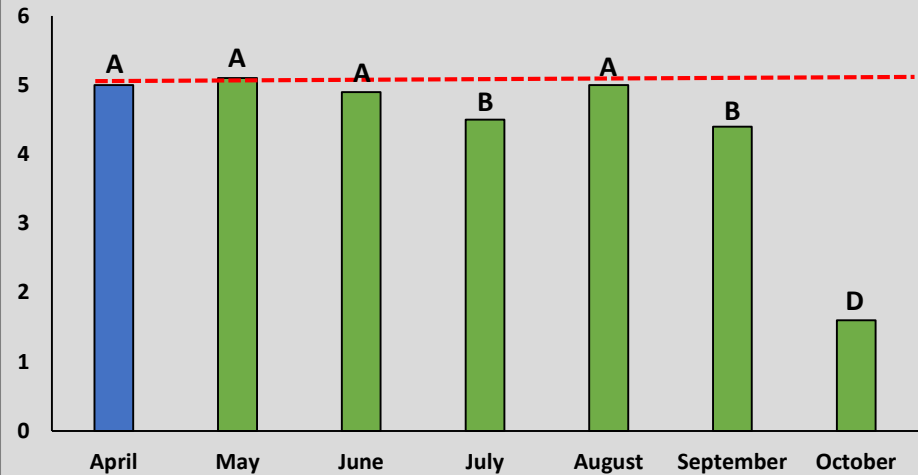


2021 Lyngbya Treatments

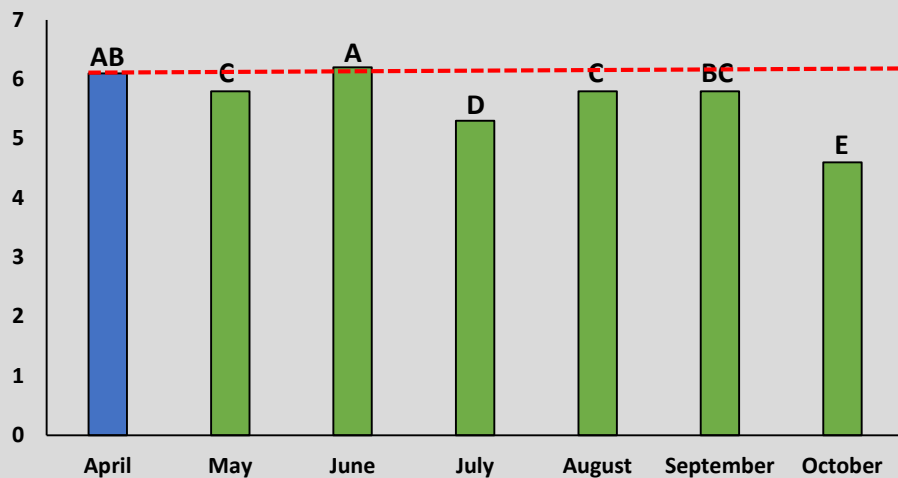
Captain XRT + AMP



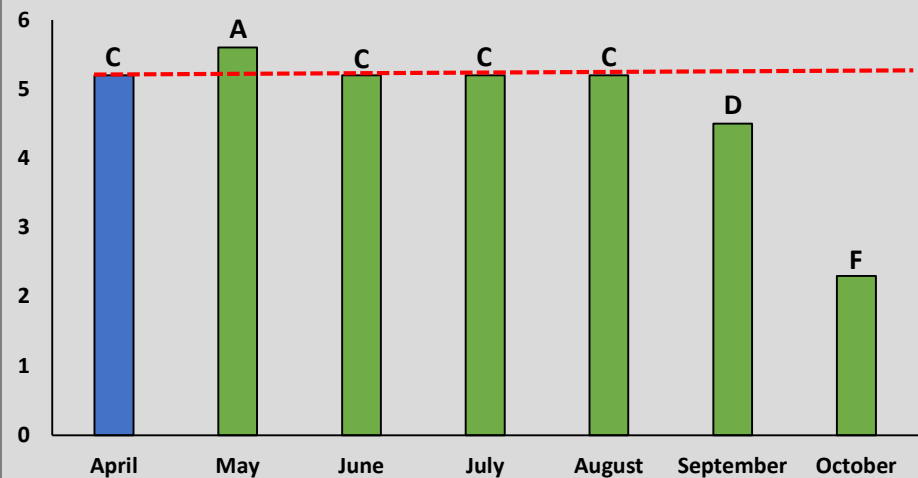
Site 18 Creek – 1st Year



Hawtree Creek - Experimental



Lees Creek – Multi-year

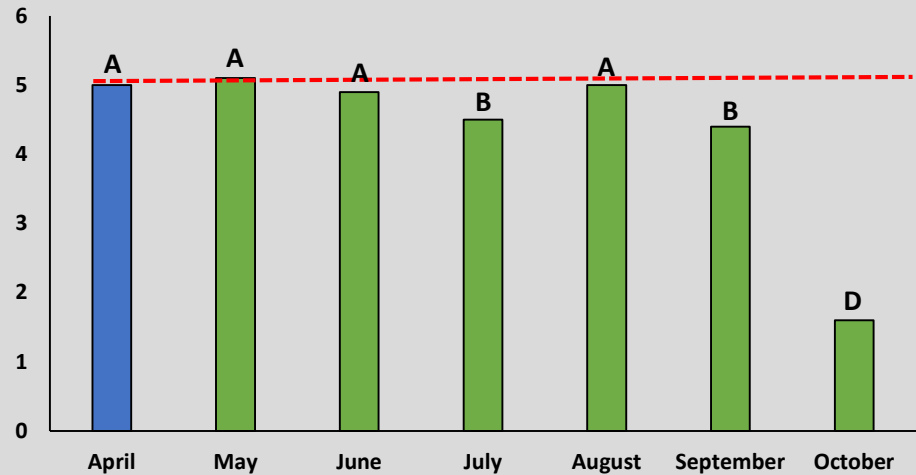


2021 Lyngbya Treatments

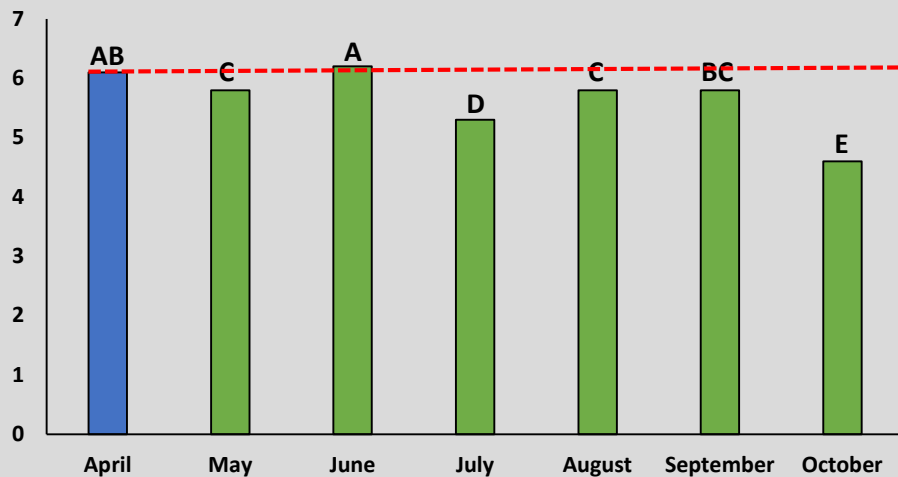
Captain XRT + AMP



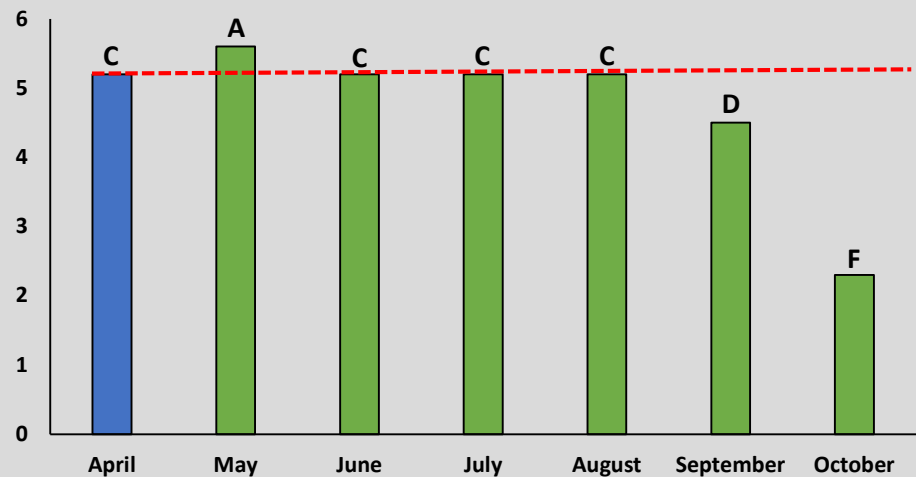
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

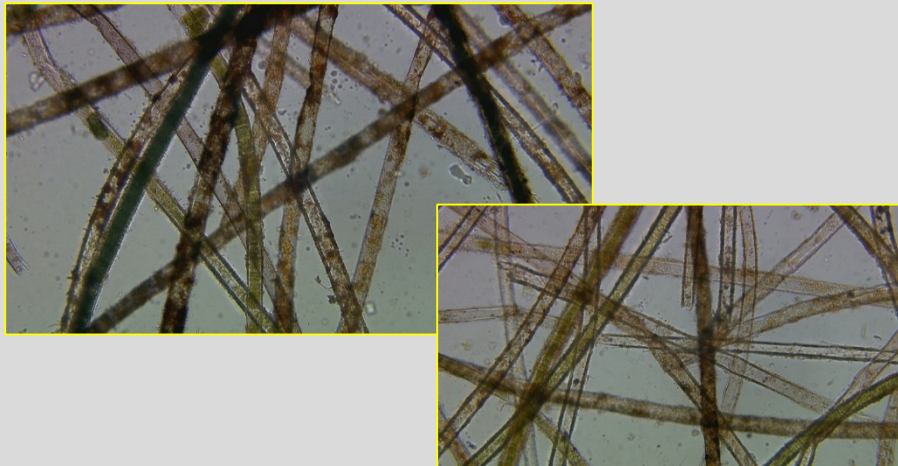


Lees Creek – Multi-year

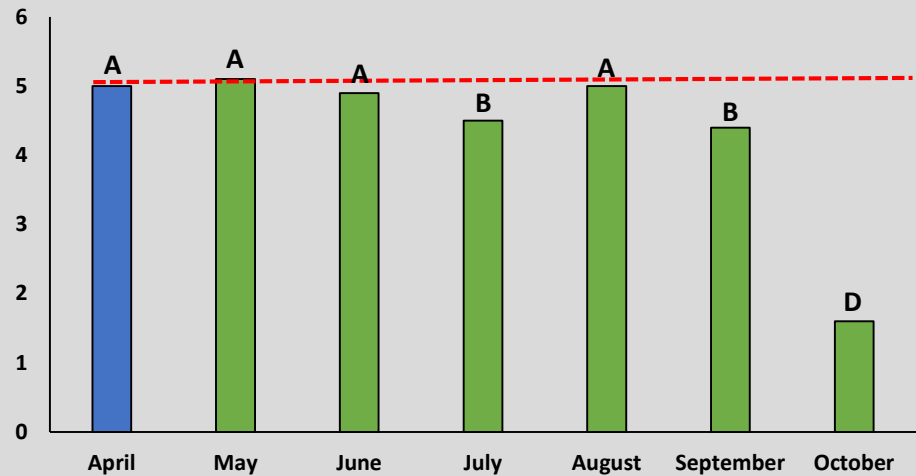


2021 Lyngbya Treatments

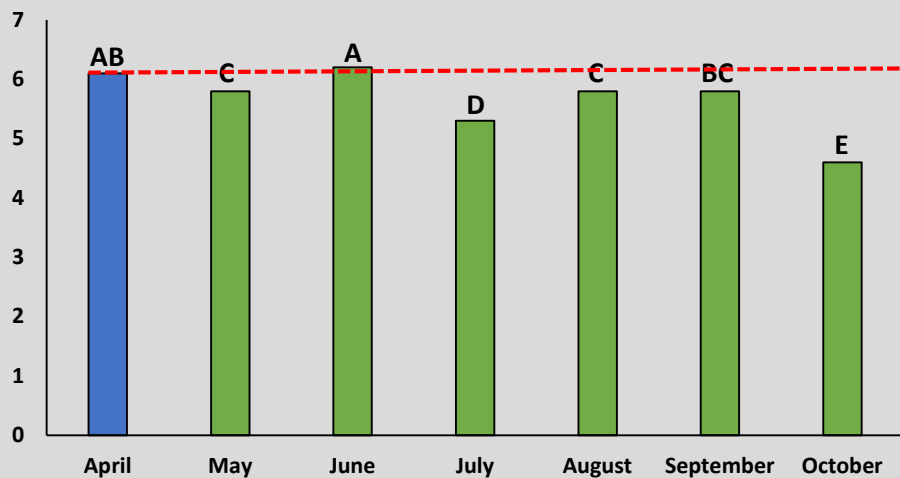
Captain XRT & AMP



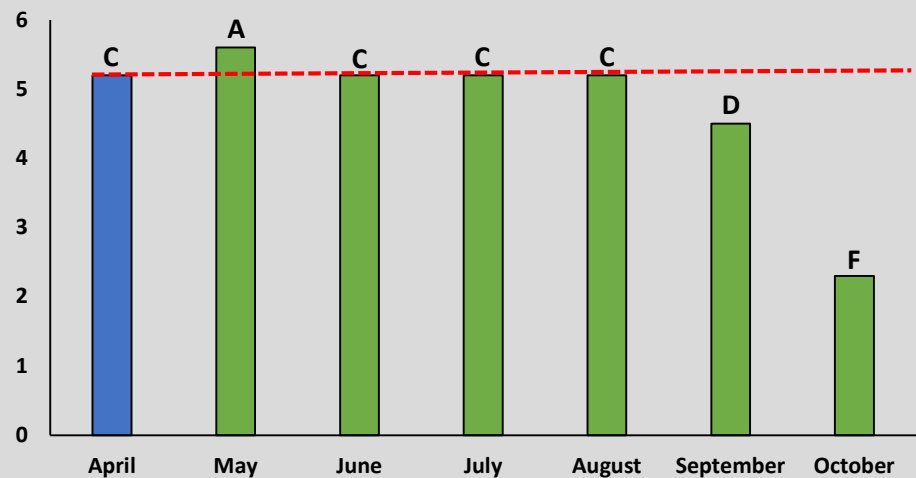
Site 18 Creek – 1st Year



Hawtree Creek - Experimental



Lees Creek – Multi-year



Lyngbya Treatments

Methods of Evaluation:

- Monthly Biosonic Scans (March – December)
- Viability Samples (December)



2021 Lyngbya Treatments

Viability

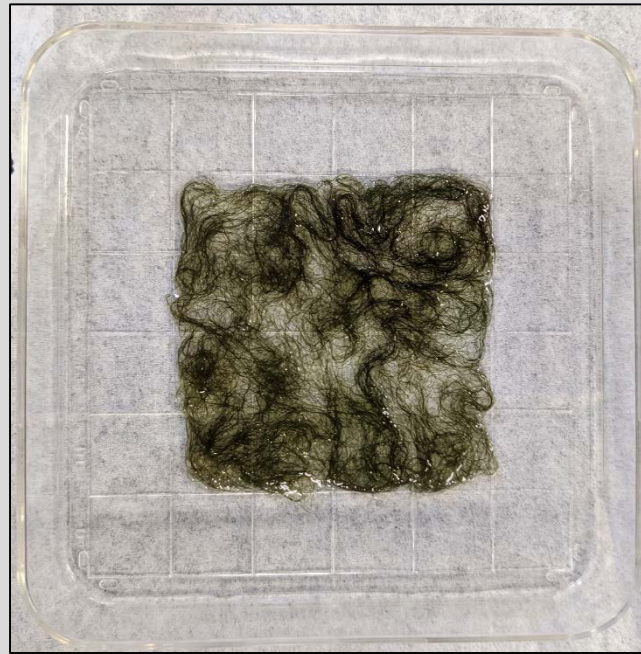
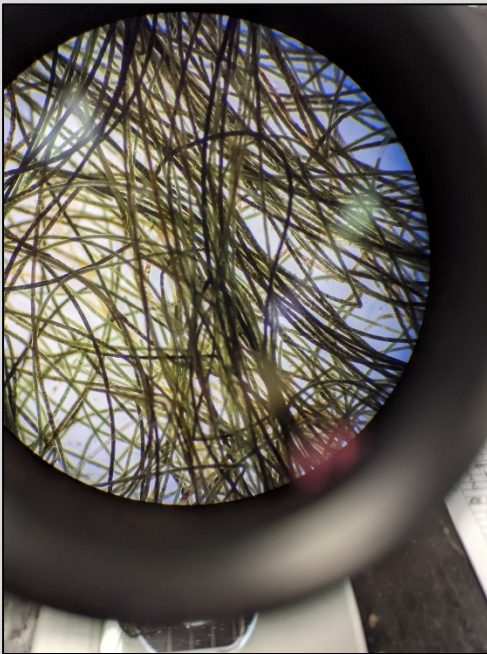
- Field samples were collected in December from:
 - Hawtree (experimental / multi-year)
 - Site 18 & 19 (1st Year)
 - Controls
- Samples were collected from two sites within each treatment area
- Two samples from each site were analyzed
- Viability was quantified by two separate readers



2021 Lyngbya Treatments

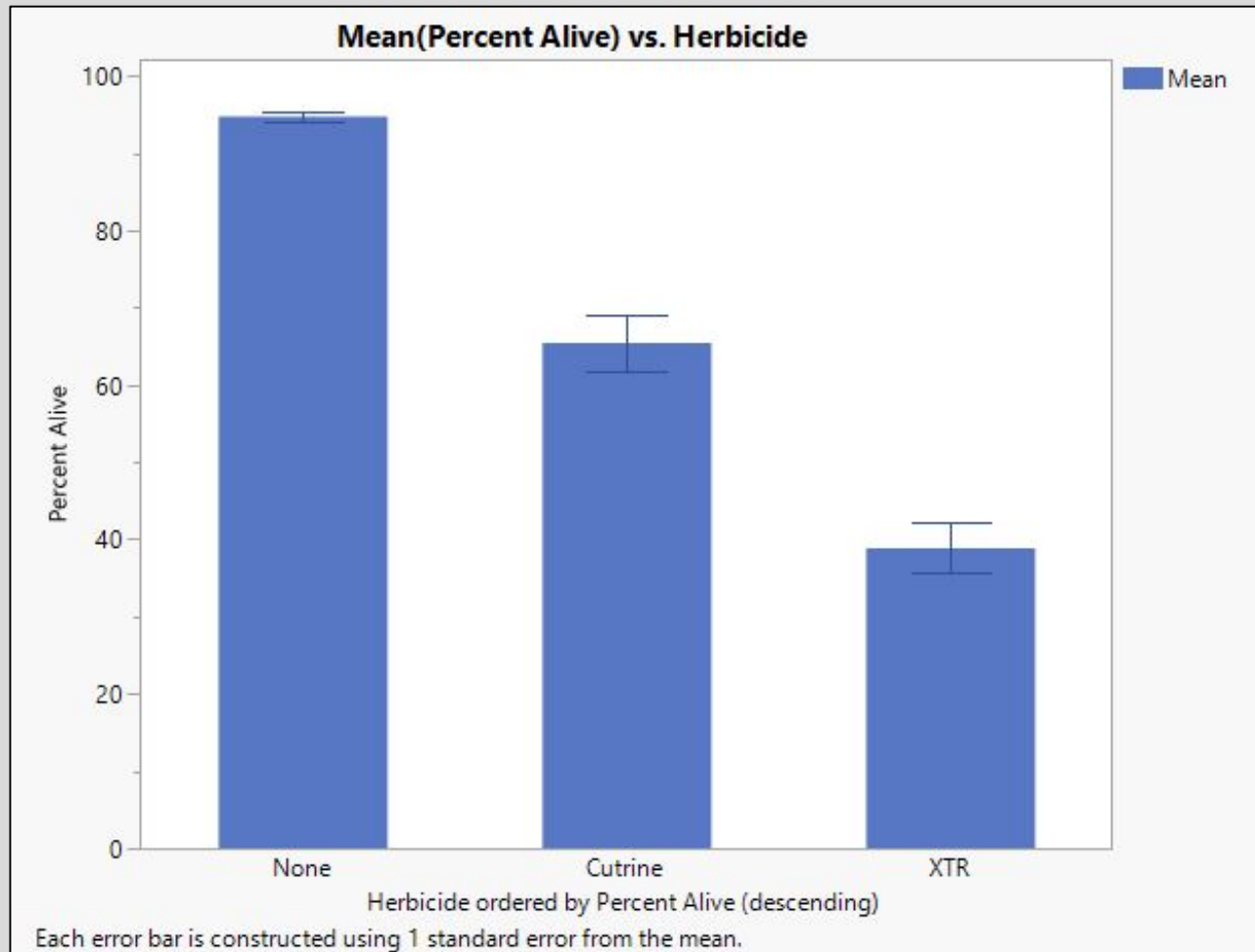
Viability

Determine what percent of the lyngbya in the viewing area was alive



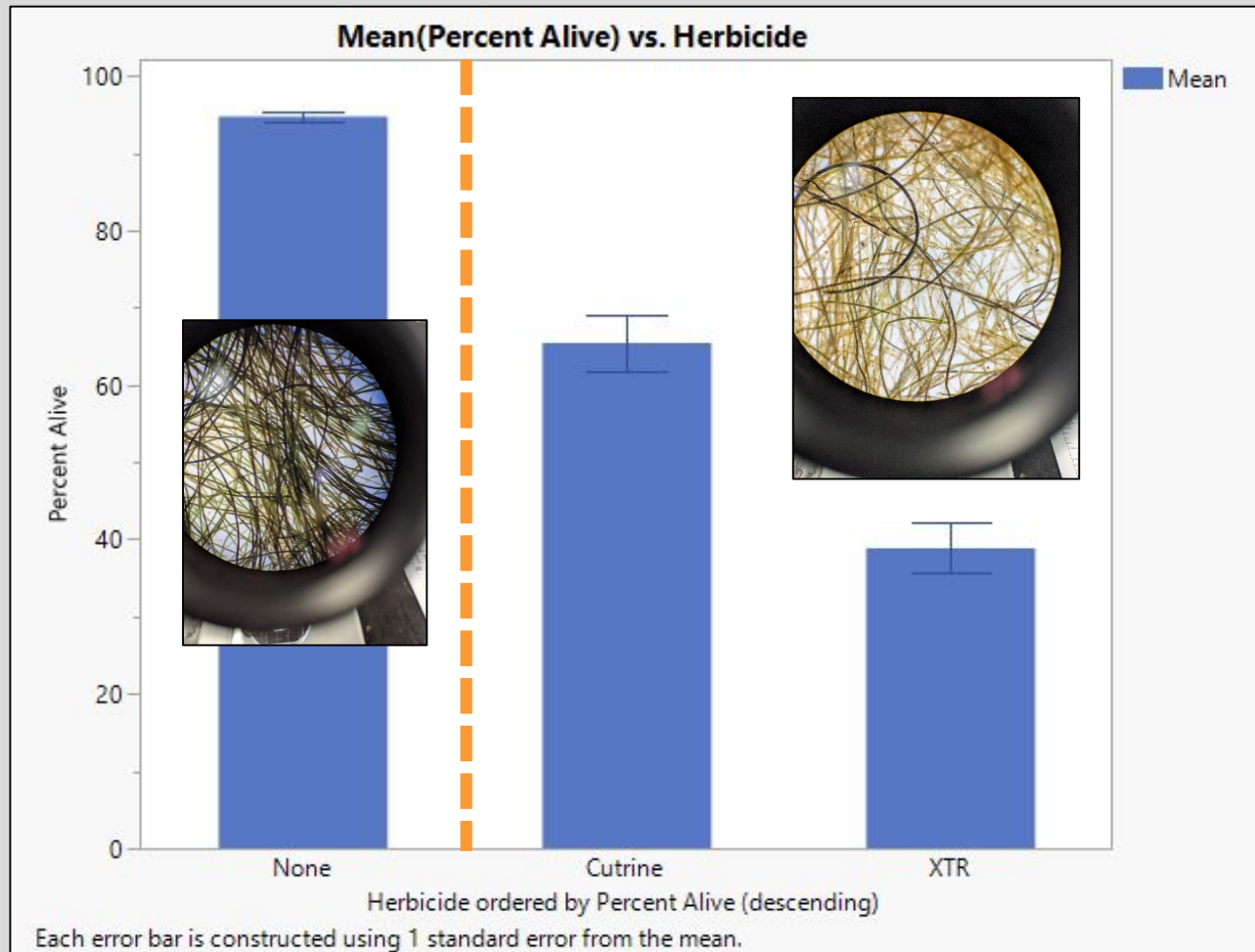
2021 Lyngbya Treatments

Viability – Overall Results



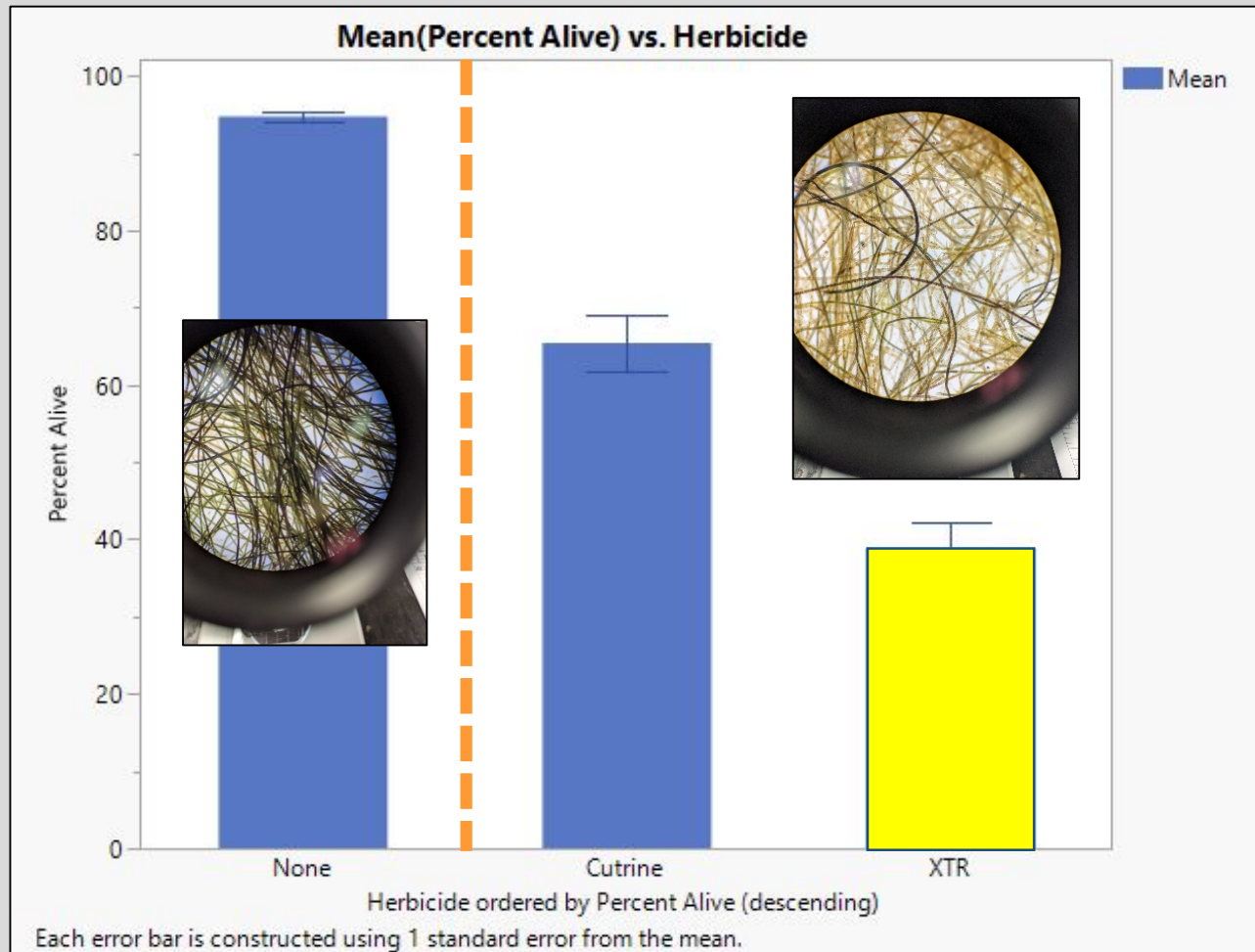
2021 Lyngbya Treatments

Viability – Overall Results



2021 Lyngbya Treatments

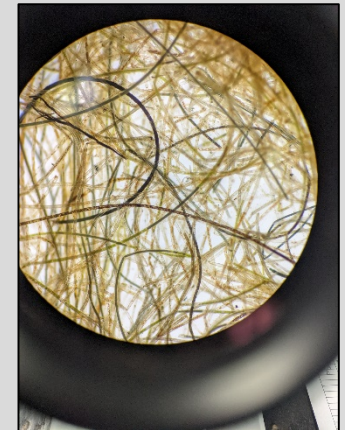
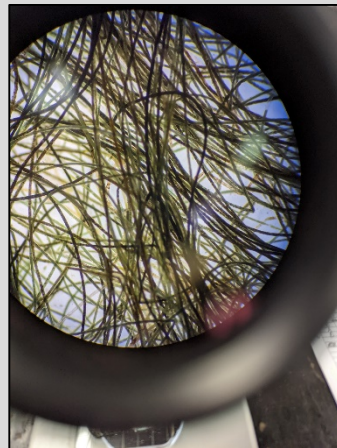
Viability – Overall Results



2021 Lyngbya Treatments

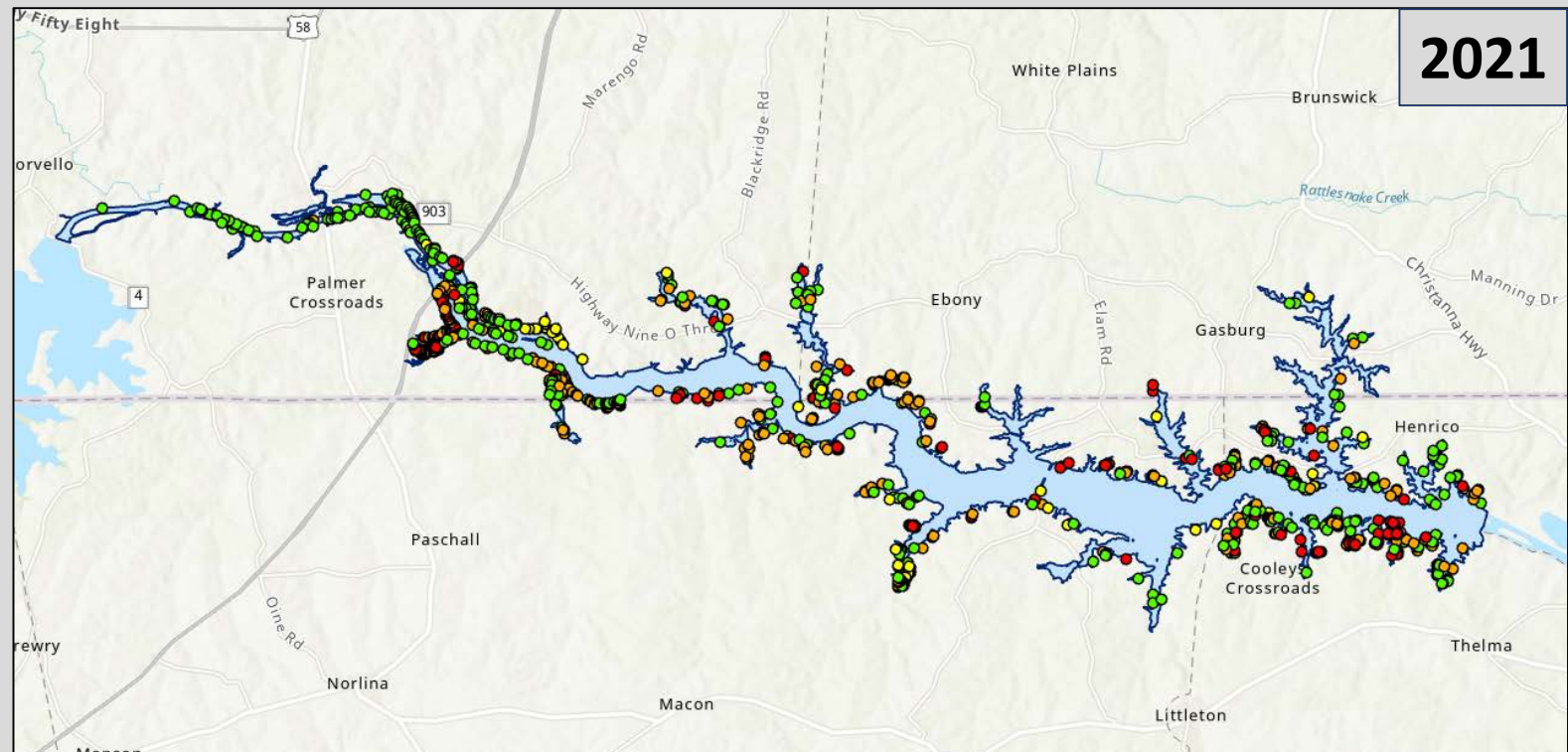
2021 Lyngbya Treatments were successful!

- Suppression of benthic mats
- Decreased viability
- Captain XTR + AMP performed best

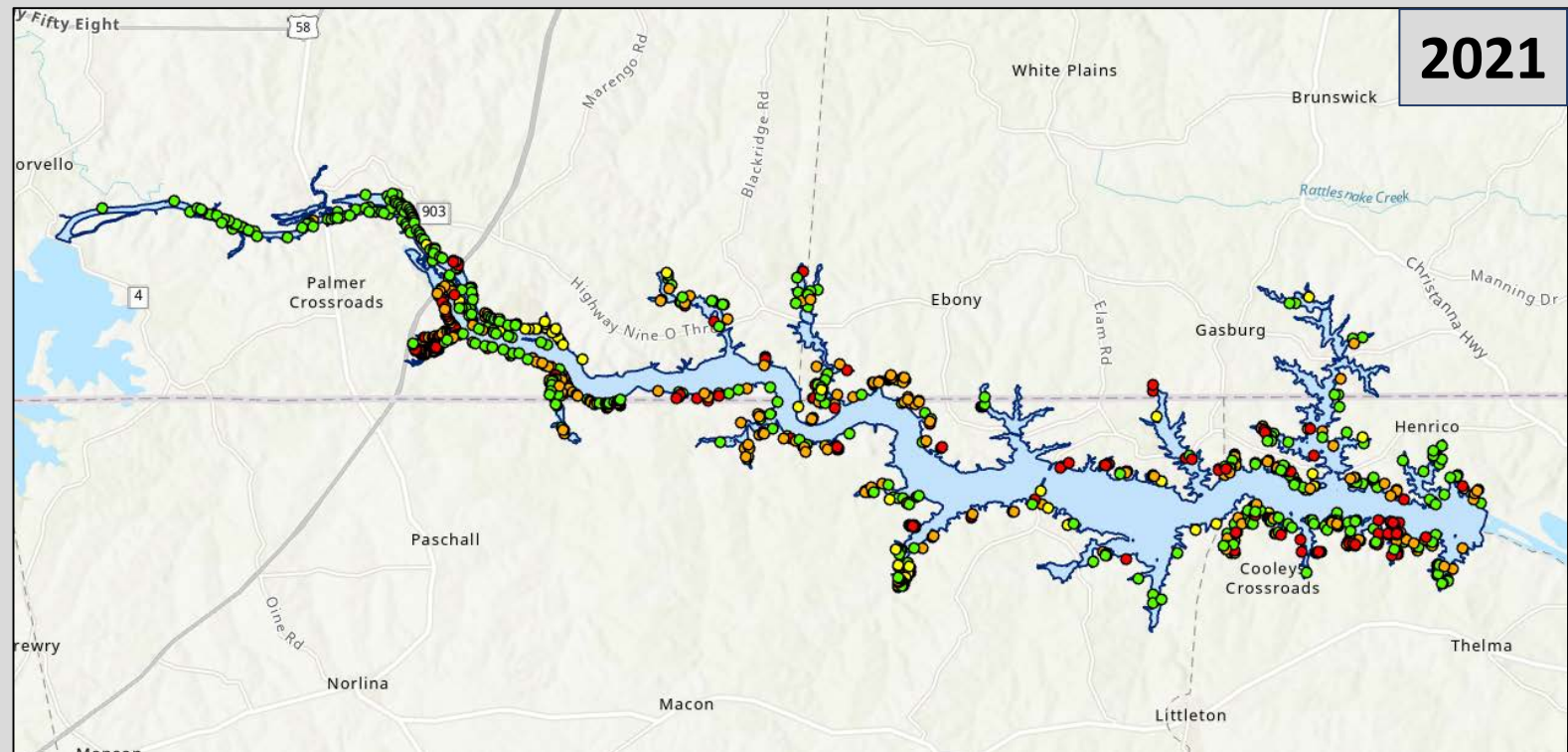


2021 Lyngbya Survey

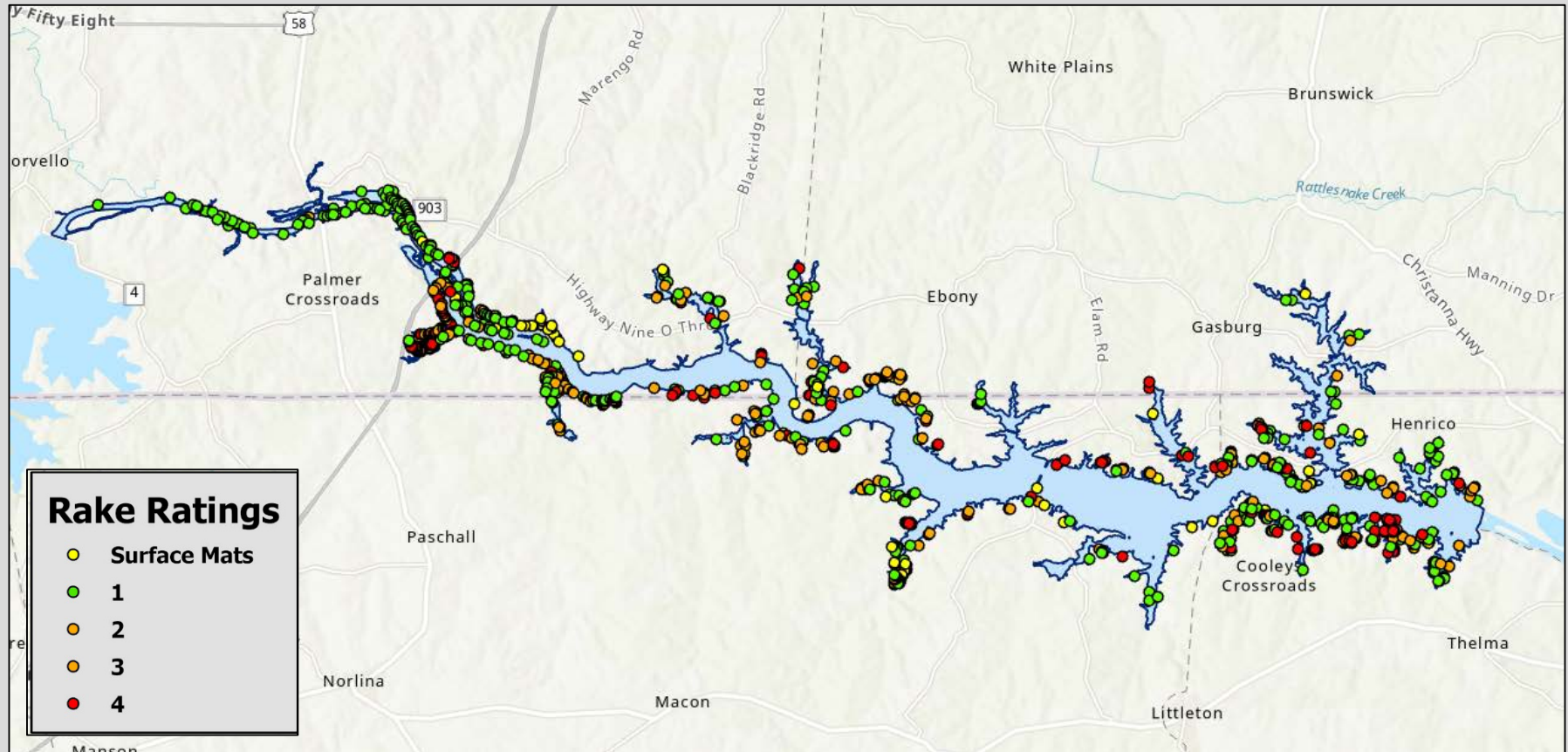
2021 Survey Results

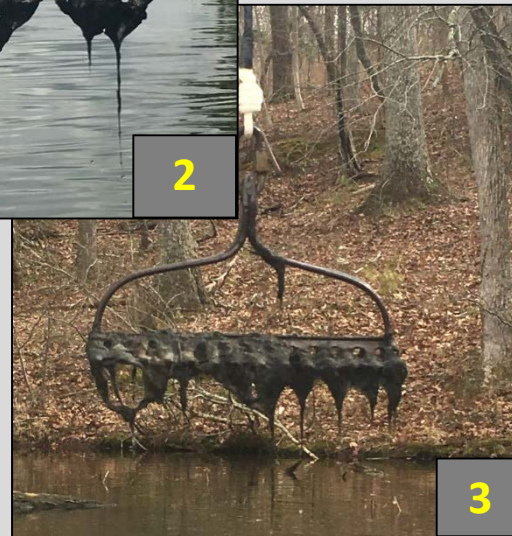


Estimated Lyngbya Acreage: 1,317 acres

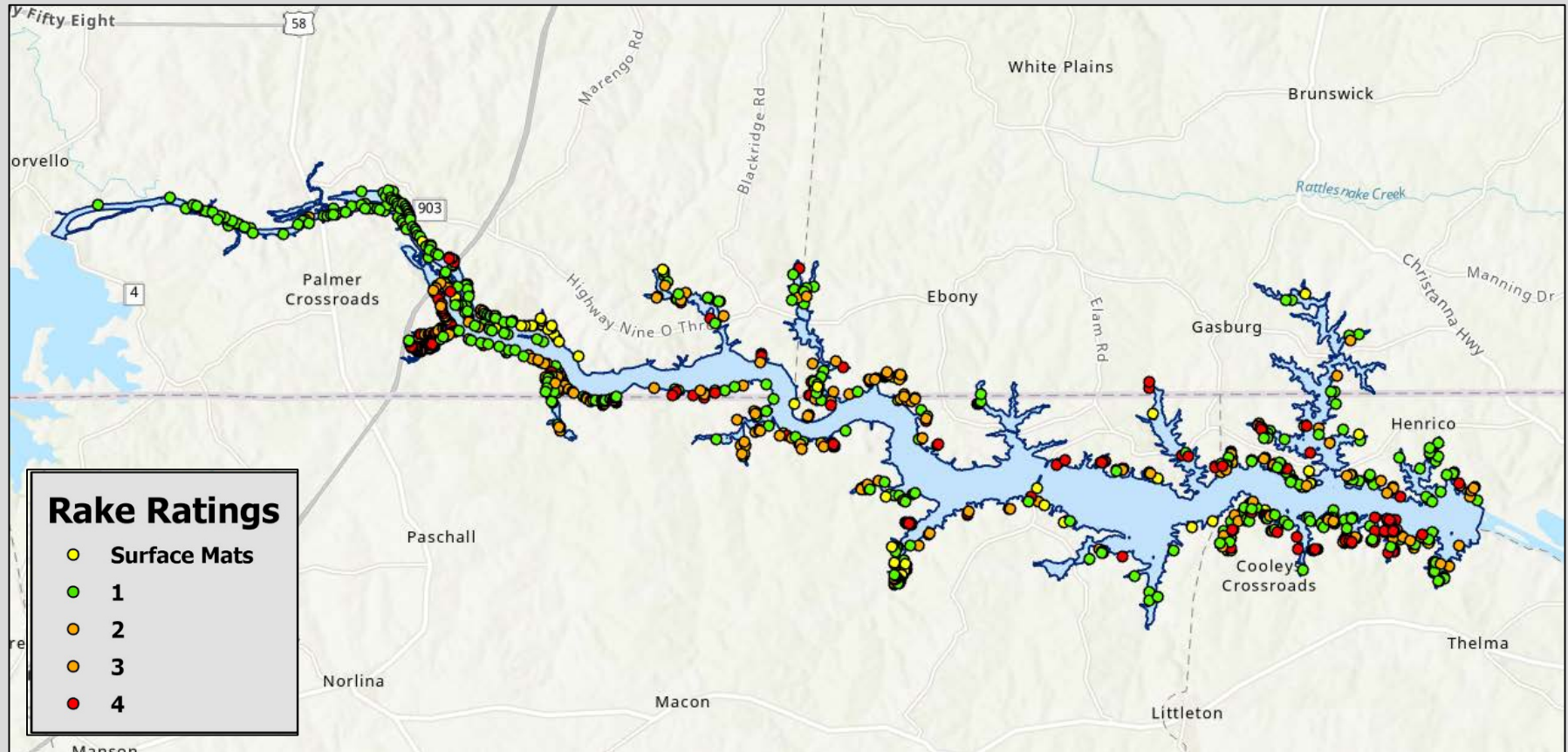


2021 Survey Results

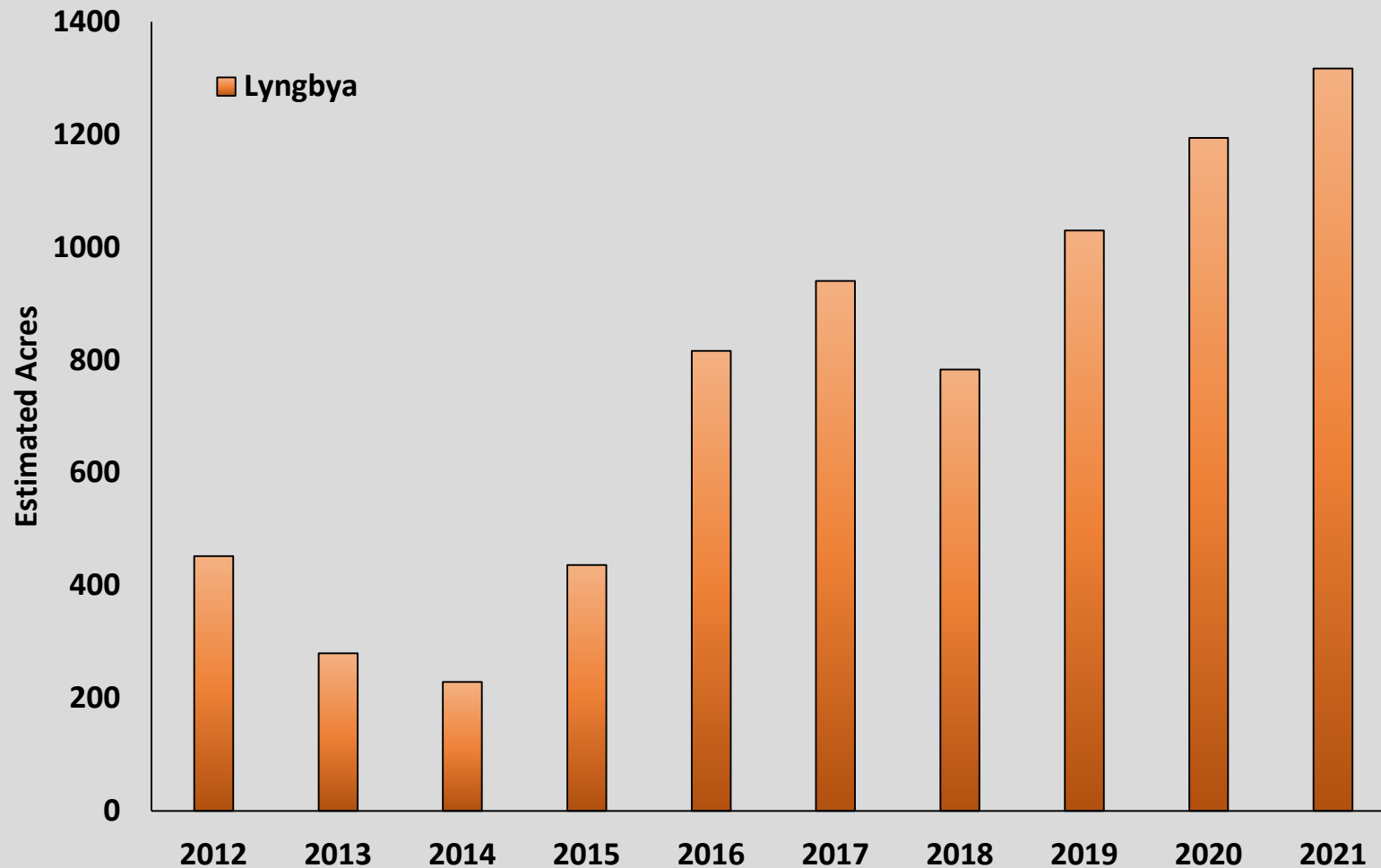




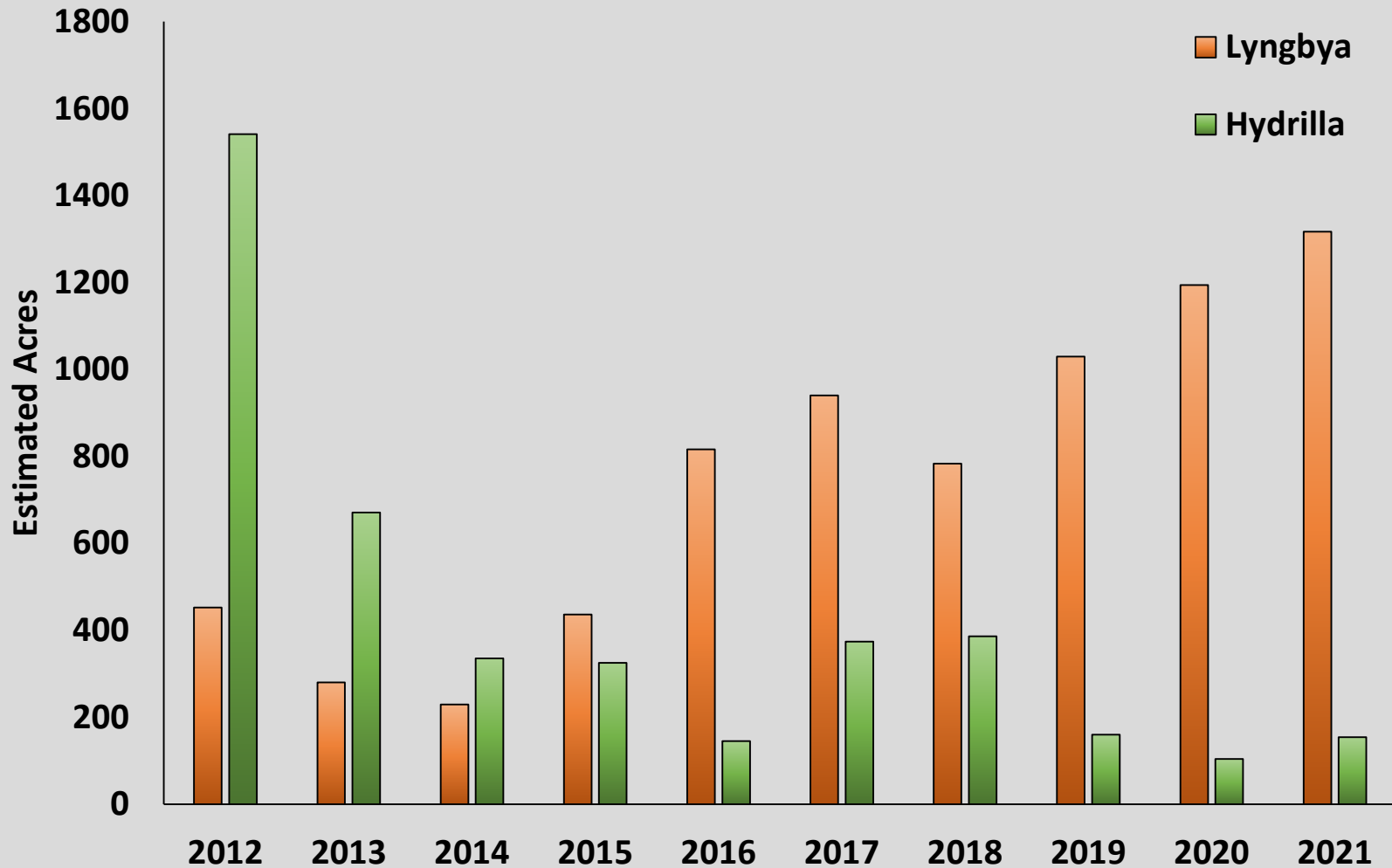
2021 Survey Results

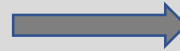


2021 Survey Results



2021 Survey Results

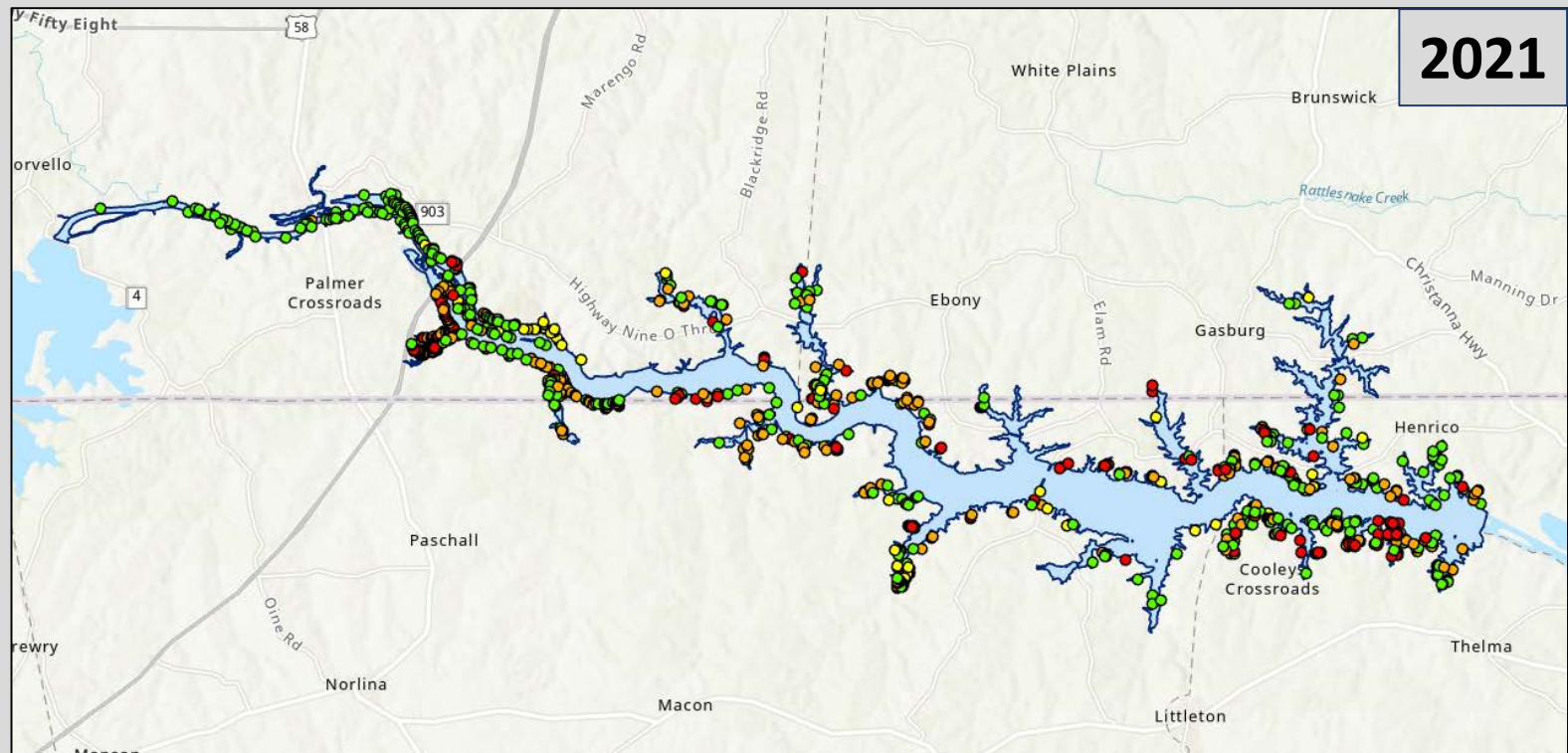




2022 Recommendation

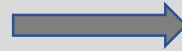
Total Vegetation: 27 %

Estimated Lyngbya Acreage: 1,317 acres



Lyngbya Treatments

2021 Survey Results

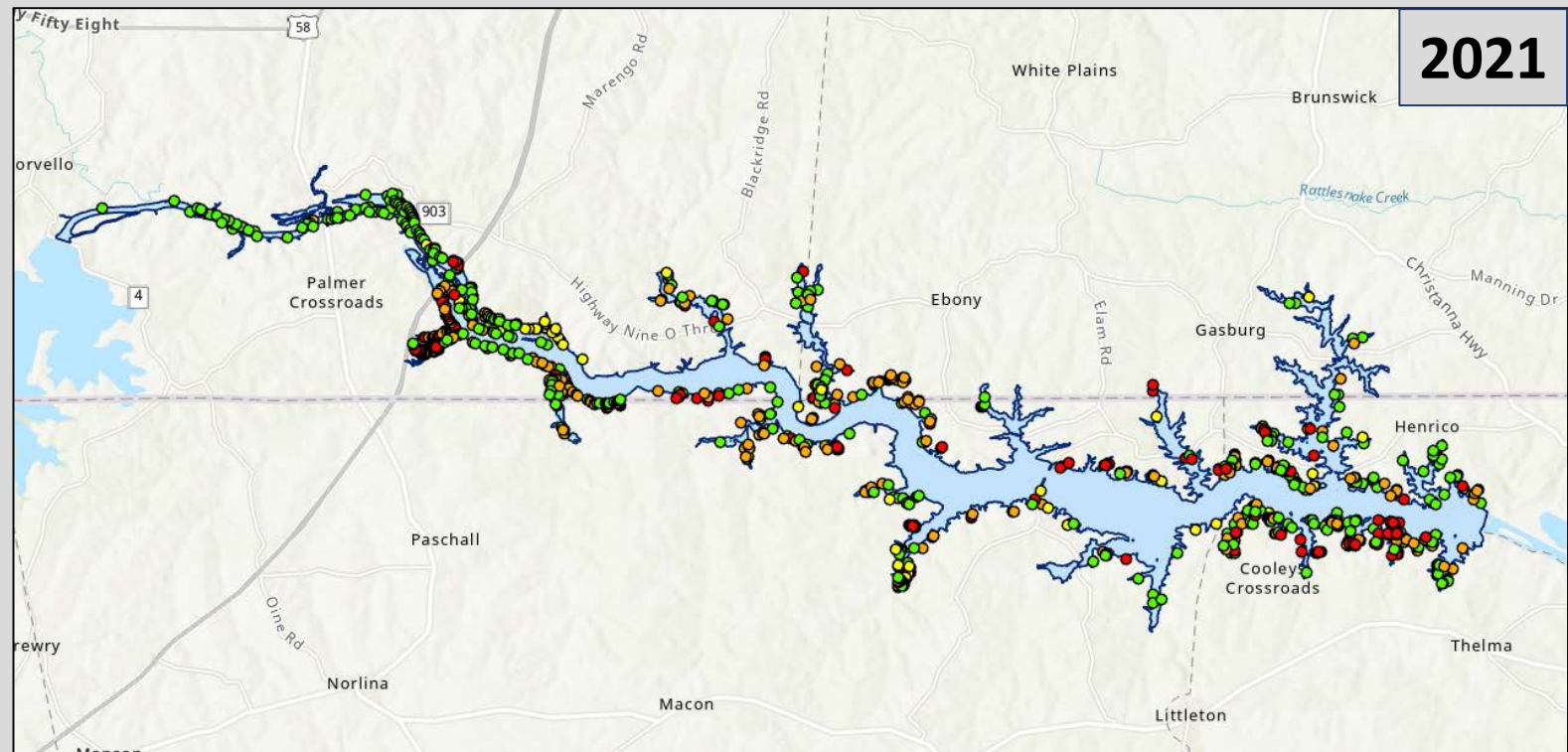


2022 Recommendation

Total Vegetation: 27 %

Expand Treatment Program

Estimated Lyngbya Acreage: 1,317 acres

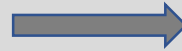


Lyngbya Treatments

2021 Survey Results

Total Vegetation: 27 %

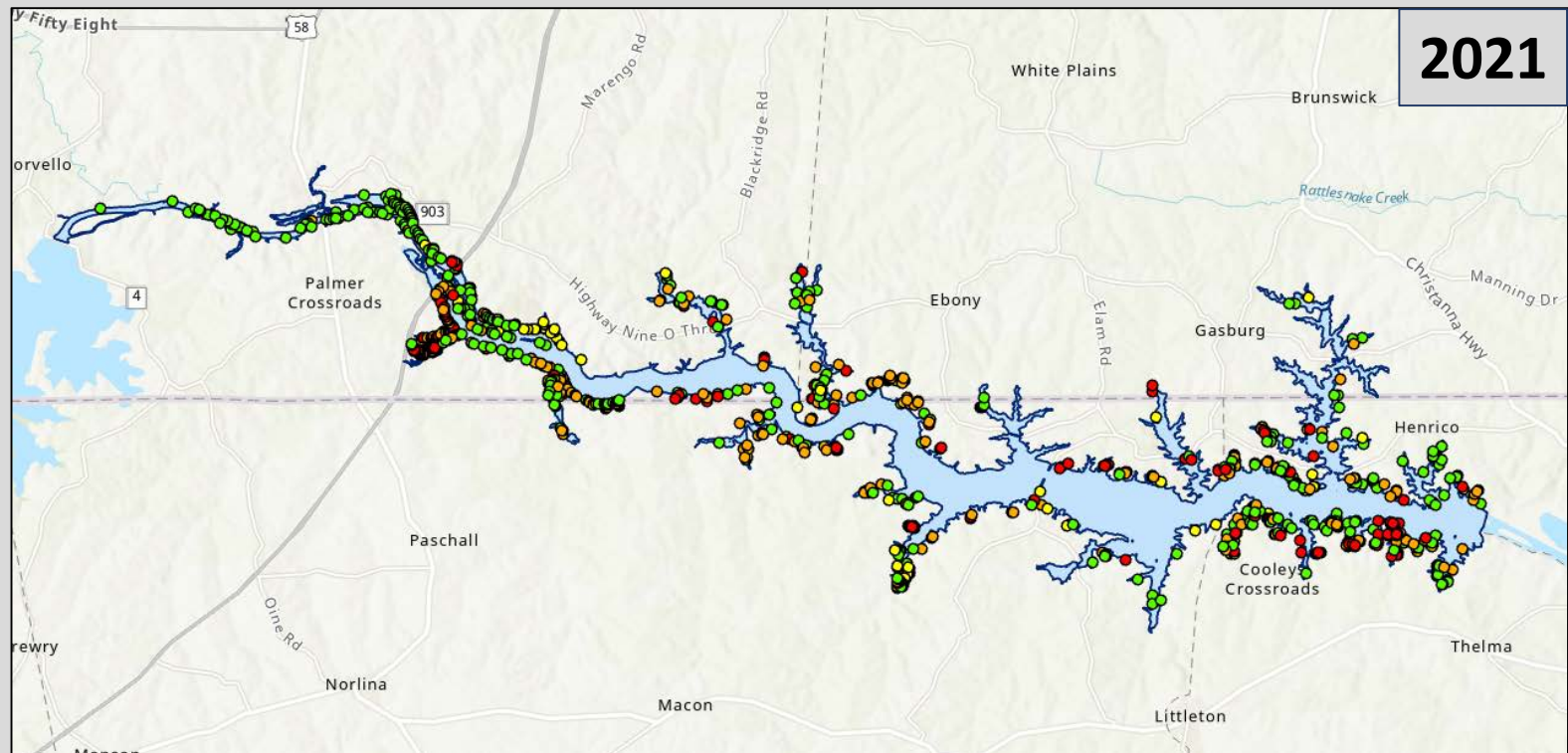
Estimated Lyngbya Acreage: 1,317 acres



2022 Recommendation

Expand Treatment Program

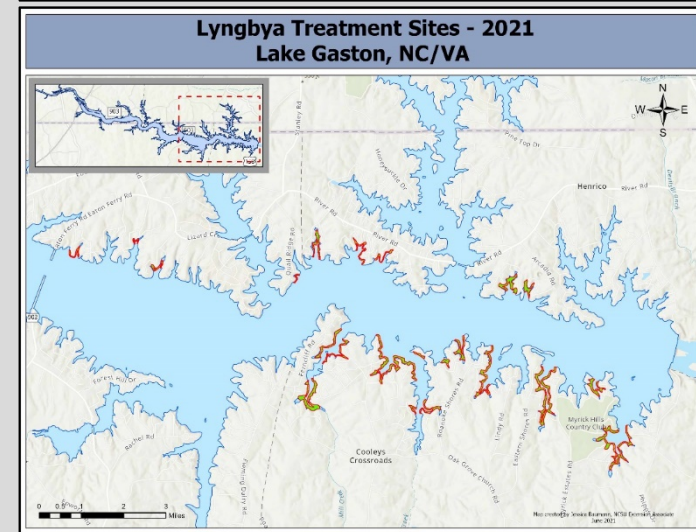
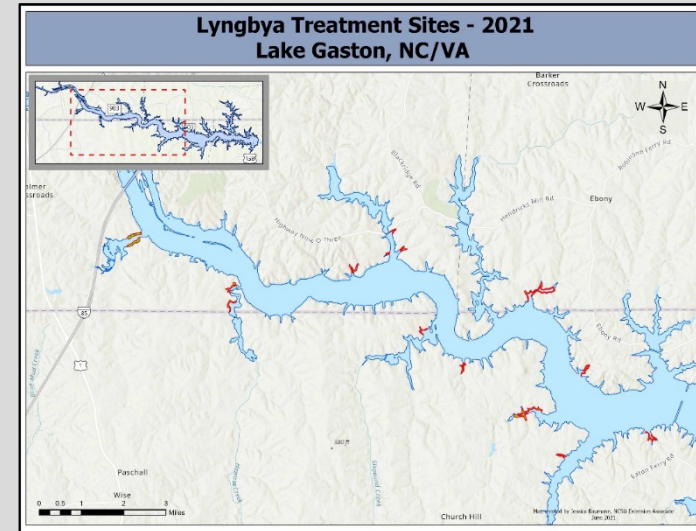
2022 Treatment Acres = 360 acres



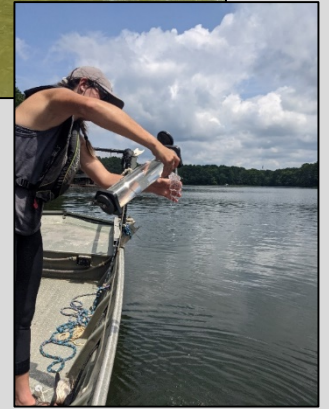
Lyngbya Treatments

2022 Lyngbya Treatments

- **Current 300 acres of treatment area**
- **Additional acreage were prioritized based on:**
 - Boat ramps present
 - Dry hydrants present
 - Connection of current treatment plots
 - Public complaints
- **Interactive Map with treatment sites will be available on the Lake Gaston Weed Control Council website**



Questions?



Email: aquaticplants@ncsu.edu

Instagram: Gaston_apm

Facebook: Gaston_apm