NC STATE UNIVERSITY

Lake Gaston Weed Control Council Meeting
NCSU Update
March 10th, 2022

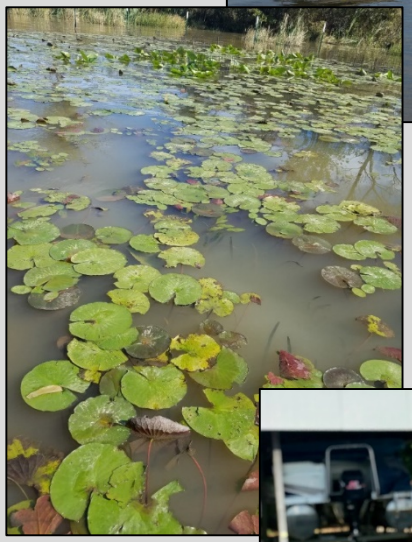
Jessica R. Baumann

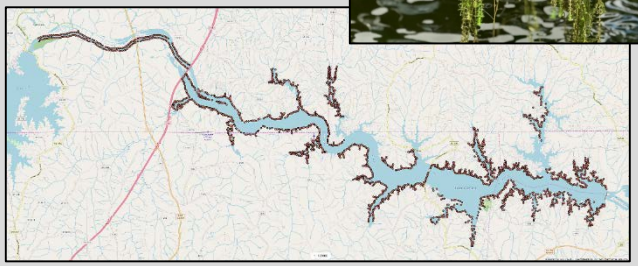
Extension Associate, Lake Gaston

Aquatic Plant Management Program

Outline

- 2021 Overall Vegetation Survey
- Hydrilla
  - 2021 Hydrilla Treatments / Survey
  - 2022 Proposed Treatments
- Lyngbya
  - 2021 Lyngbya Treatments
  - 2021 Lyngbya Survey
  - 2022 Proposed Treatments
- TAG Recommendations



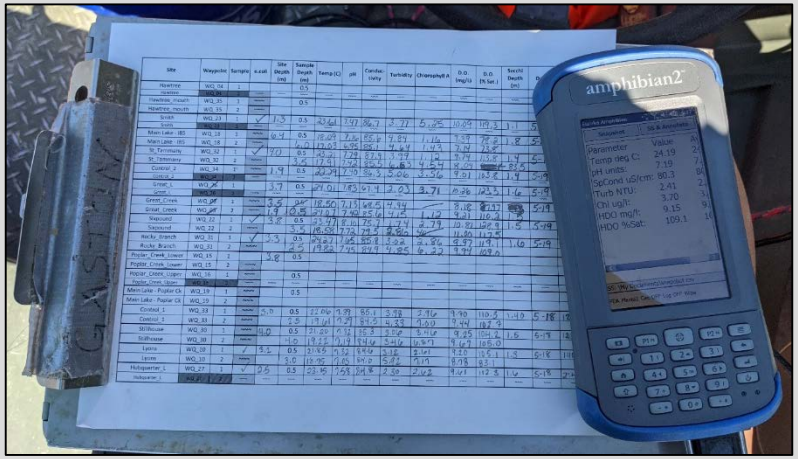


2021 Water Quality

2021 Water Quality Report

1. Nutrients
2. Water Chemistry
3. Bacterial Community

** Will be included in Final Report for Integrated Lyngbya Research Grant**



Outline

- **2021 Overall Vegetation Survey**
- Hydrilla
  - 2021 Hydrilla Treatments / Survey
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- Lyngbya
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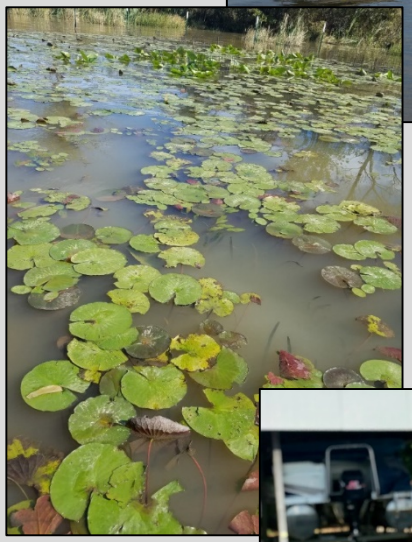
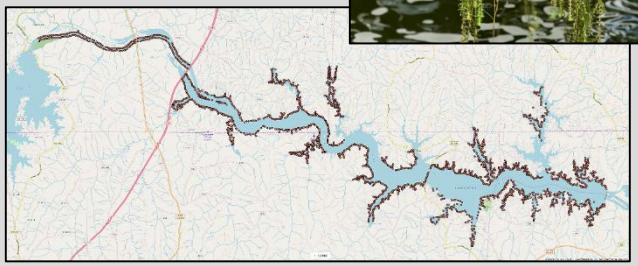
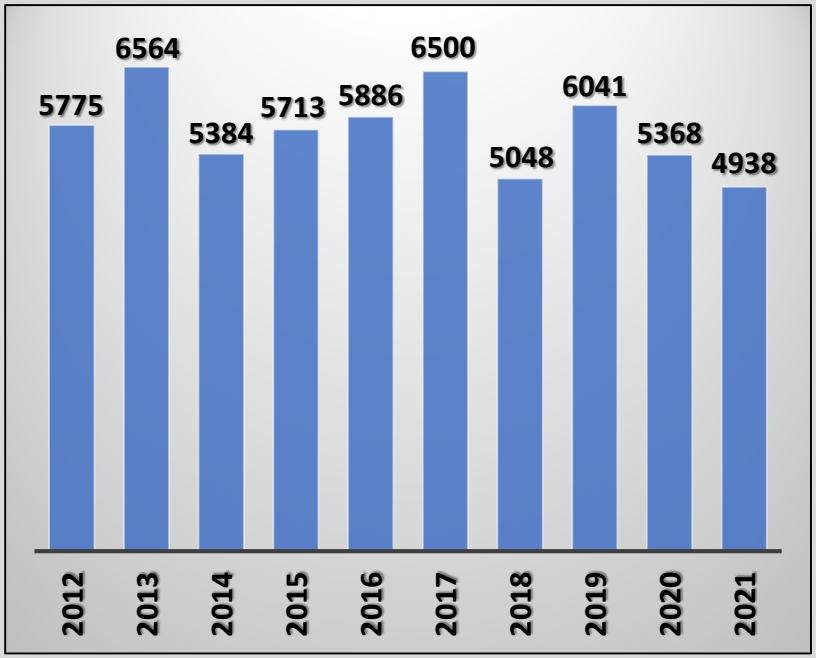
- Future Research Needs



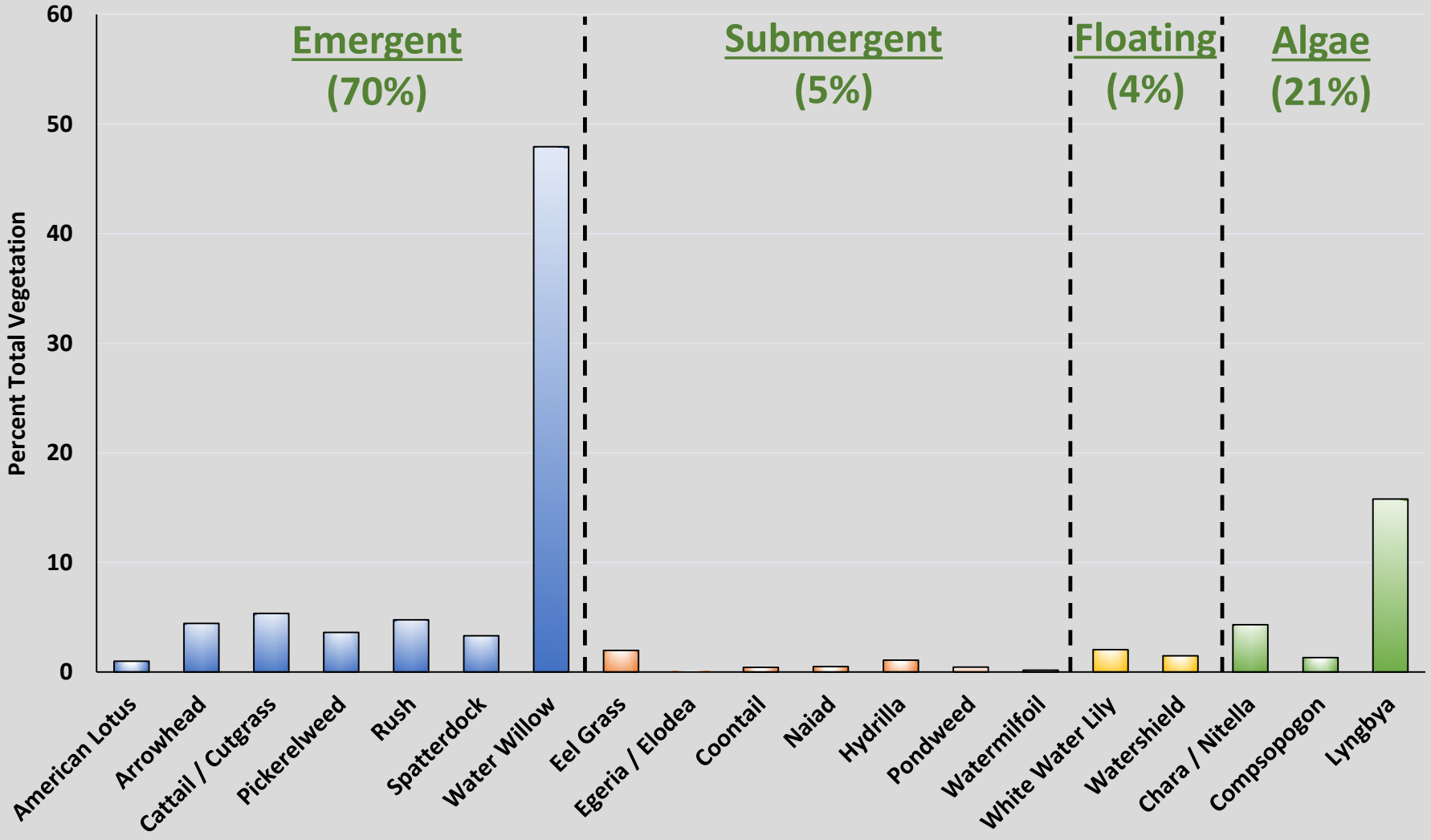


Fall Volunteer Survey

- **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



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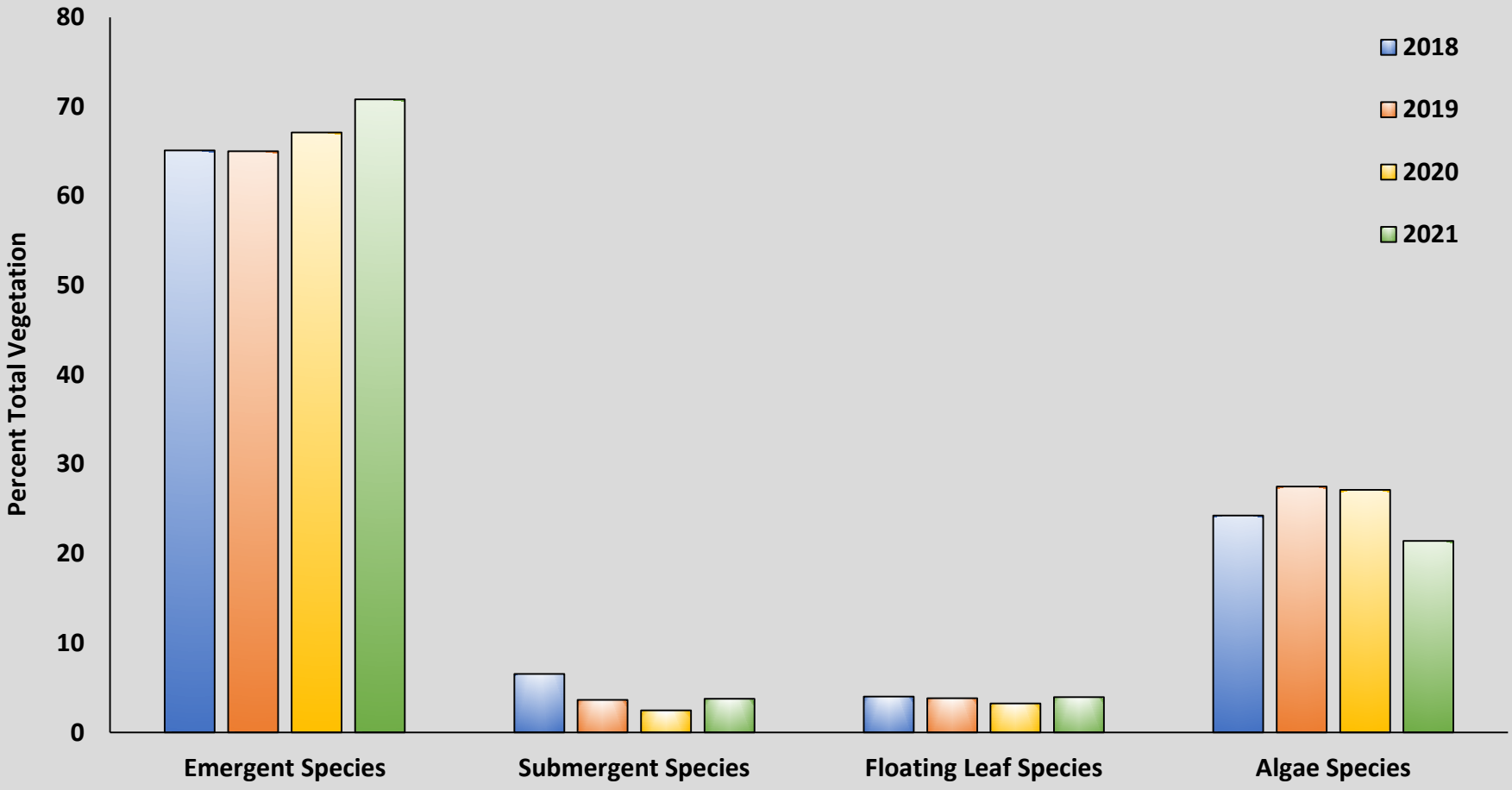

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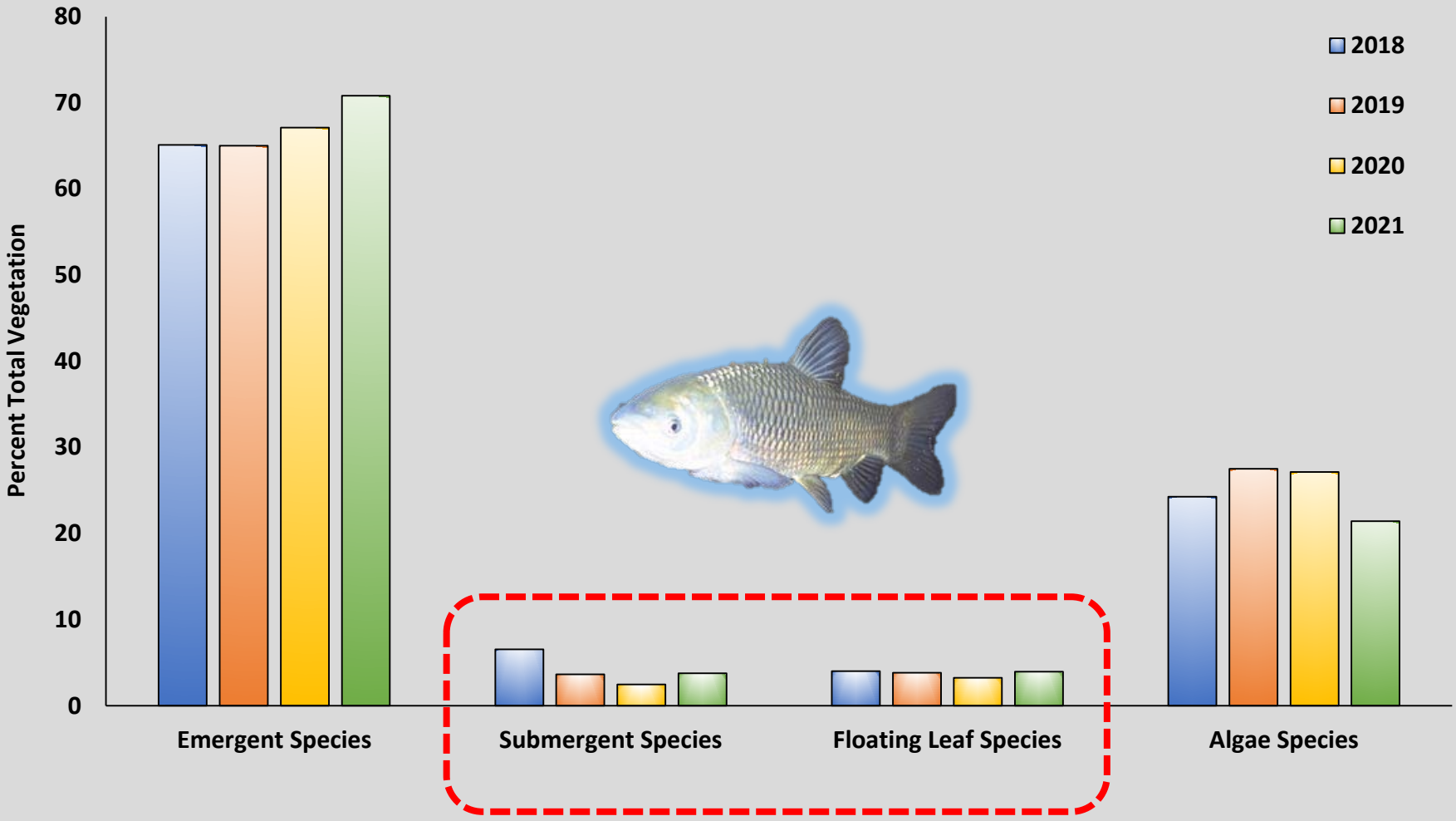
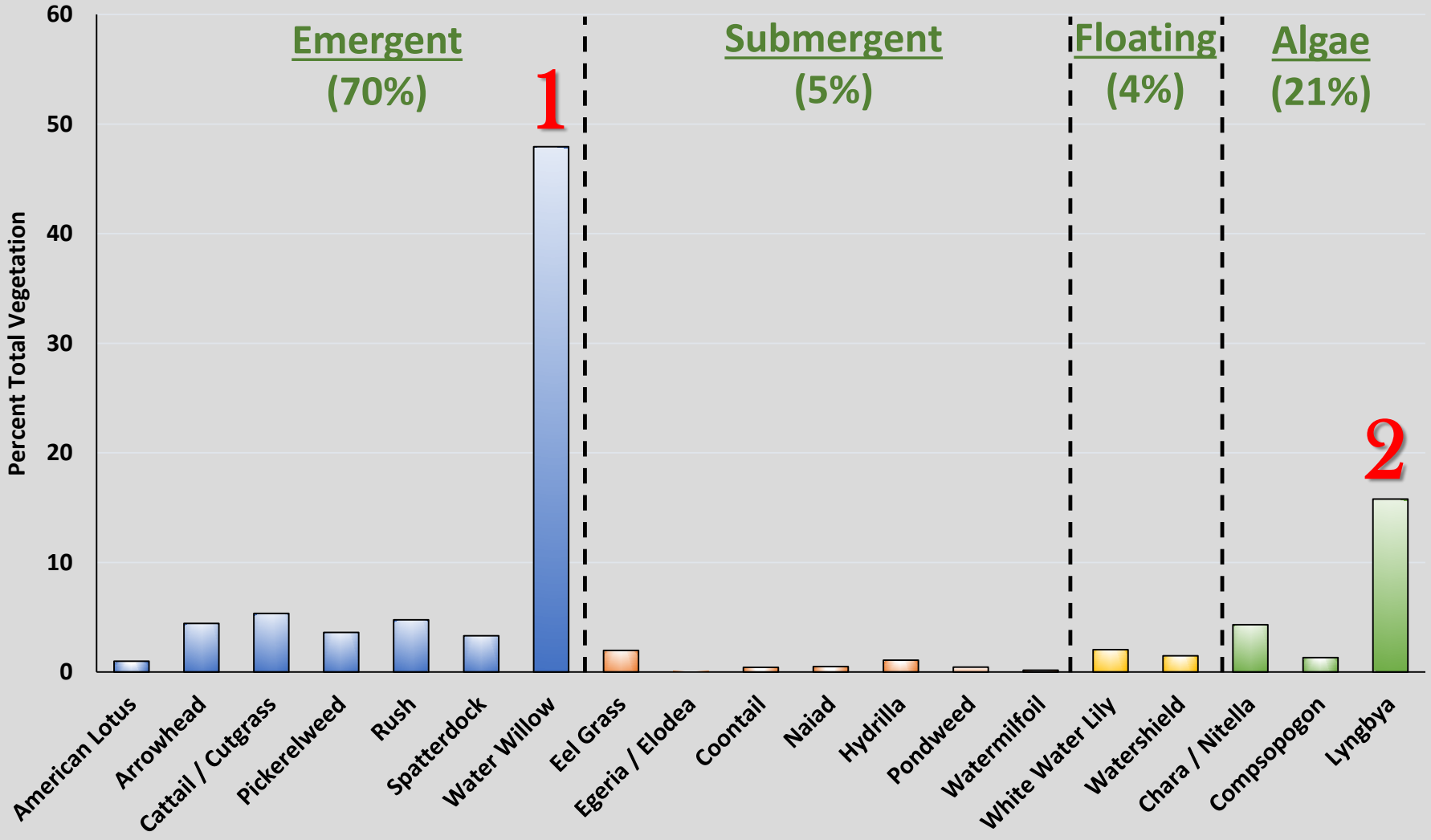


2021 Aquatic Plant Community



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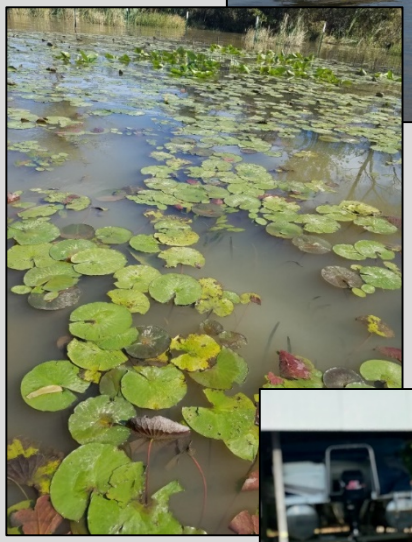
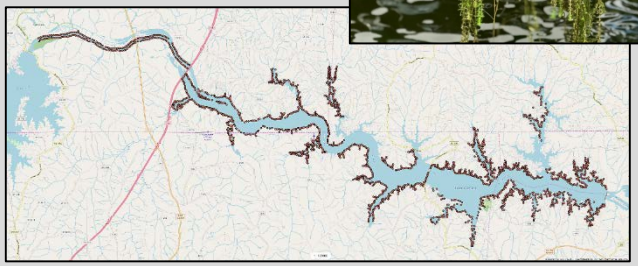
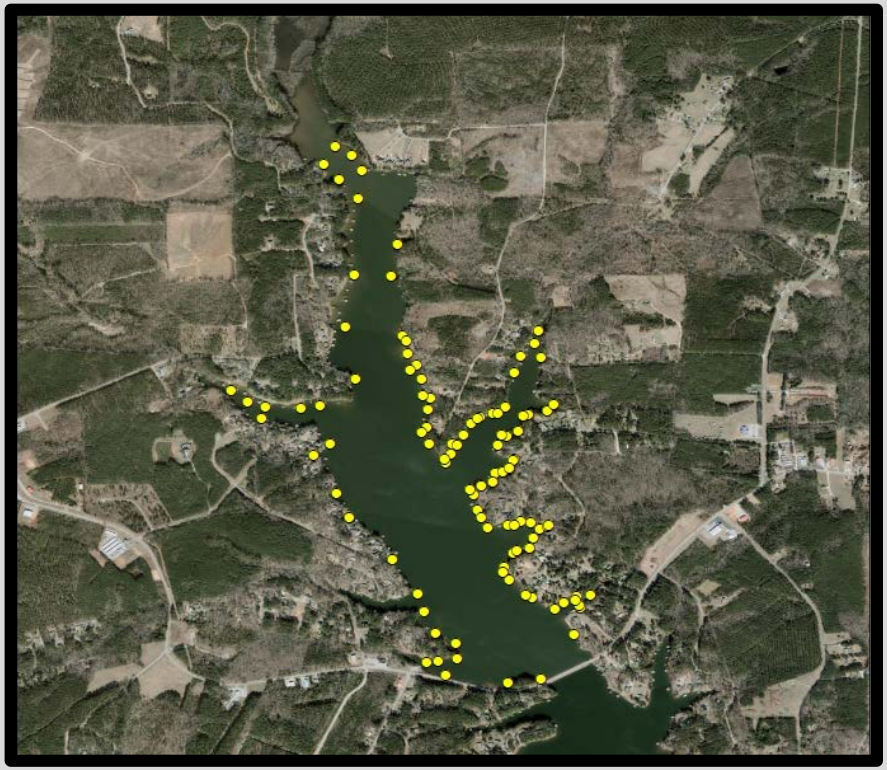




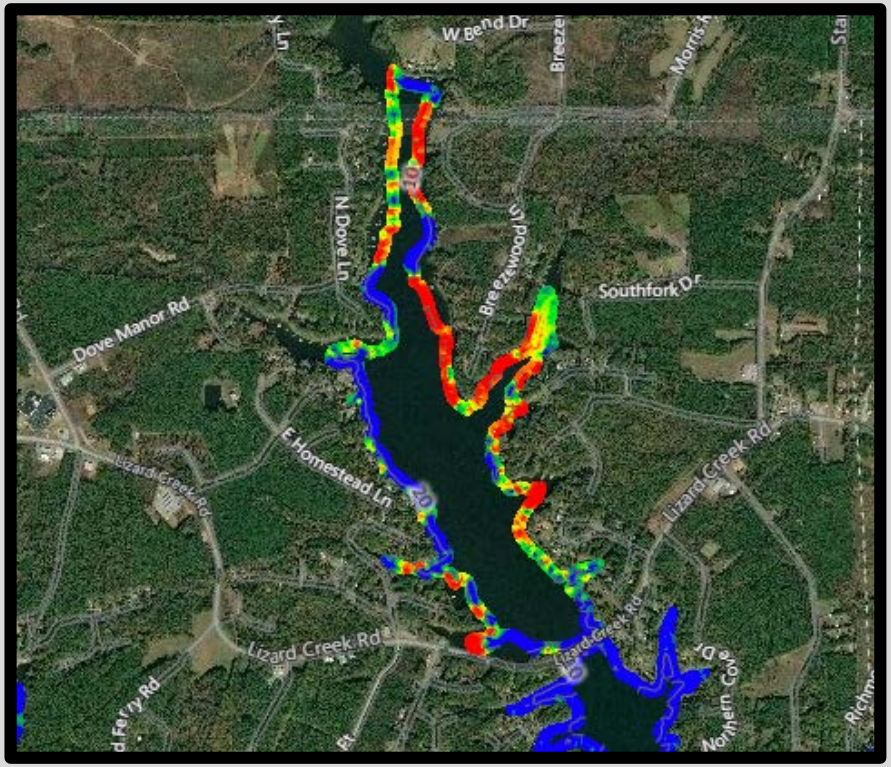
Hydrilla Management

Acreage Estimates



Vegetation Survey

Presence Data



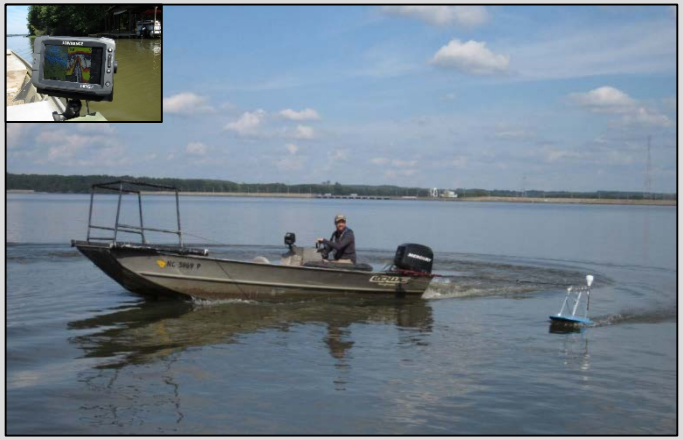
Sonar Survey

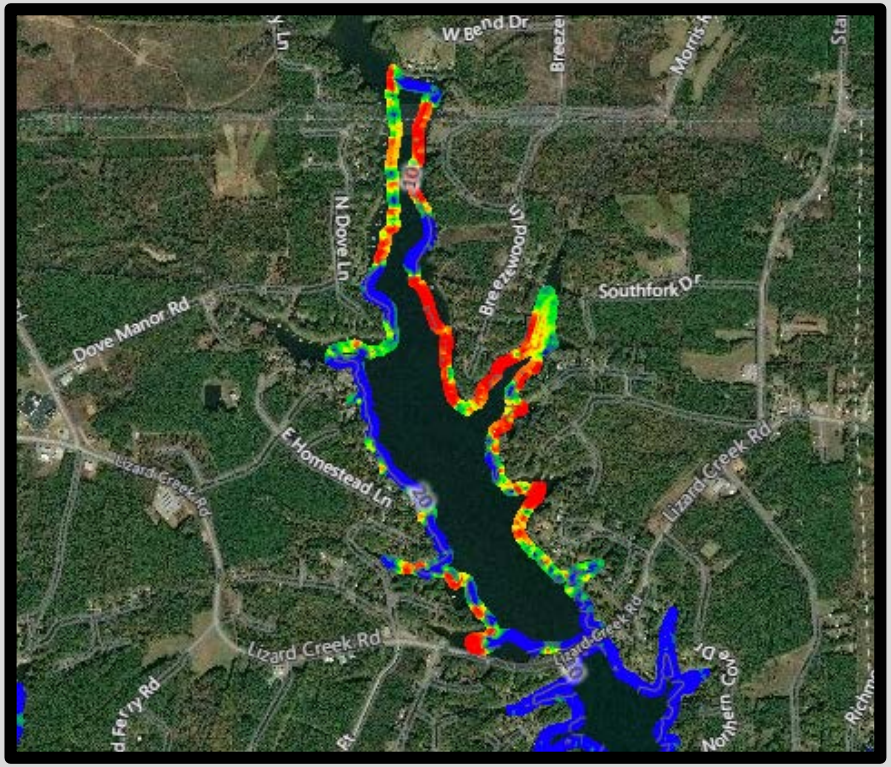
Volume Data

Hydrilla Management

Acreage Estimates

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





Sonar Survey

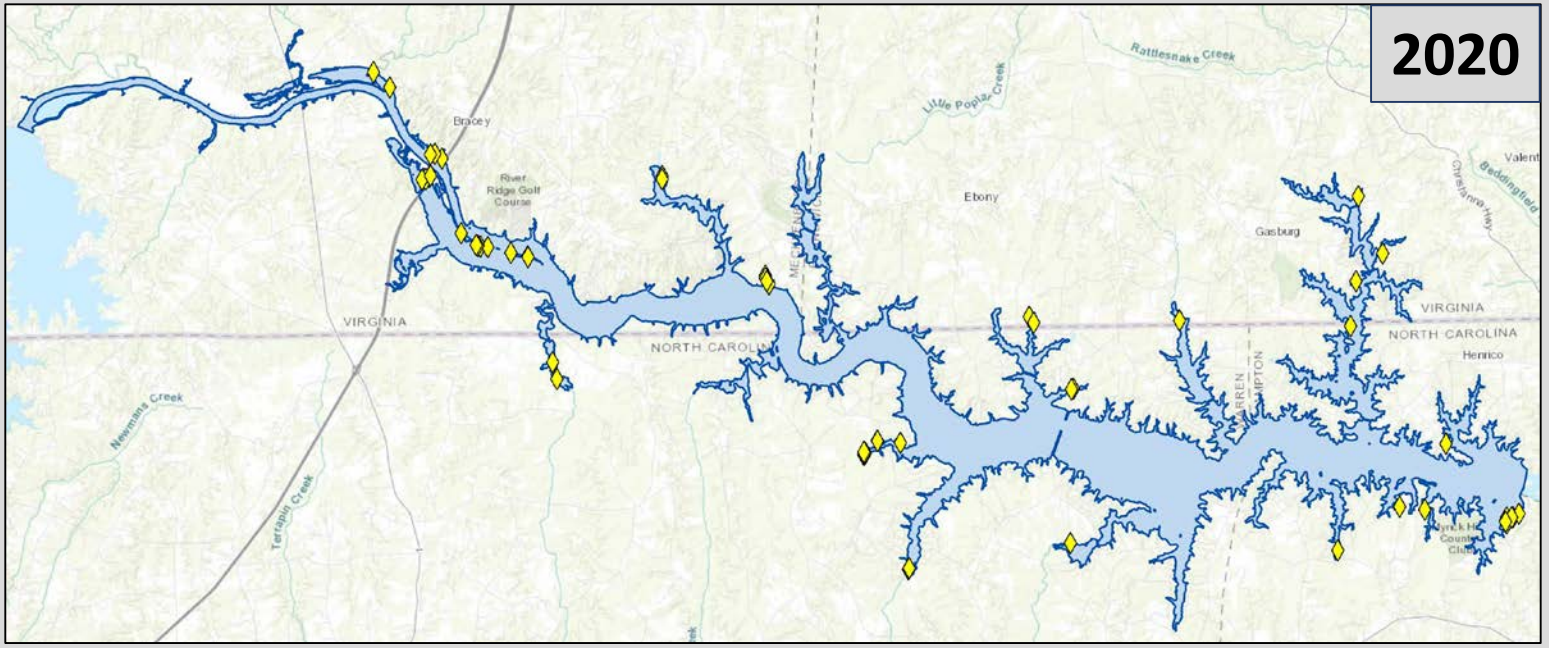
Volume Data

Hydrilla Treatments

2020 Survey Results

Total Vegetation: 1 %

Estimated Hydrilla Acreage: 104 acres



Hydrilla Treatments

2020 Survey Results

Total Vegetation: 1 %

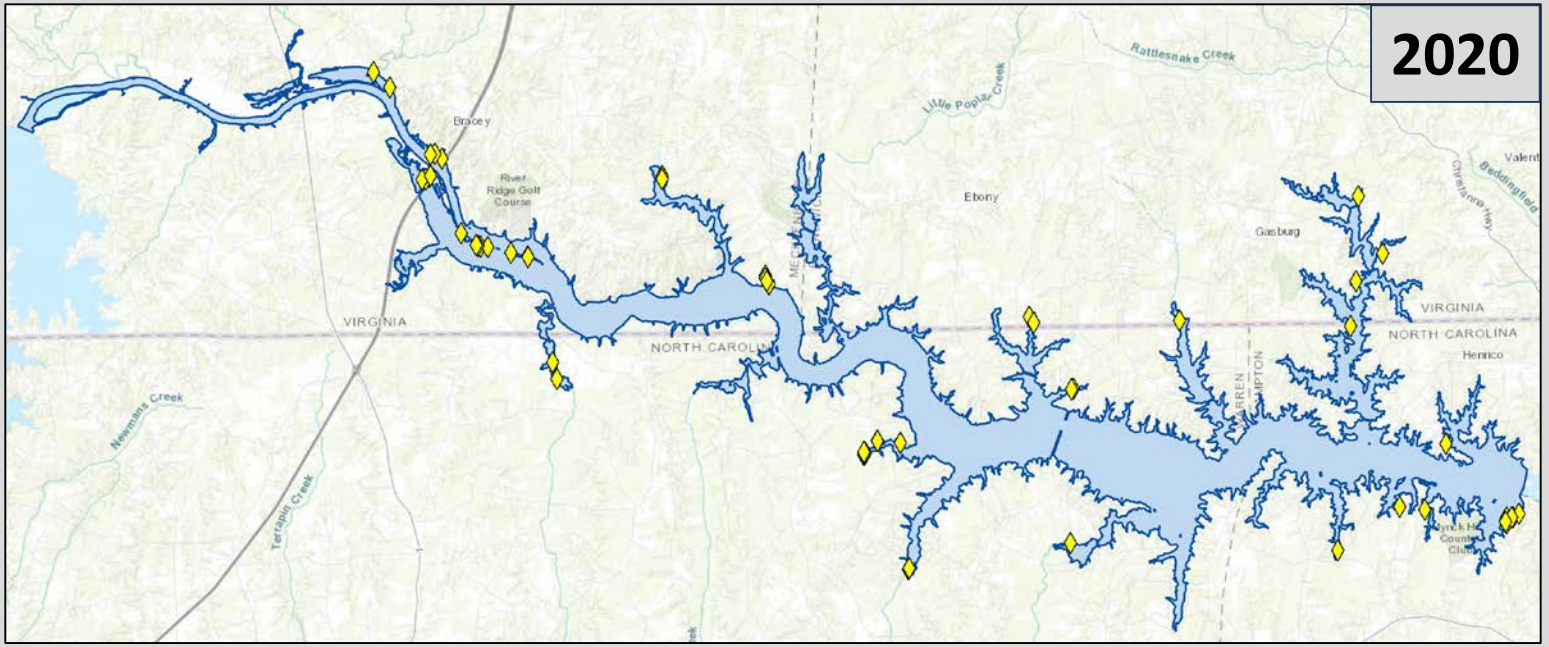
Estimated Hydrilla Acreage: 104 acres

2021 TAG Recommendation

Maximum Treatment Acres: 104 acres

Planned Treatment Acres: 0 acres

Grass Carp Stocking: 0 GC



Hydrilla Treatments

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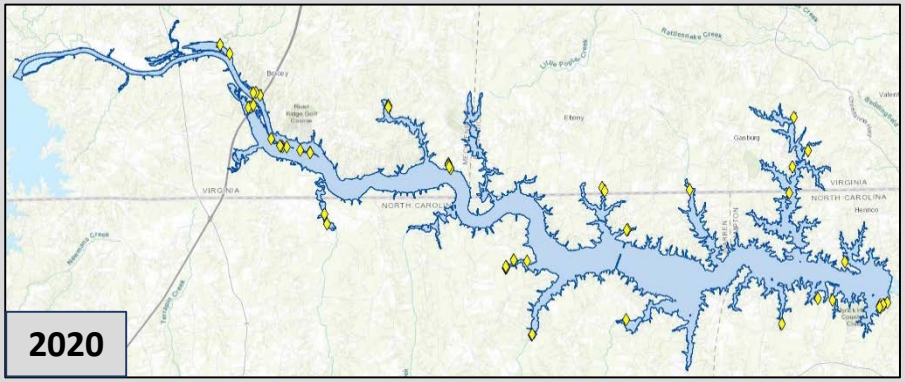


2021 Hydrilla Treatments

Treated Acreage: WCC Spot Treatments

Grass Carp Stocking: 0 GC

Hydrilla Treatments

2021 Survey Results

Hydrilla Treatments

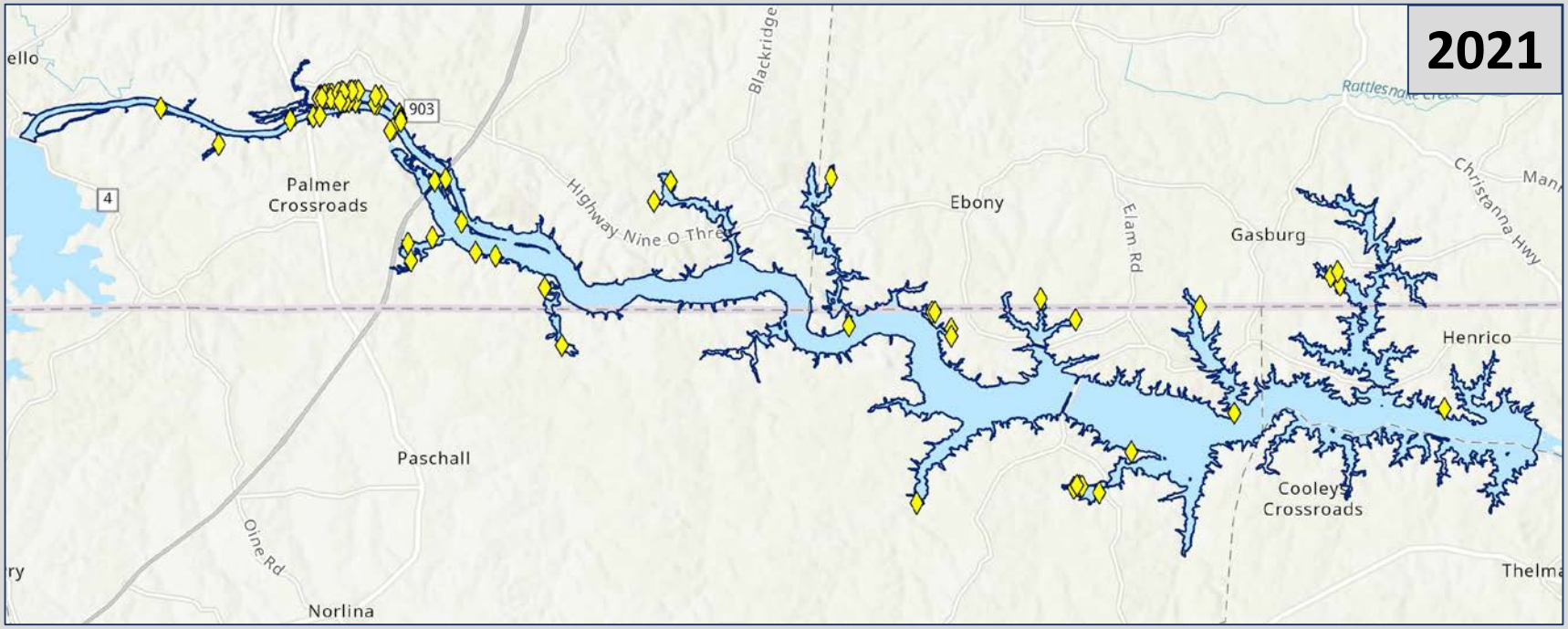
2021 Survey Results

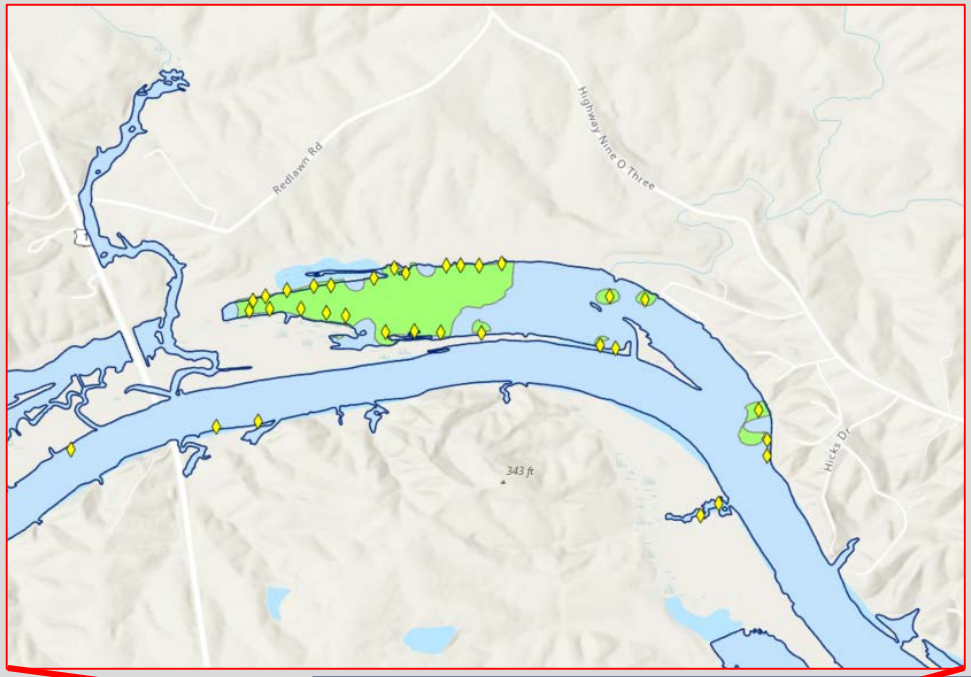
Hydrilla Treatments

2021 Survey Results

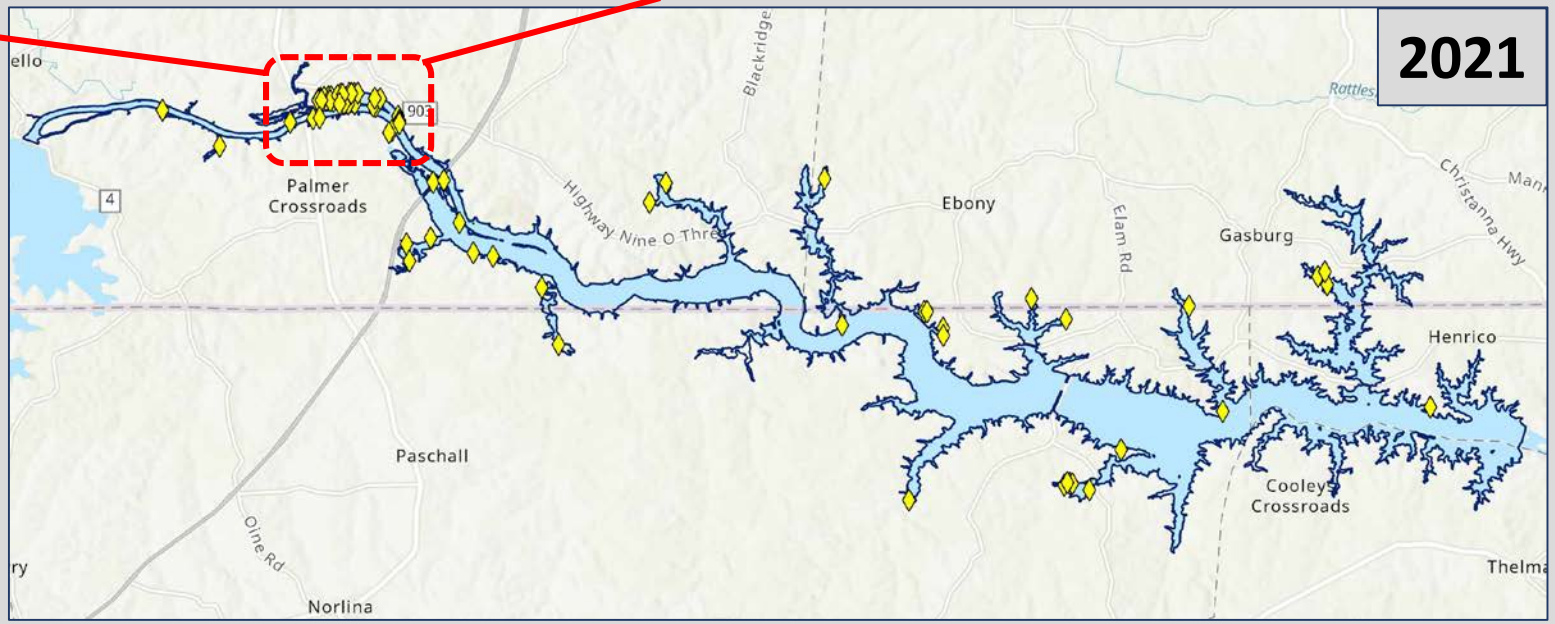
Total Vegetation: 1.4 %

Estimated Hydrilla Acreage: 154 acres





86 Estimated Acres at Beachwood



Hydrilla Treatments

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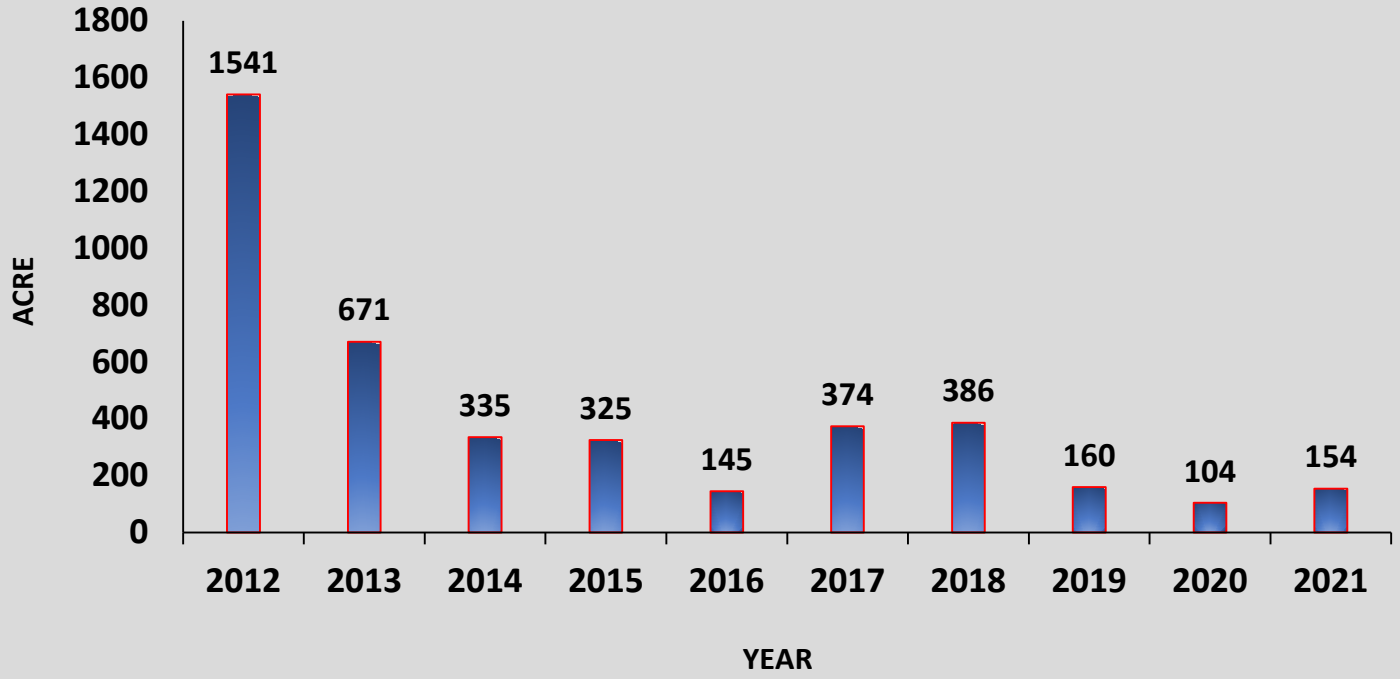
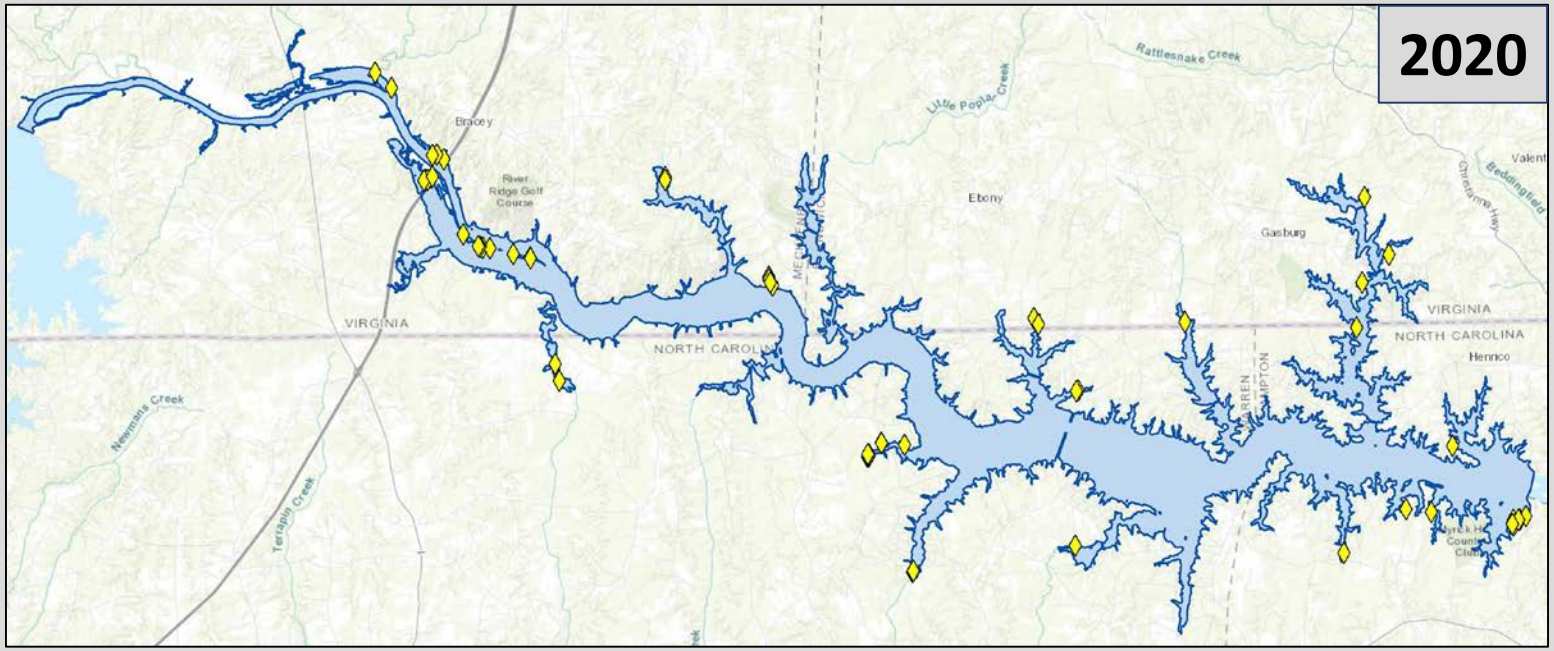
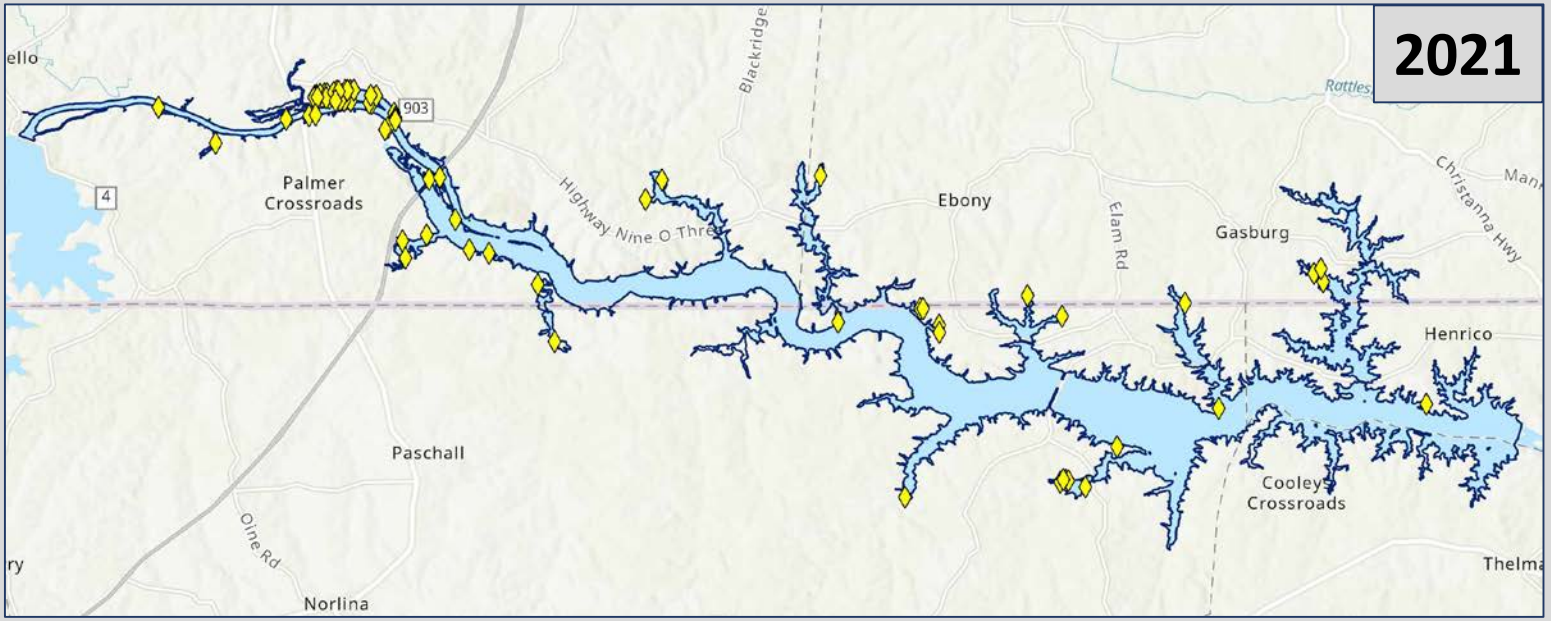
Hydrilla Acreage




2020
Bracey
River Ridge Golf Course
Rattlesnake Creek
Little Poplar Creek
Ebony
Gasburg
VIRGINIA
NORTH CAROLINA
Henrico
Newmans Creek
Terrapin Creek


2021
903
4
Palmer Crossroads
Blackridge
Highway Nine O Three
Ebony
Elam Rd
Gasburg
Christanna Hwy
Henrico
Paschall
Olne Rd
Norlina
Cooleys Crossroads

Hydrilla Treatments

2021 Survey Results

- Sonar/Vegetation Surveys
  - Current Hydrilla Situation

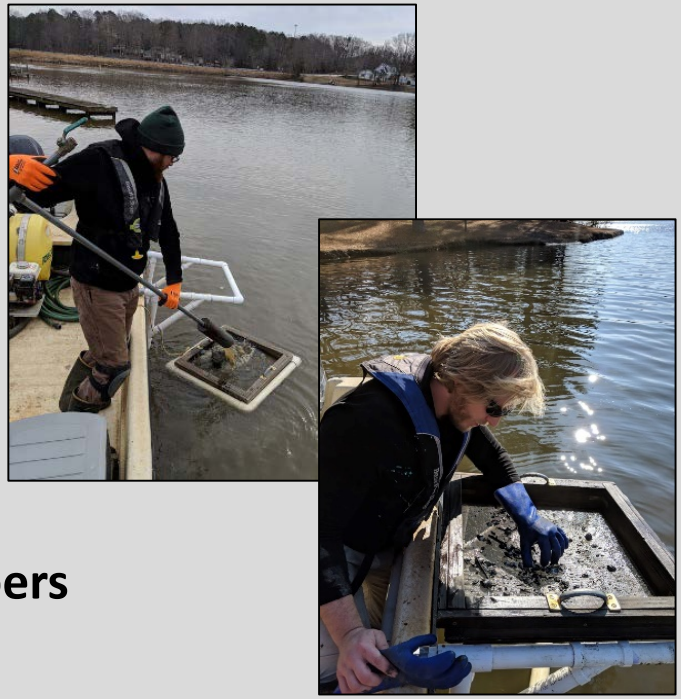
Hydrilla Treatments

2021 Survey Results

- Tuber Surveys
  - Future Hydrilla Situation

Tuber Survey

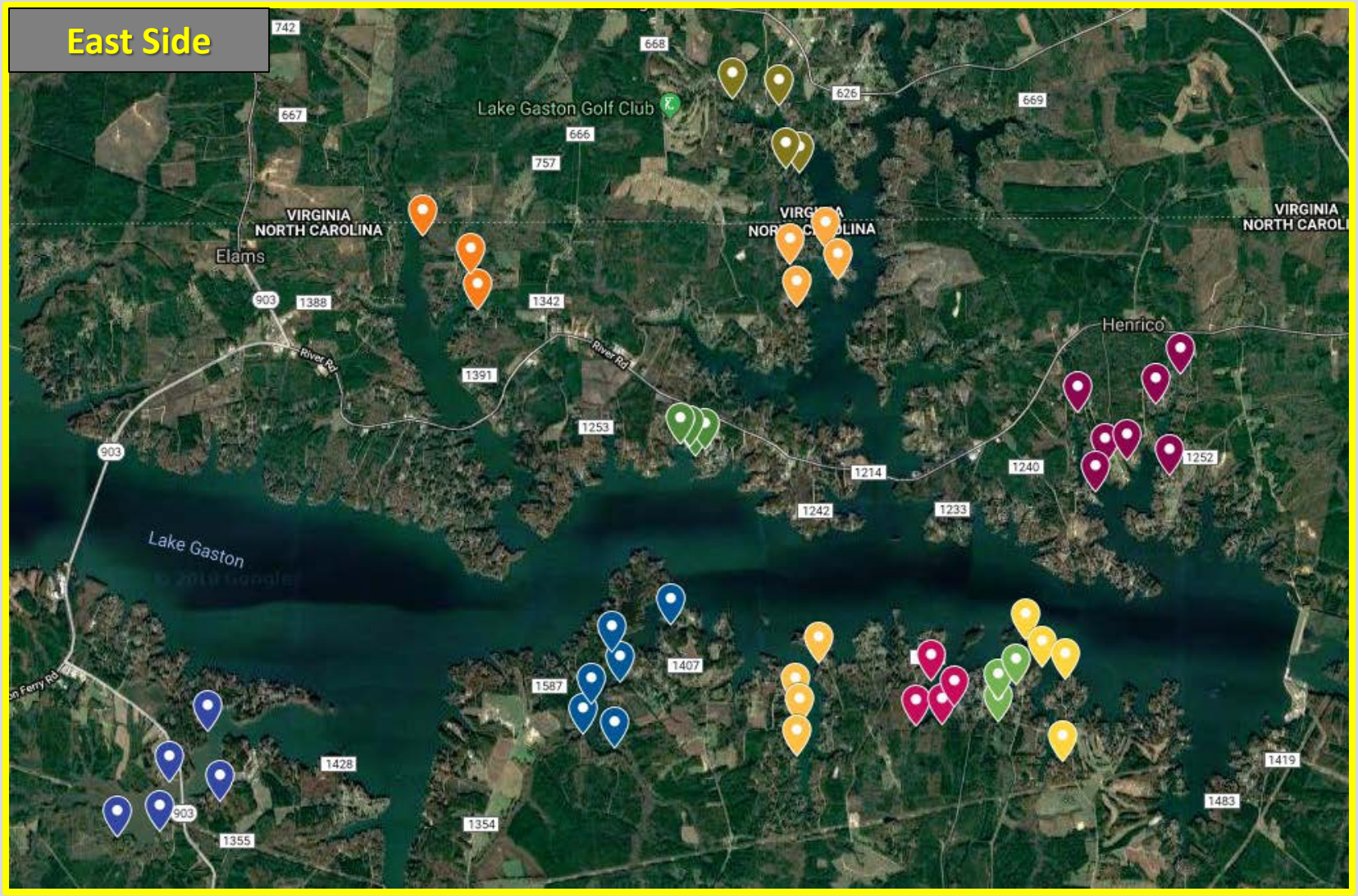
- Sampled December 2021
- 18 Total Creeks
  - Based on historical hydrilla presence
  - 3 – 6 sample sites per creek



- 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



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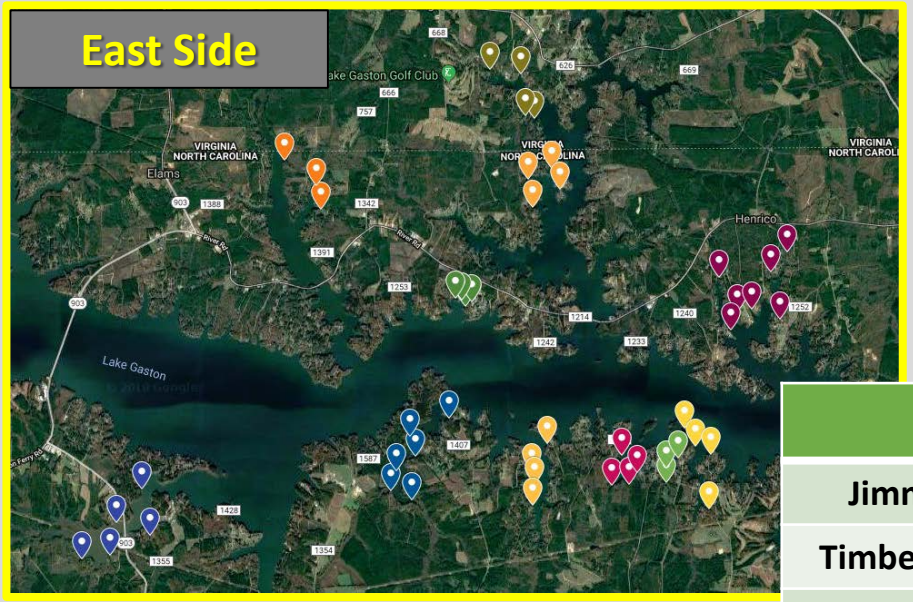
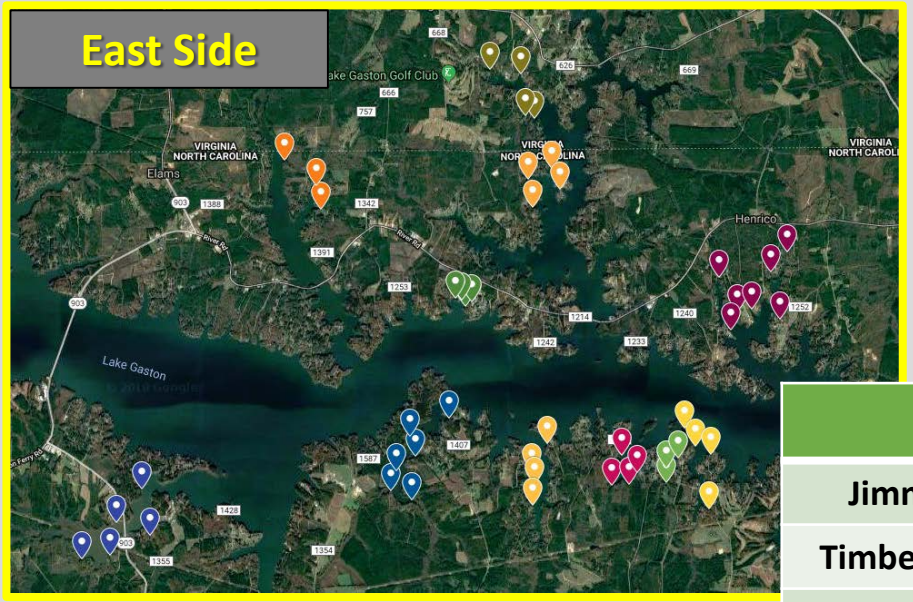


Tuber Density (m2)

	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			
Hamlin	*446.08*			

Tuber Survey

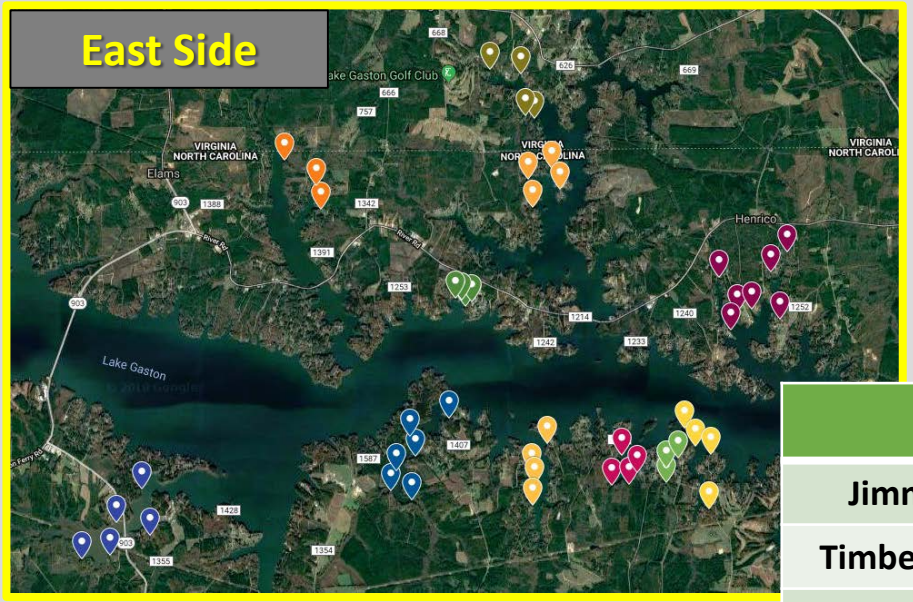


- **Low detection rates**

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	
Hamlin	*446.08*	0	0	

Tuber Survey

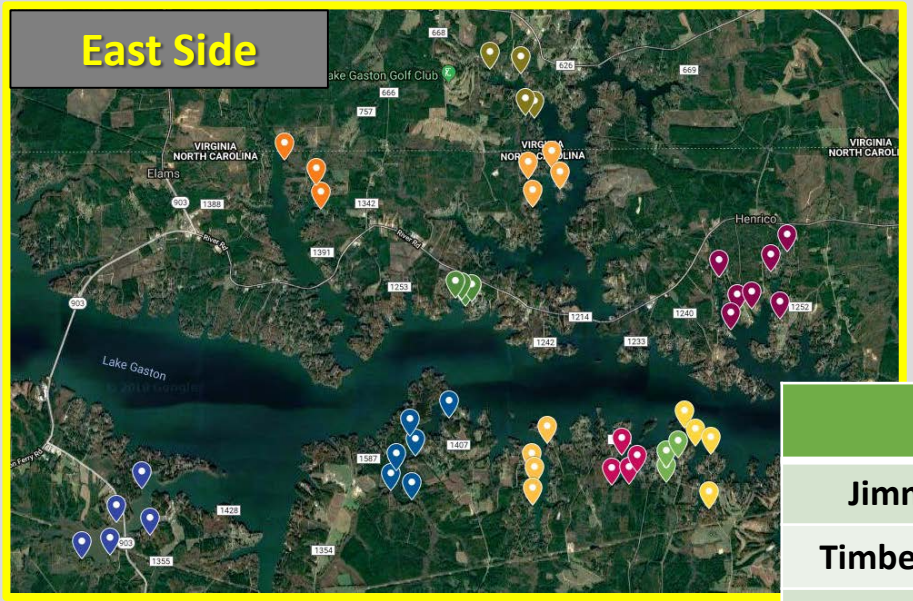


- Low detection rates
- However, monitoring still needed

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
Hamlin	*446.08*	0	0	2 yrs

Tuber Survey



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

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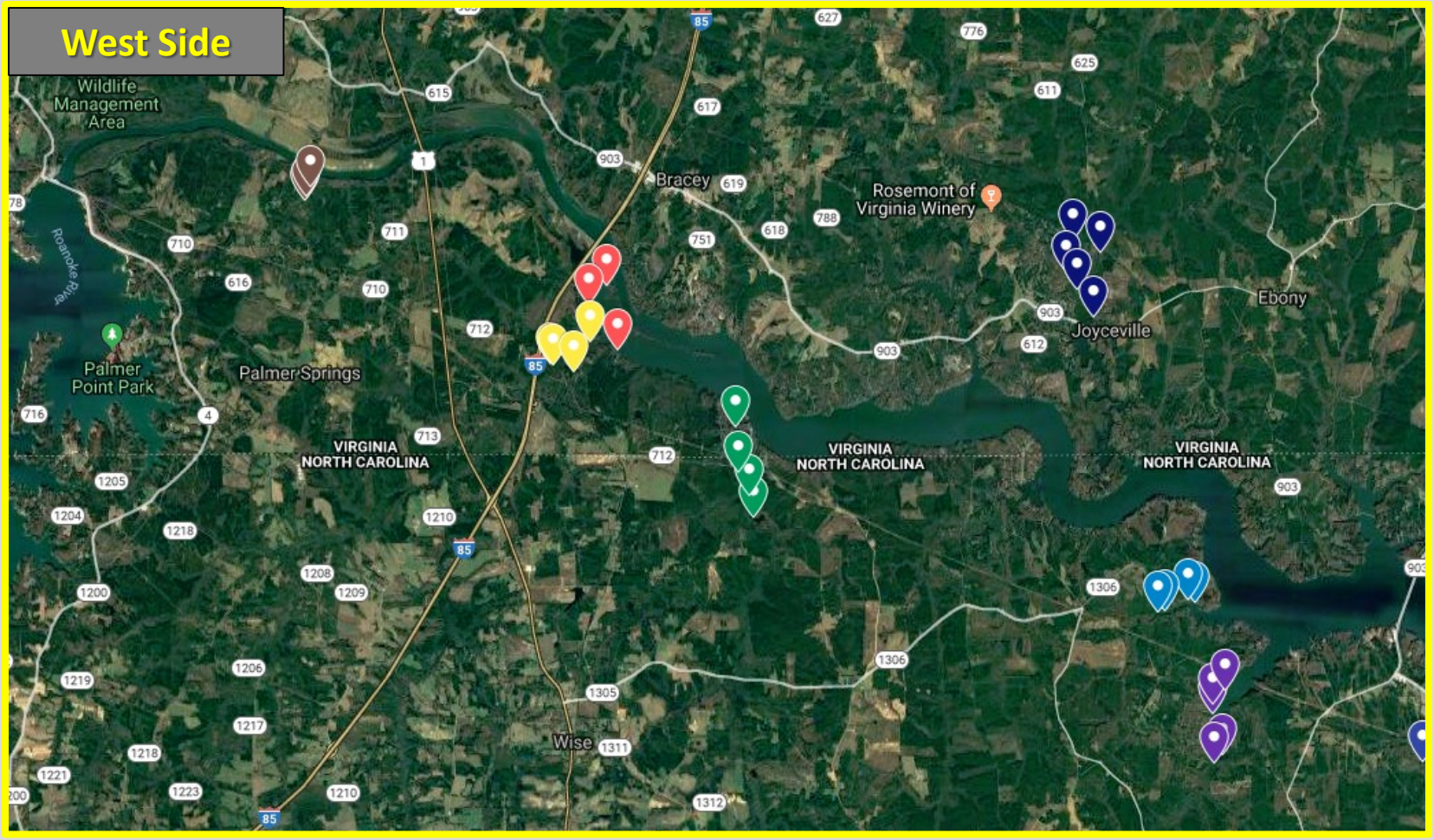

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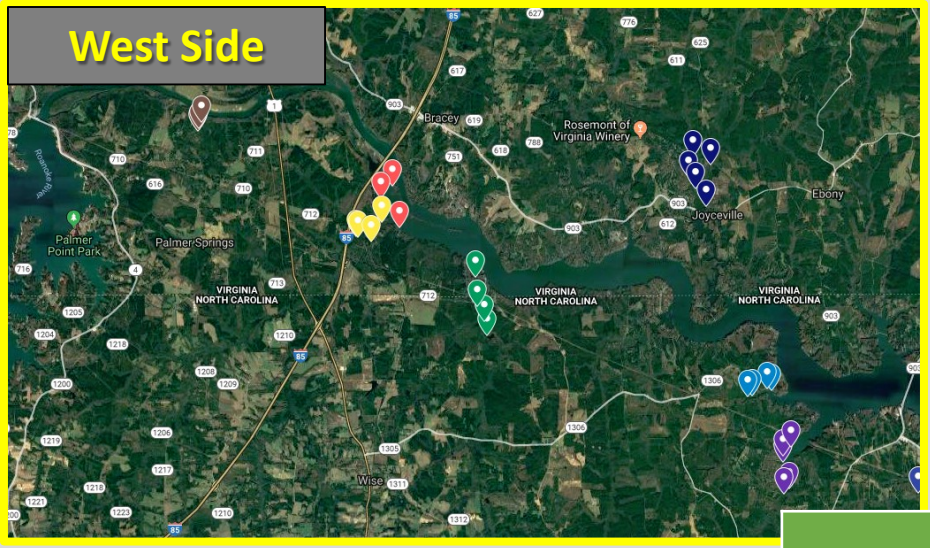
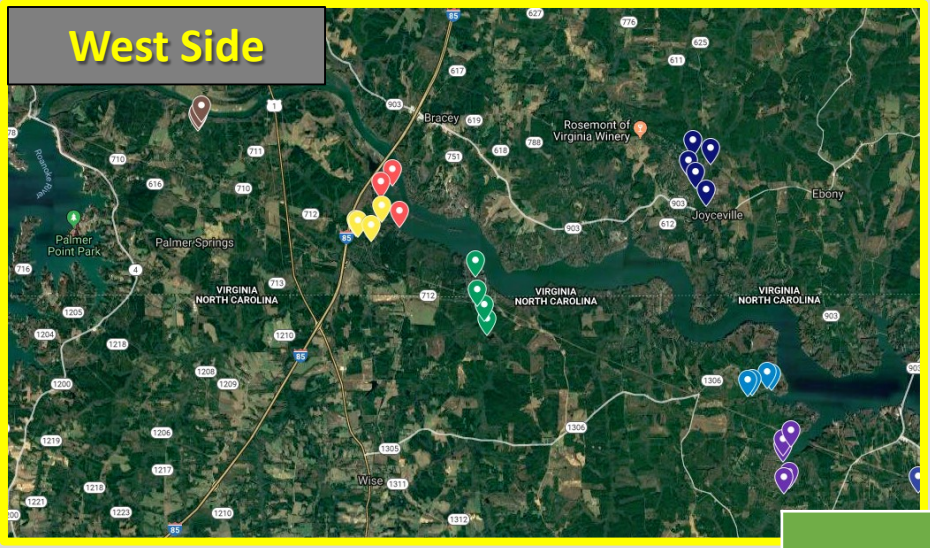


Tuber Density (m2)

	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			
Cotton Creek	*217.90*			

Tuber Survey

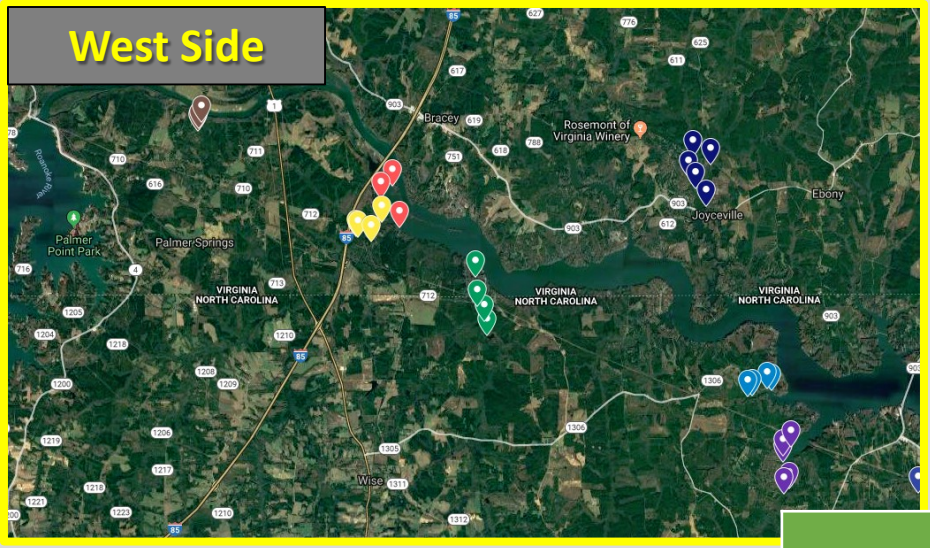


- Slightly higher detection rates than East side sites
- Monitoring still needed

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	
Cotton Creek	*217.90*	42.48	*0**	

Tuber Survey



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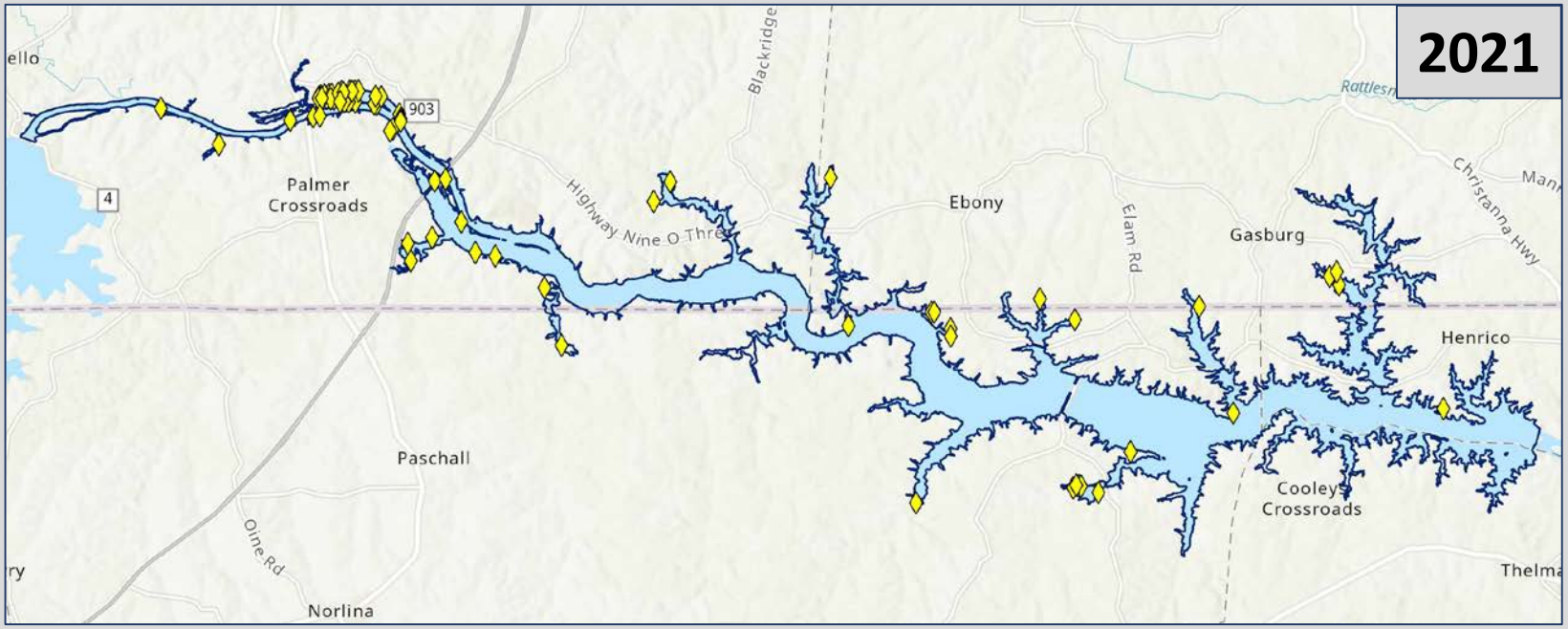
Hawtree	38.03	6.58	4.93	0 yrs
Smith Creek	8.22	0	0	***6 yrs***
Flats	119.23	0	0	***3 yrs***
Cotton Creek	*217.90*	42.48	*0**	1 yr

Hydrilla Treatments

2021 Survey Results → 2022 Recommendation

Estimated Hydrilla Acreage: 154 acres
Low Tuber Bank Density



Hydrilla Treatments

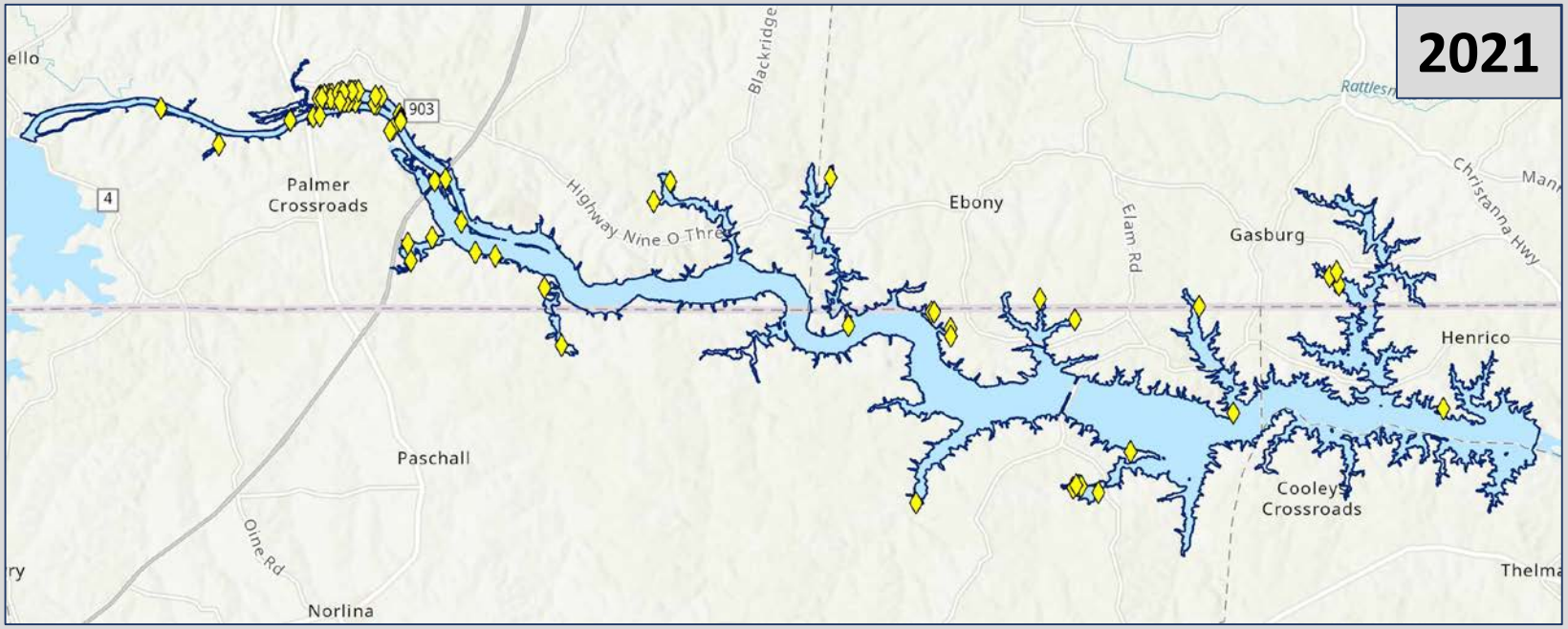
2021 Survey Results

Estimated Hydrilla Acreage: 154 acres
Low Tuber Bank Density

2022 Recommendation

Maximum Treatment Acres: 154 acres

Possible Treatment Areas
Beachwood Flats
Lizard Creek



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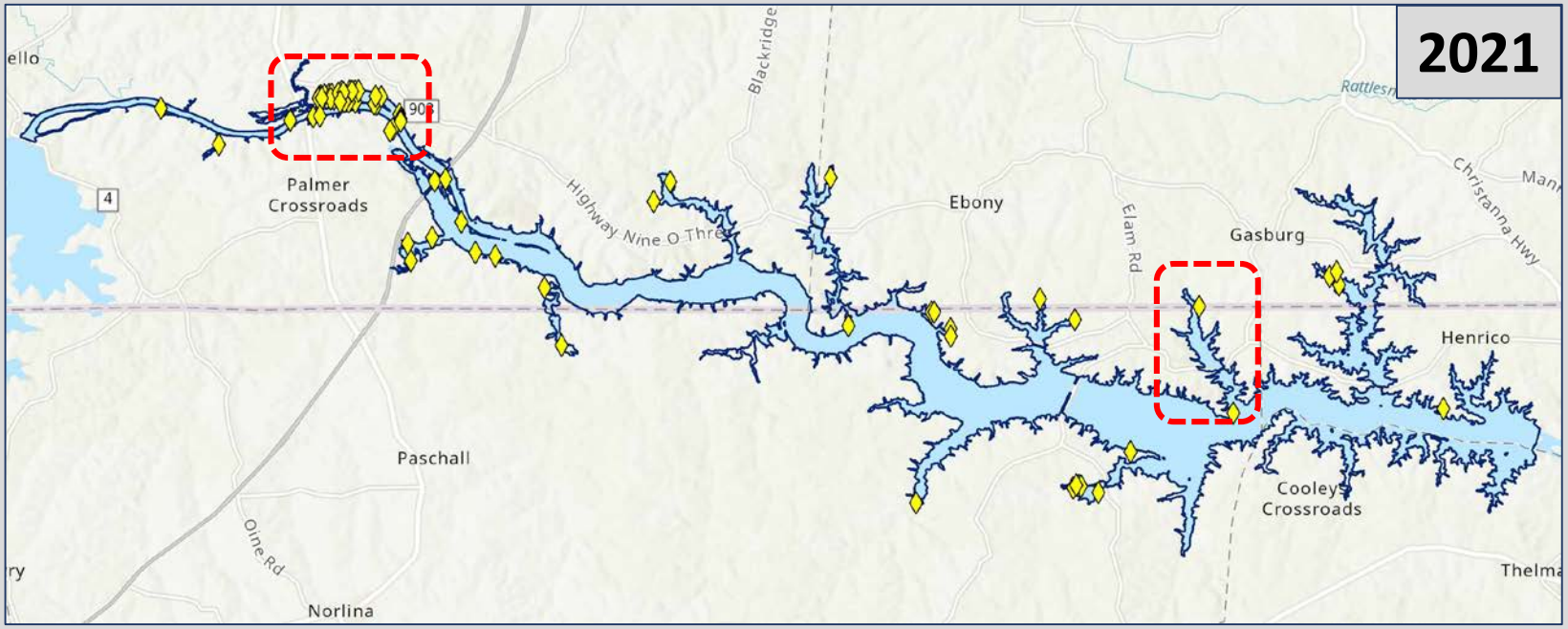

Hydrilla Treatments

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2022 Recommendation

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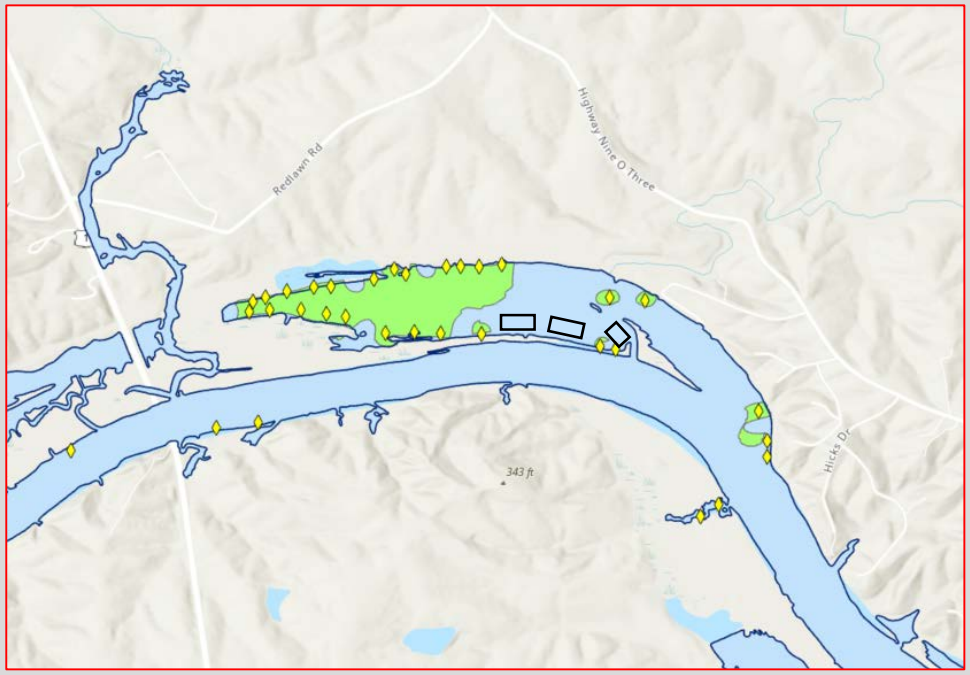

Area to Treat

- Cages

Hydrilla Treatments

2021 Survey Results

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Low Tuber Bank Density

2022 Recommendation

Maximum Treatment Acres: 154 acres

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

Hydrilla Treatments

2021 Survey Results

Total Vegetation: 1.4 %

Estimated Hydrilla Acreage: 154 acres

2022 Recommendation

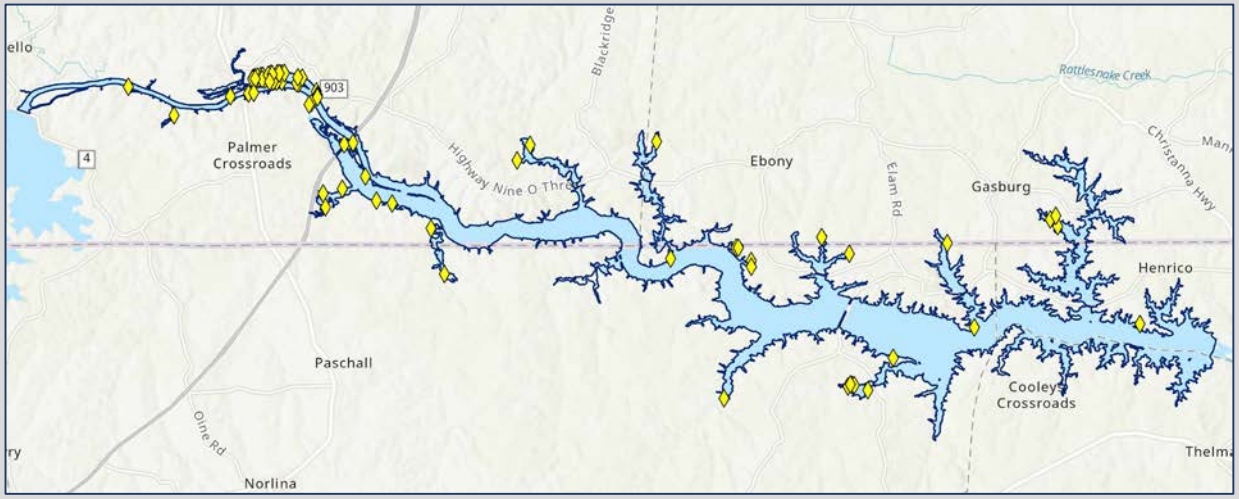
Maximum Treatment Acres: 154 acres

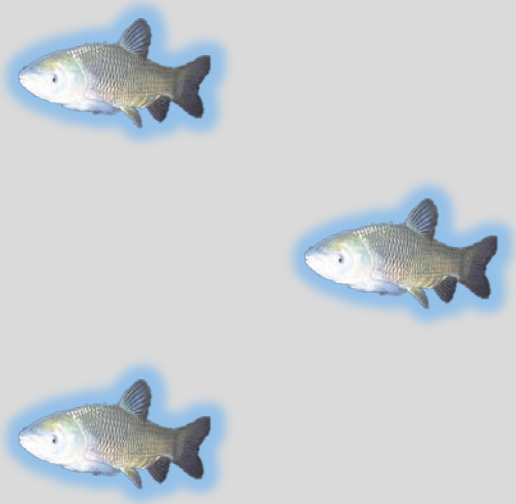
Possible Treatment Areas

Beachwood Flats

Lizard Creek

Grass Carp Stocking Number:





Hydrilla Treatments

2021 Survey Results

Total Vegetation: 1.4 %

Estimated Hydrilla Acreage: 154 acres

2022 Recommendation

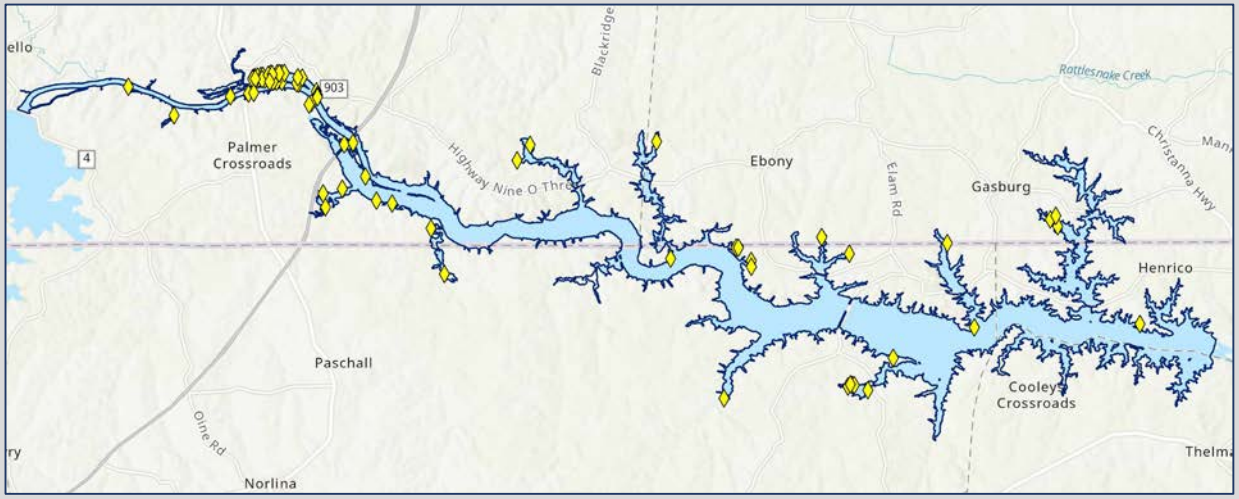
Maximum Treatment Acres: 154 acres

Possible Treatment Areas

Beachwood Flats

Lizard Creek

Grass Carp Stocking Number: 0



Hydrilla Treatments

2021 Survey Results

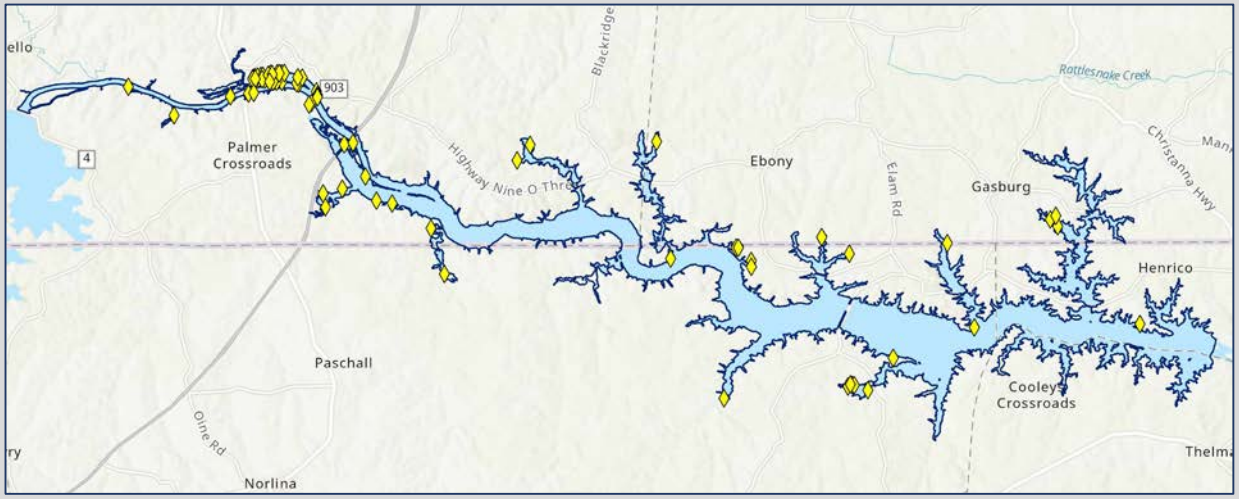
Total Vegetation: 1.4 %

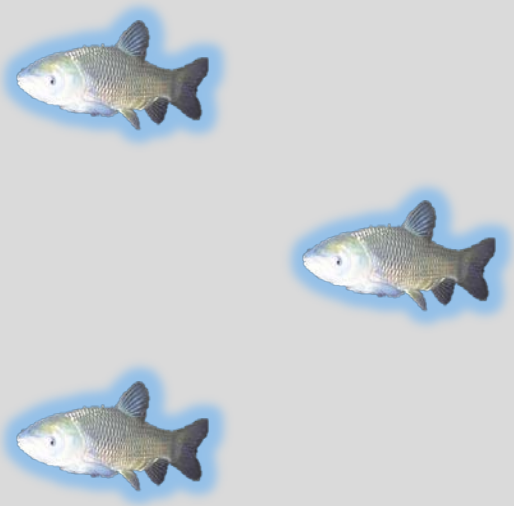
Estimated Hydrilla Acreage: 154 acres

2022 Recommendation

Maximum Treatment Acres: 154 acres

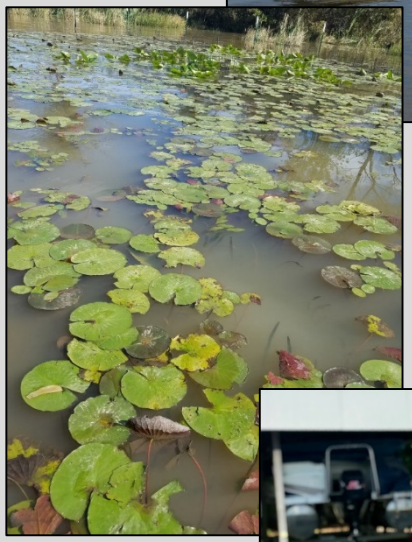
Grass Carp Stocking Number: 0

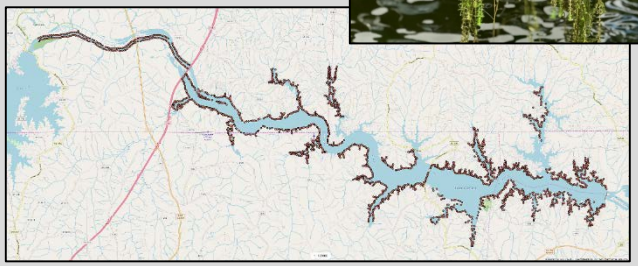




Outline

- 2021 Overall Vegetation Survey
- Hydrilla
  - 2021 Hydrilla Treatments / Survey
  - 2022 Proposed Treatments
- Lyngbya
  - 2021 Lyngbya Treatments
  - 2021 Lyngbya Survey
  - 2022 Proposed Treatments
- Future Research Needs



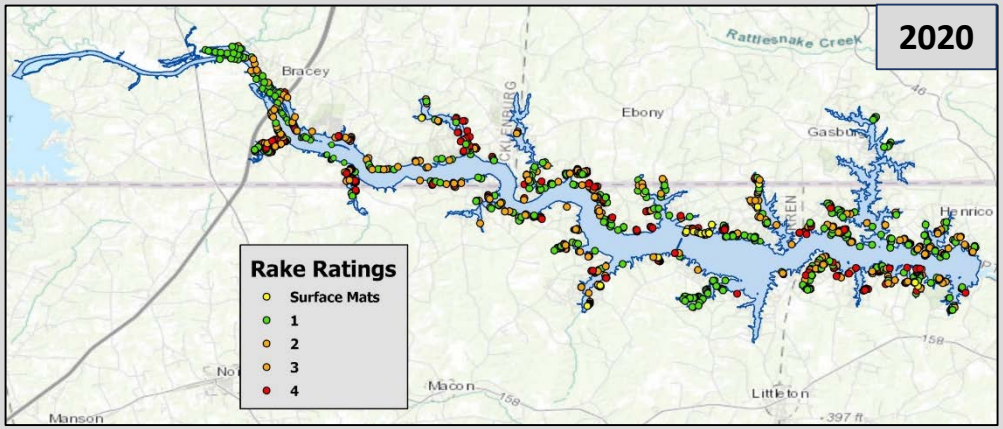


Lyngbya Treatments

2020 Survey Results

Total Vegetation: 30 %

Estimated Lyngbya Acreage: 1,194 acres



2021 TAG Recommendation

Treatment Acres: 300

Captain XTR + AMP
Cutrine Ultra + AMP

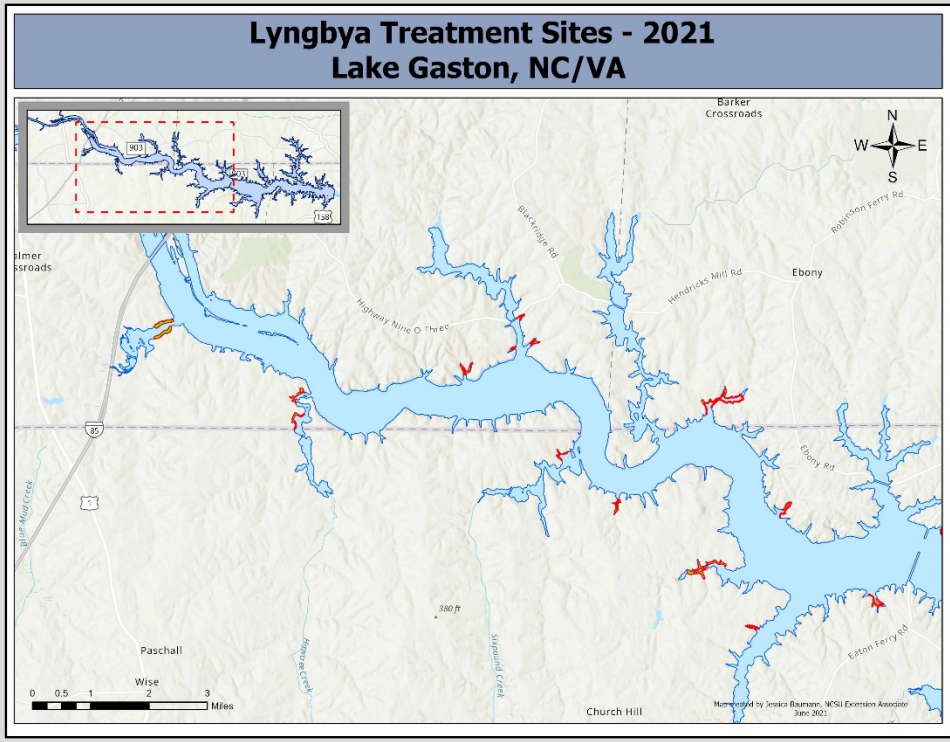
2021 Lyngbya Treatments

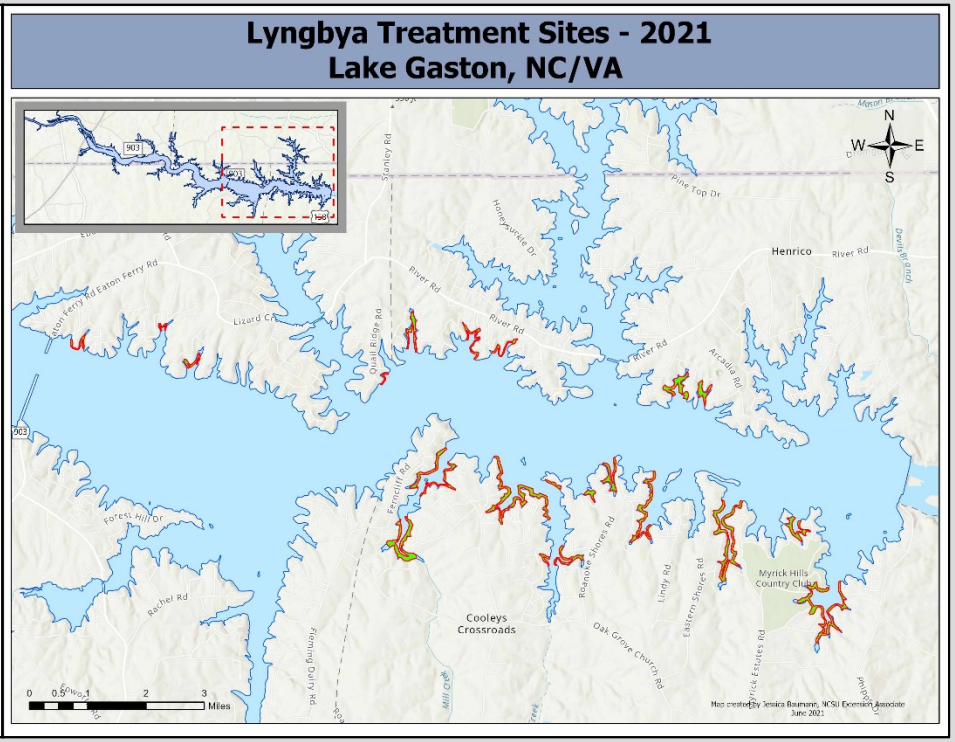
Treatment Acres: 300

Captain XTR + AMP
Cutrine Ultra + AMP

Lyngbya Treatments

2021 Lyngbya Treatments





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

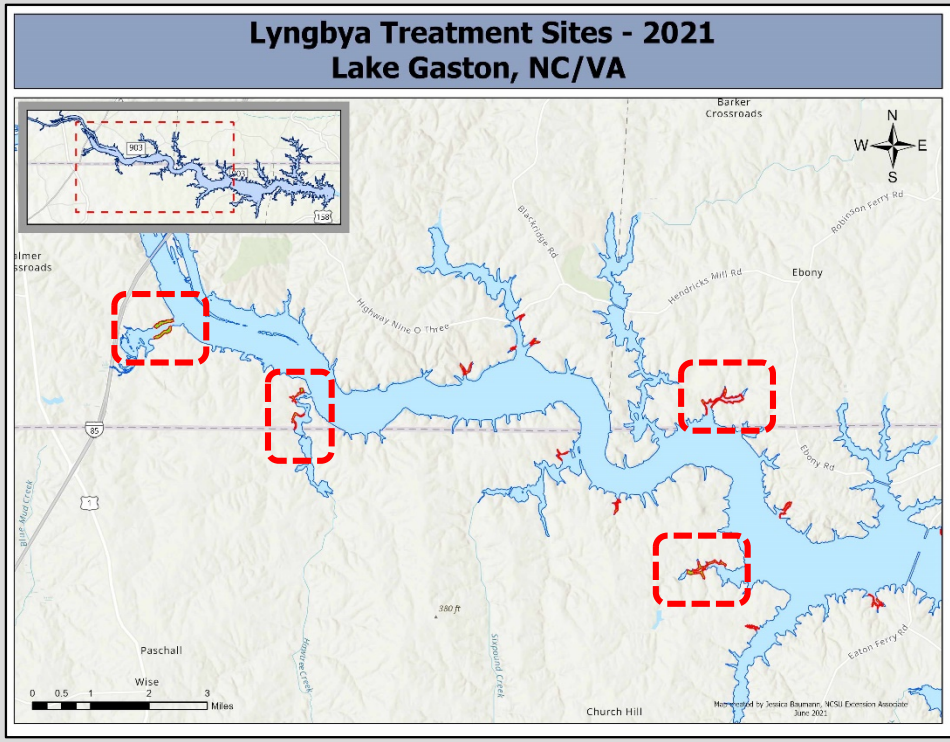
aqua services, inc.

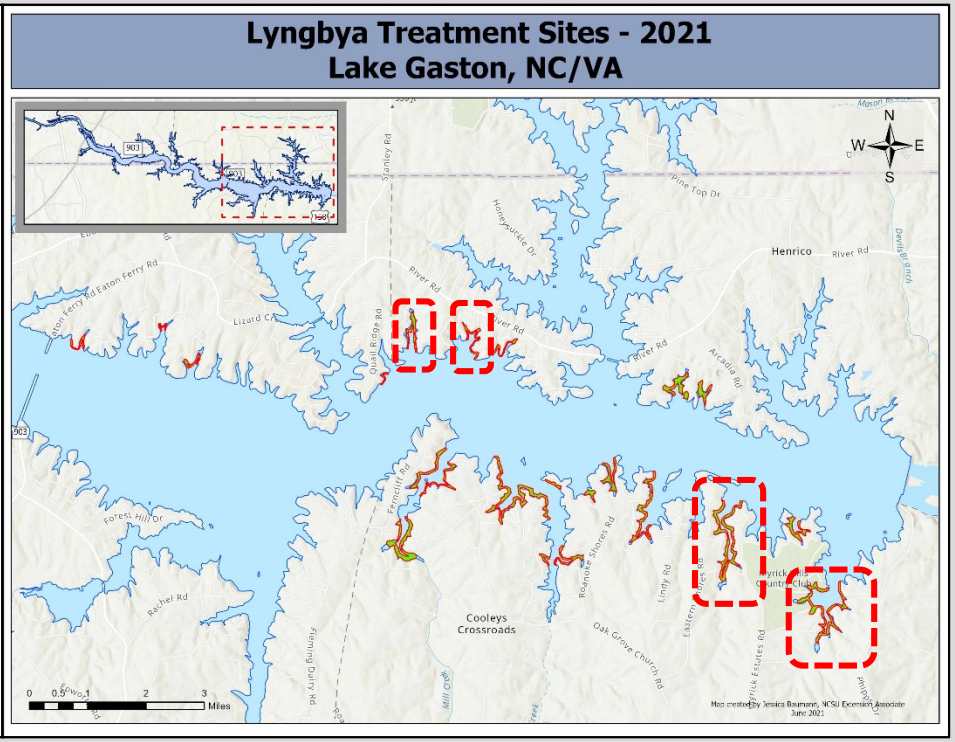
New Applicator

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

Lyngbya Treatments

2021 Lyngbya Treatments





Two Treatment Combinations - Evaluation

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

Lyngbya Treatments

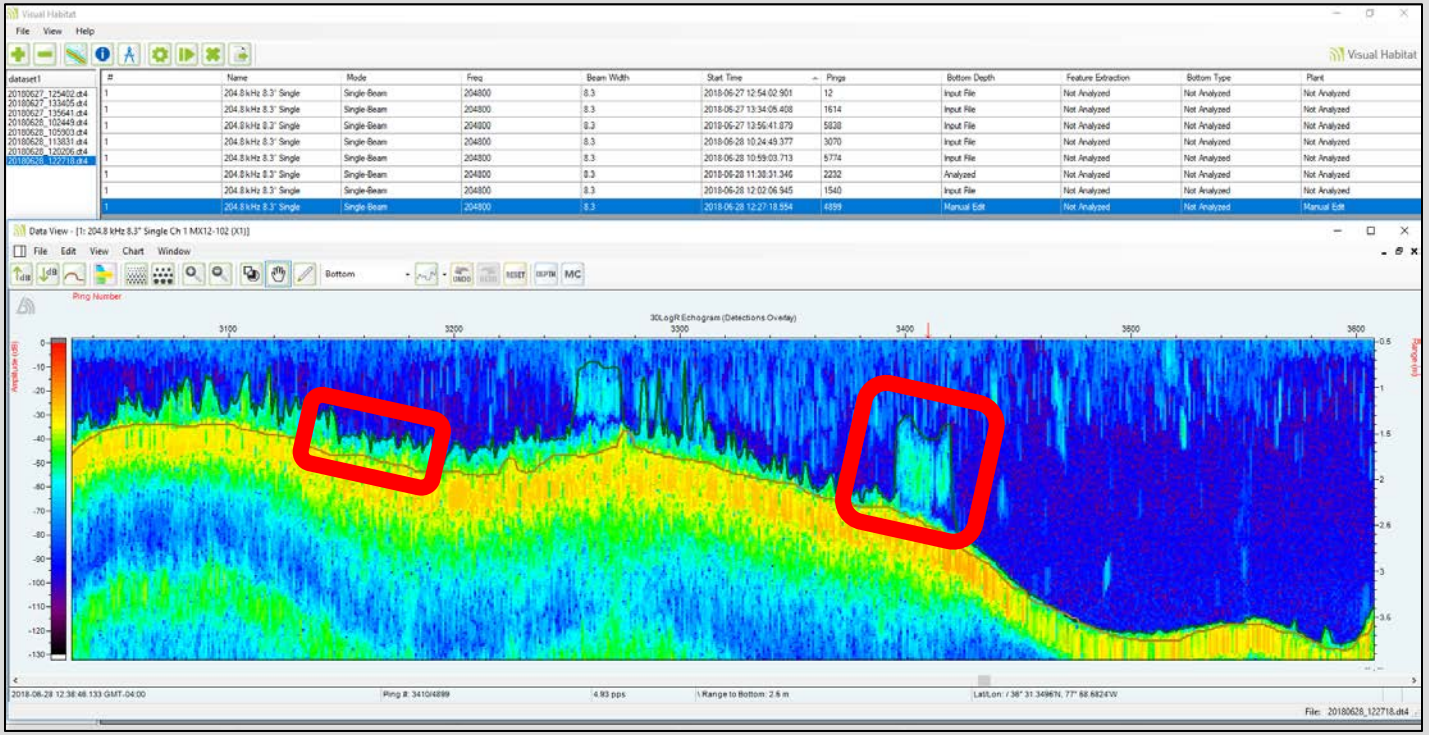
Methods of Evaluation:

- 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:

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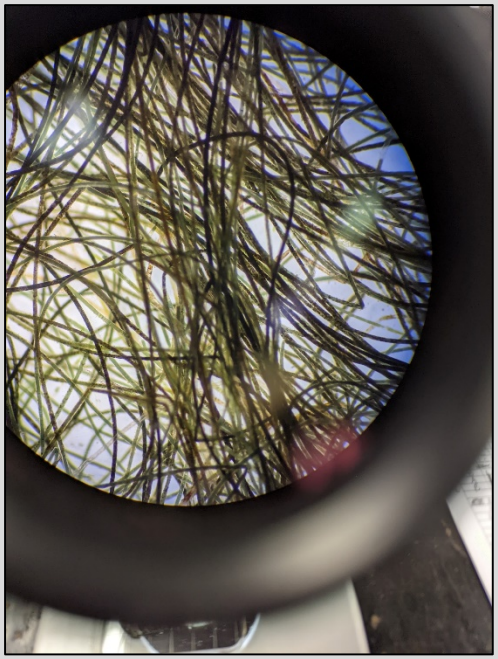
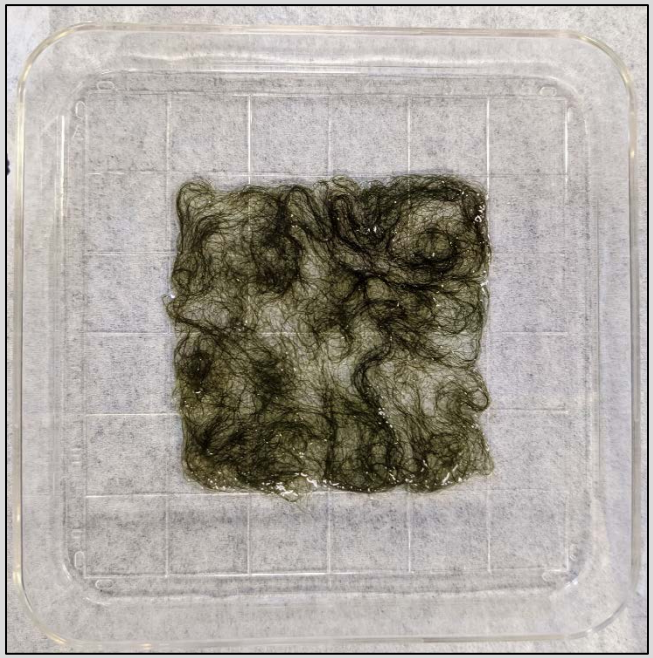
- Viability Samples (December)

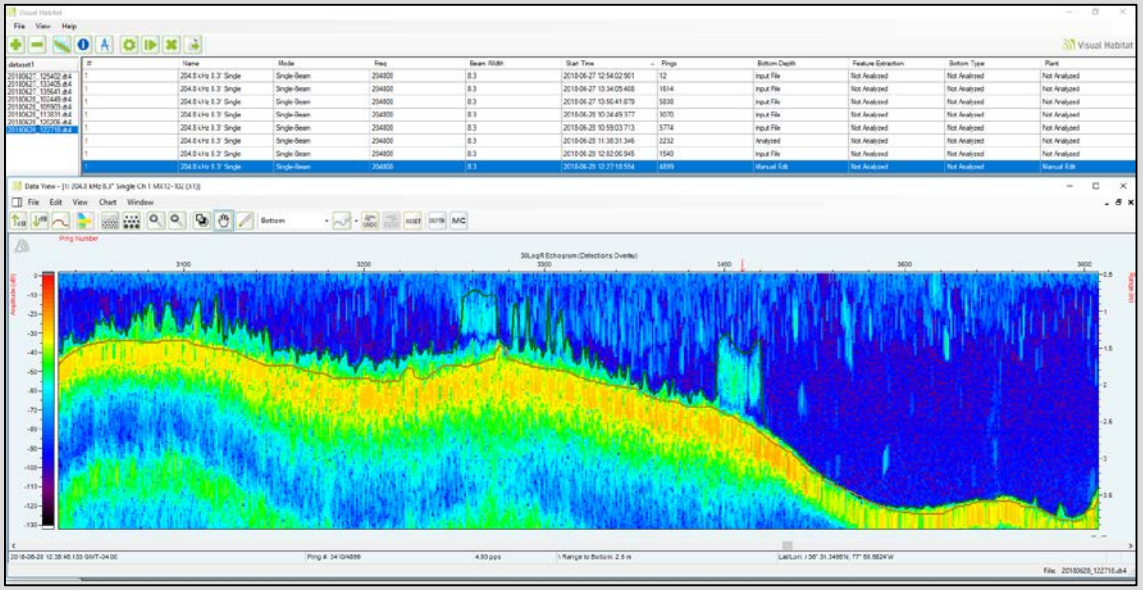




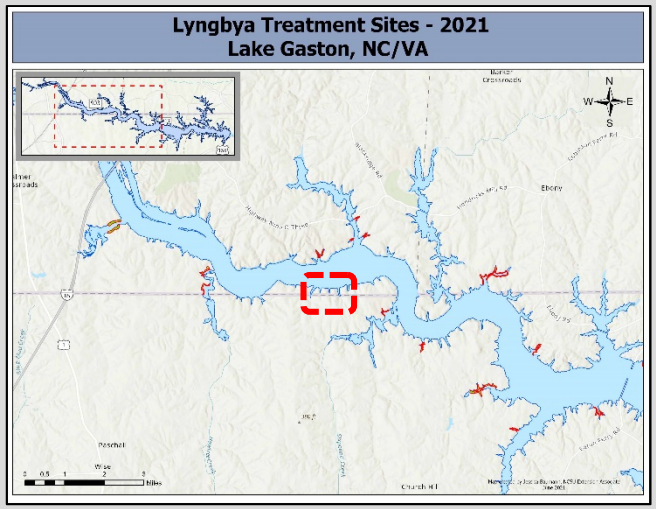
Lyngbya Treatments

Methods of Evaluation:

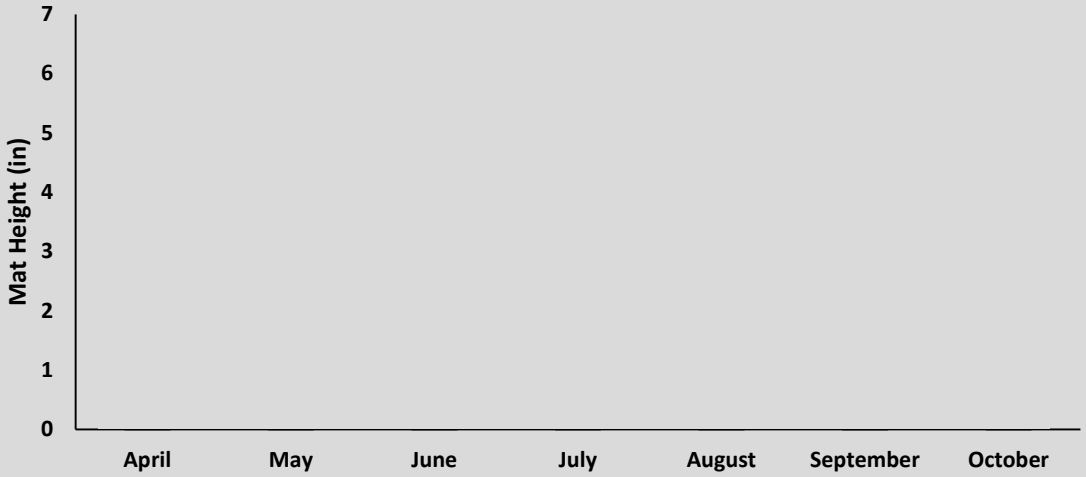
- **Monthly Biosonic Scans (March – December)**
- **Viability Samples (December)**

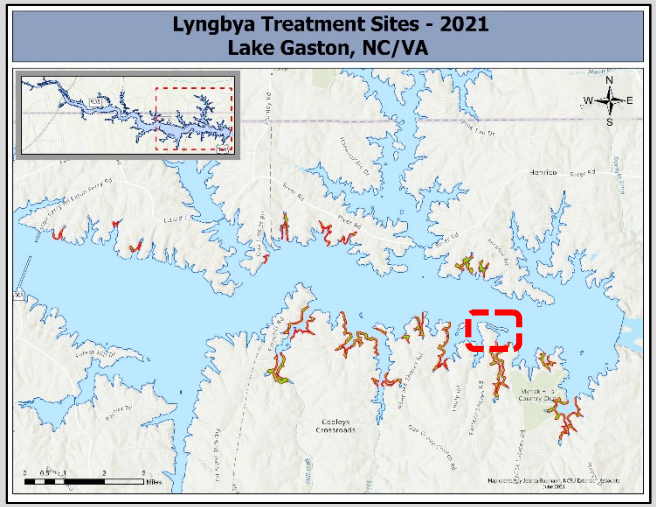


2021 Lyngbya Treatments



Upper Control





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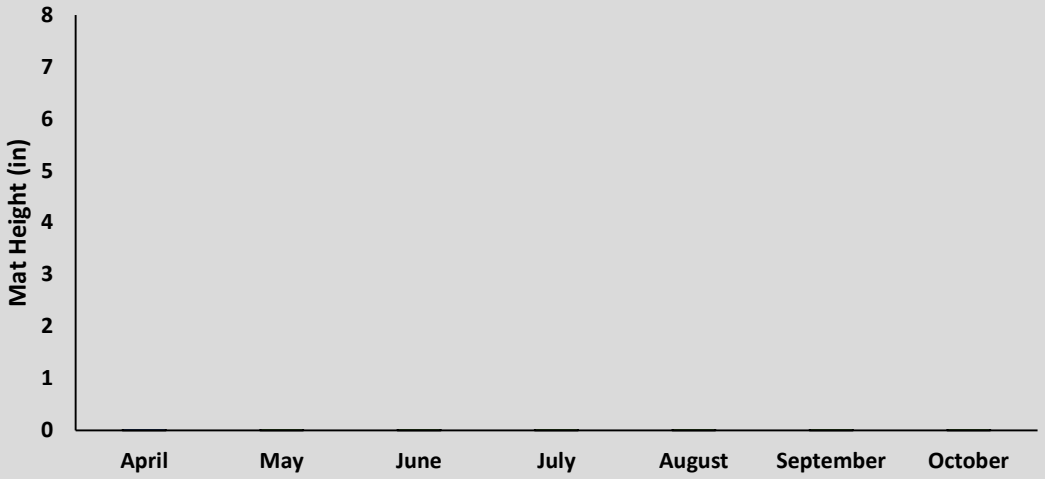
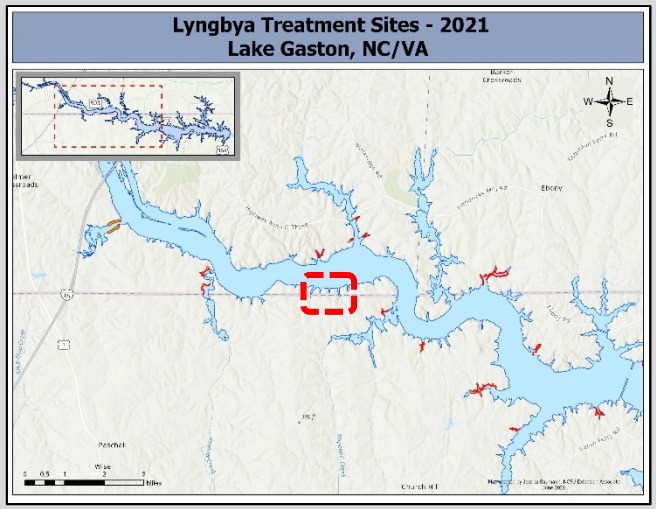
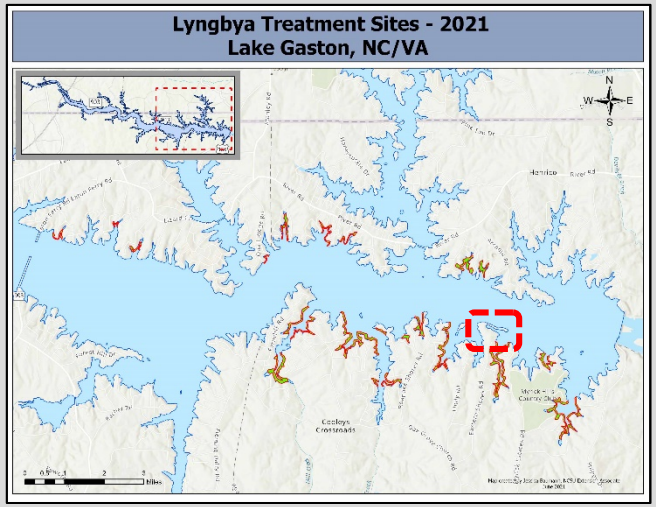
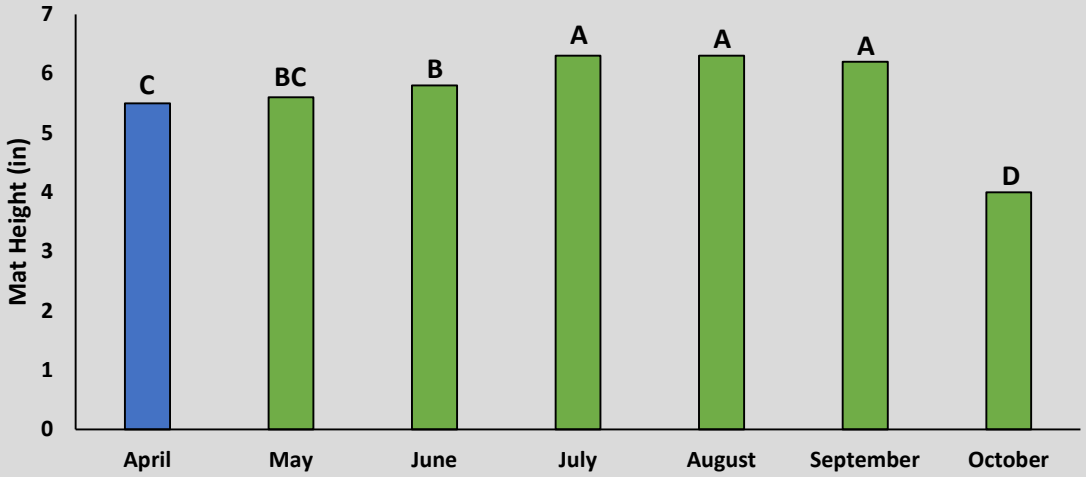


2021 Lyngbya Treatments





Upper Control



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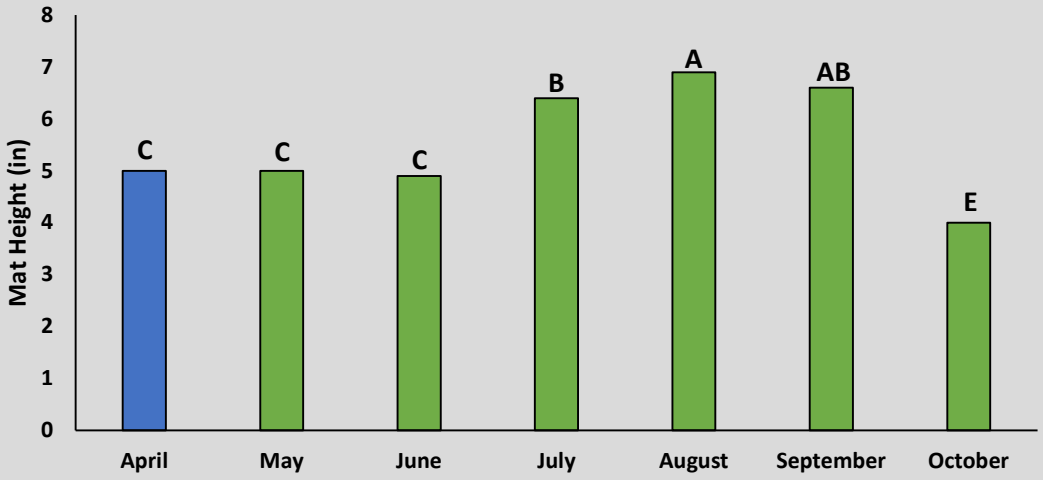
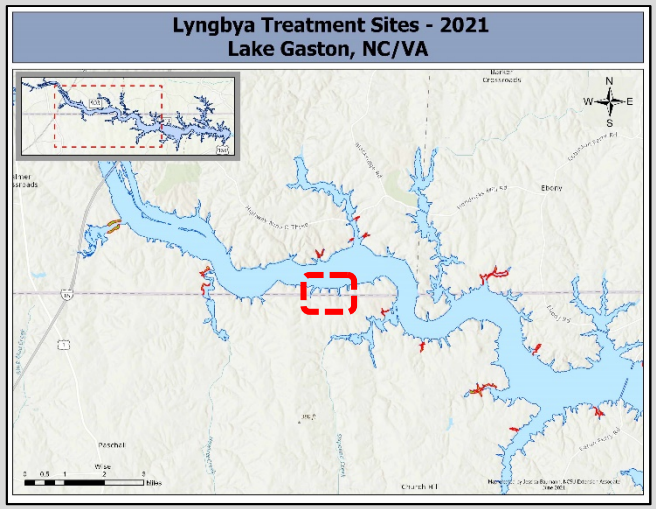
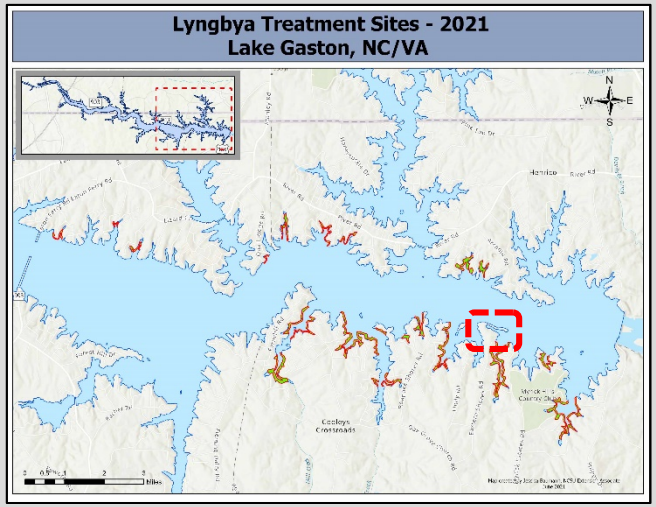
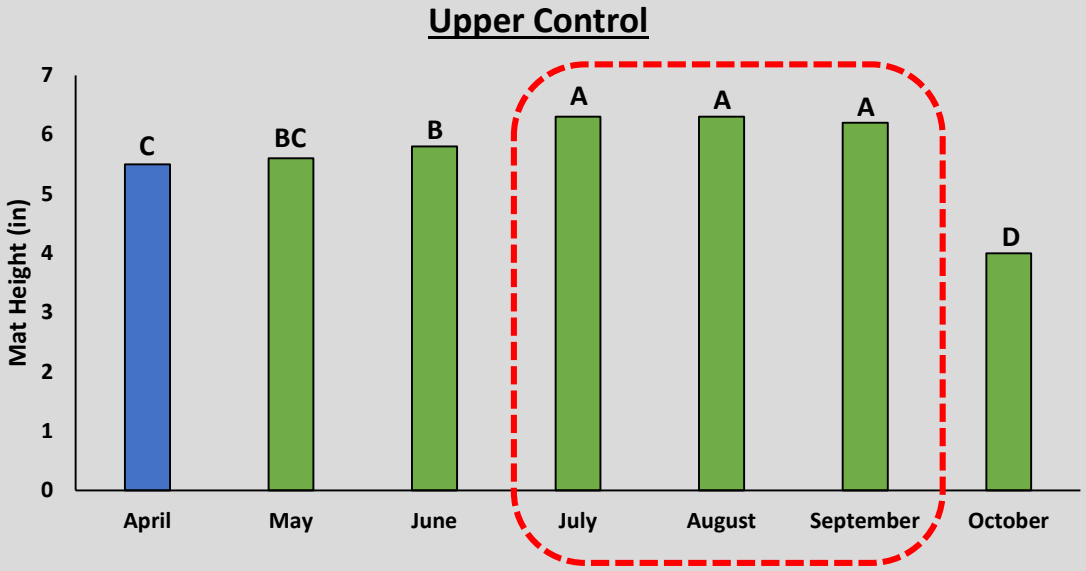
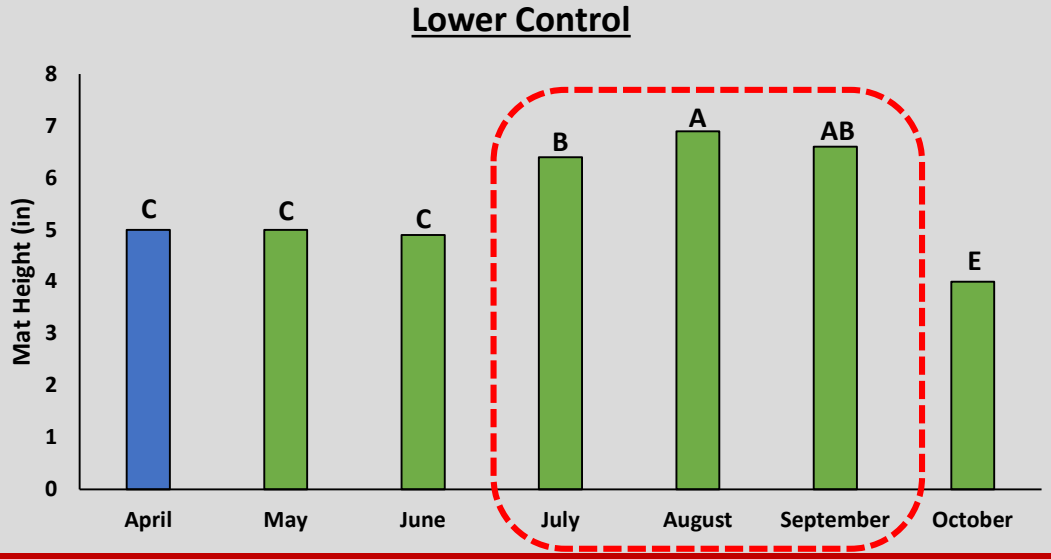


2021 Lyngbya Treatments

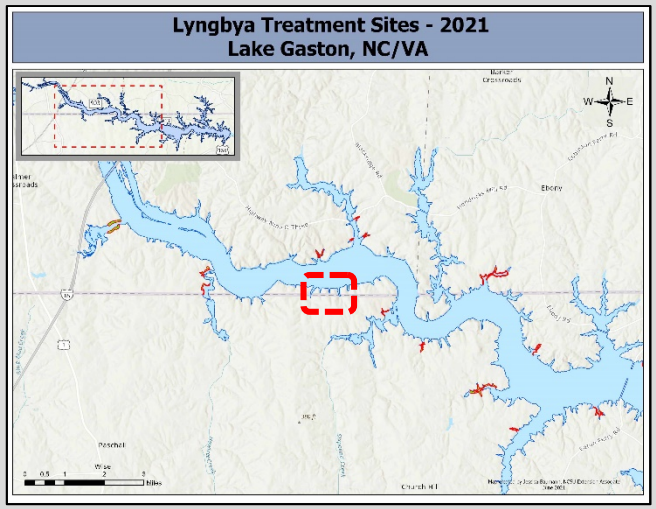


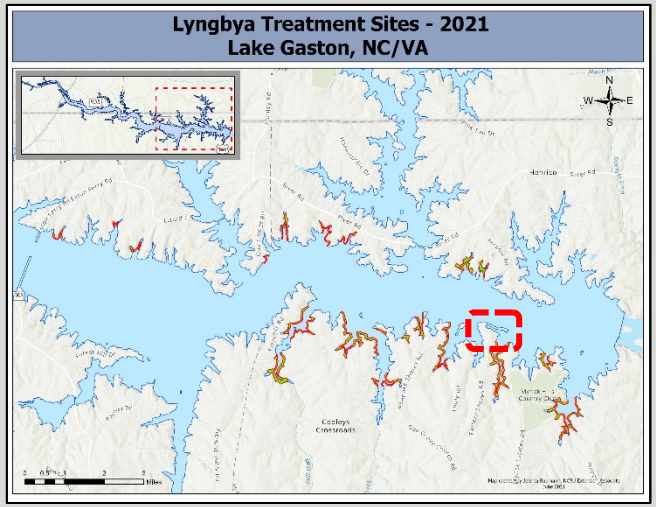


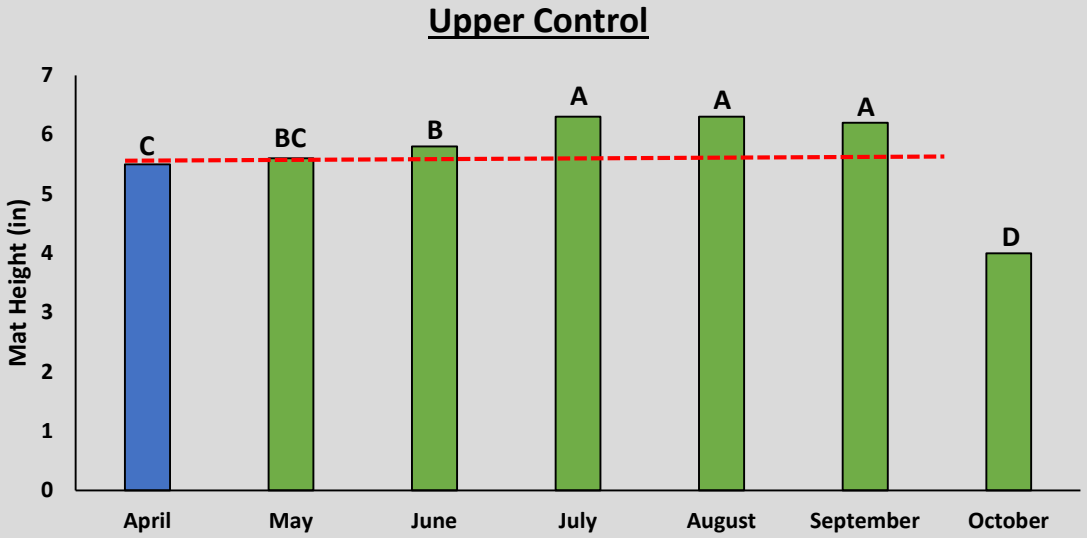


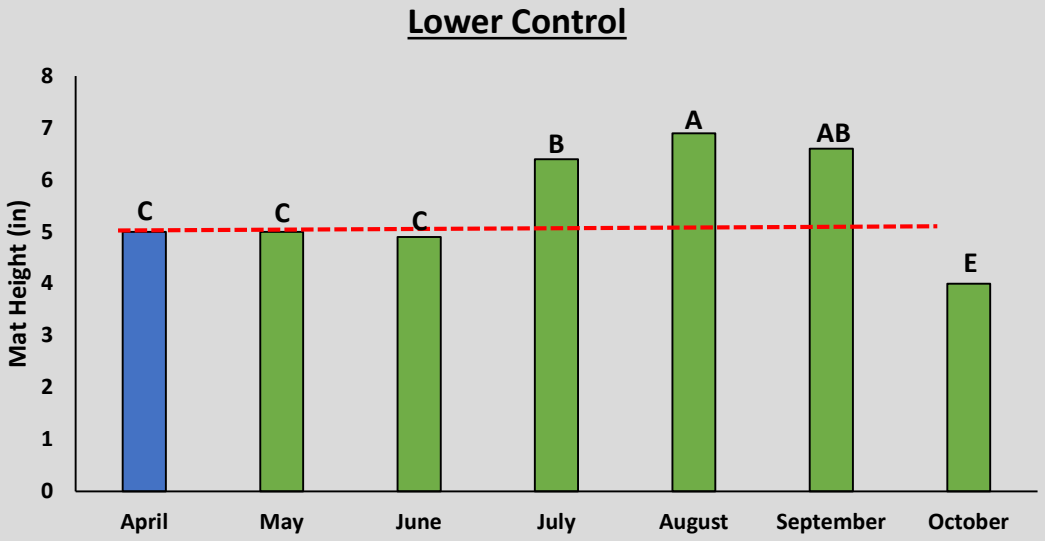


2021 Lyngbya Treatments









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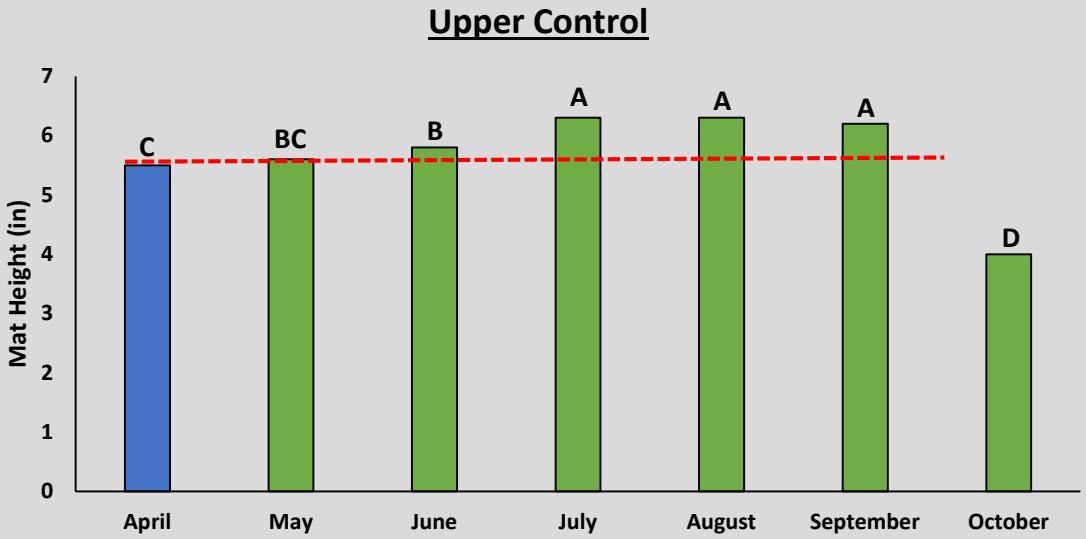
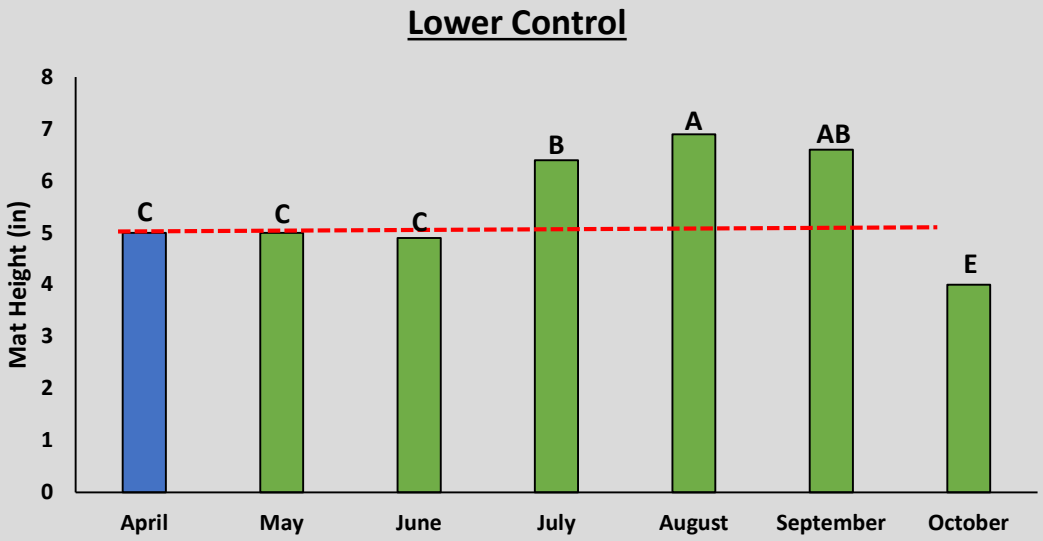
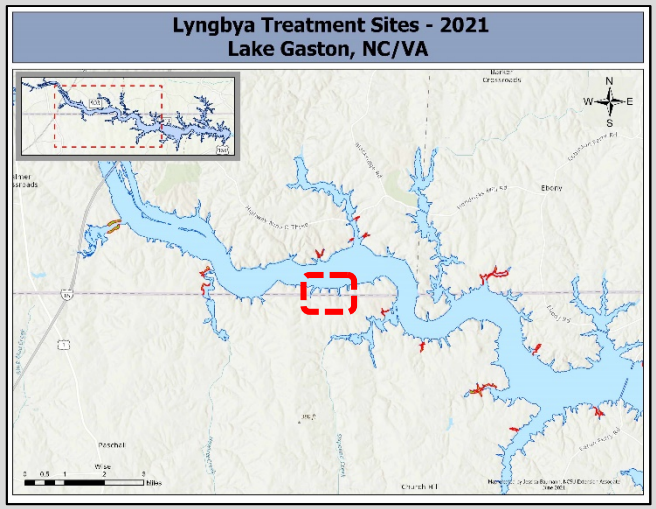
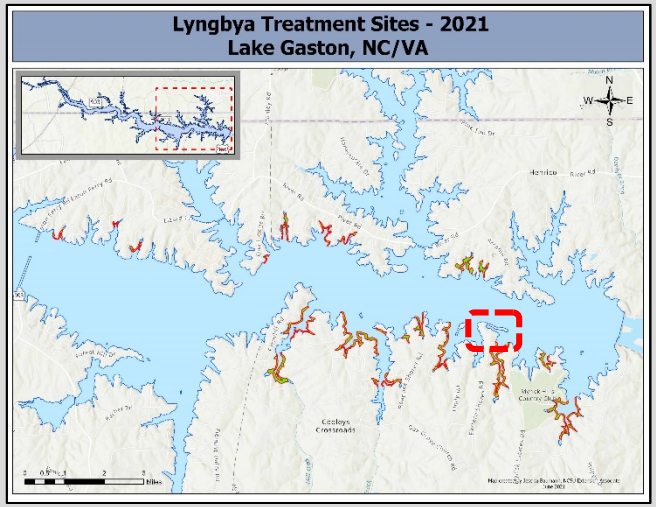
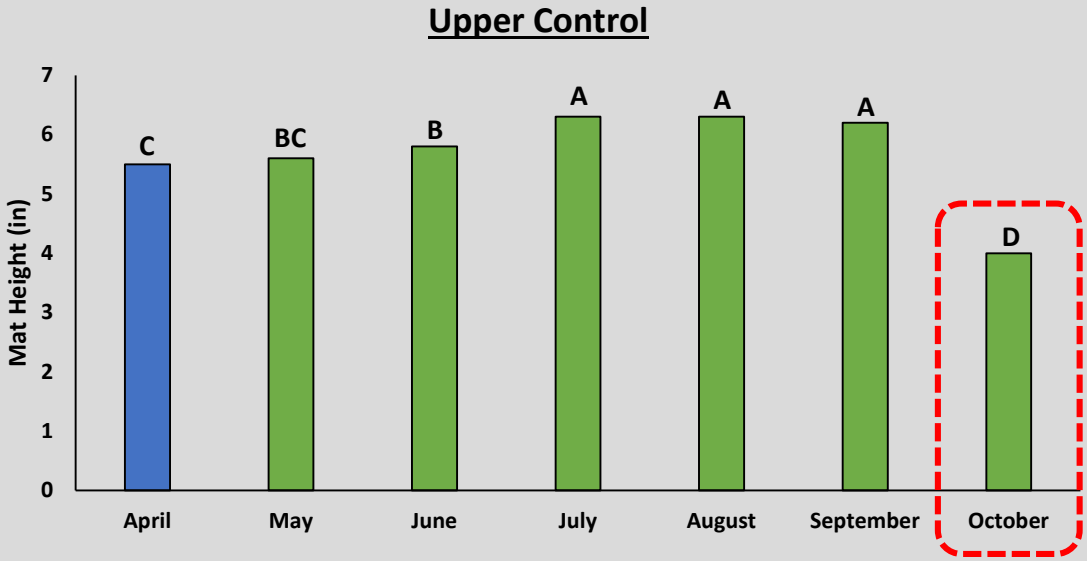


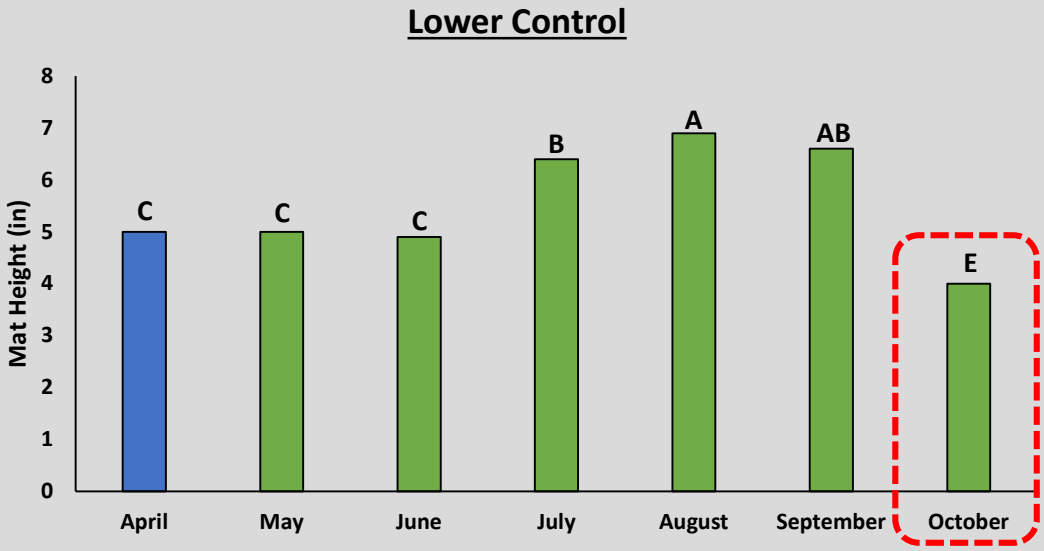


2021 Lyngbya Treatments



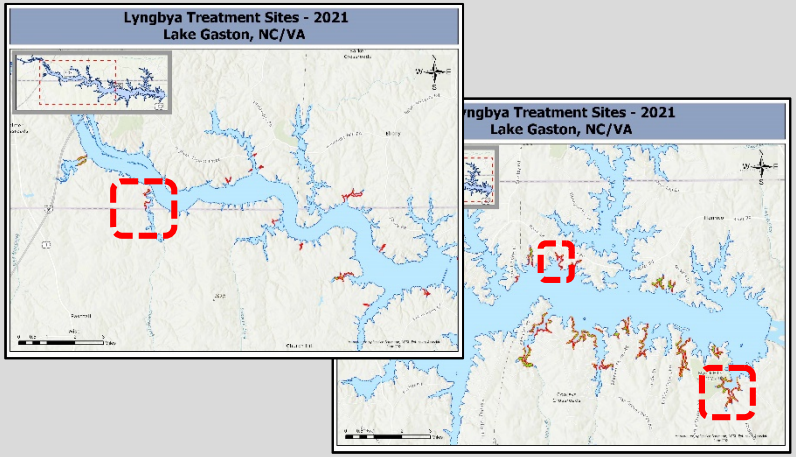




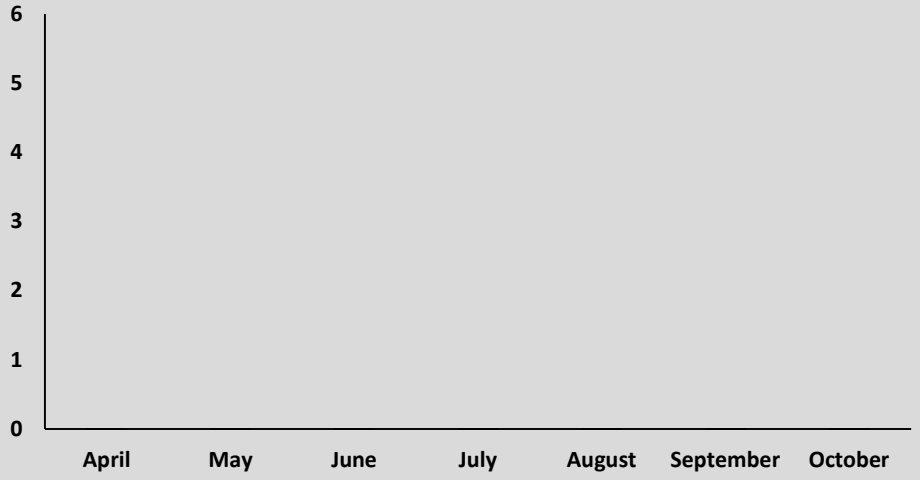


2021 Lyngbya Treatments

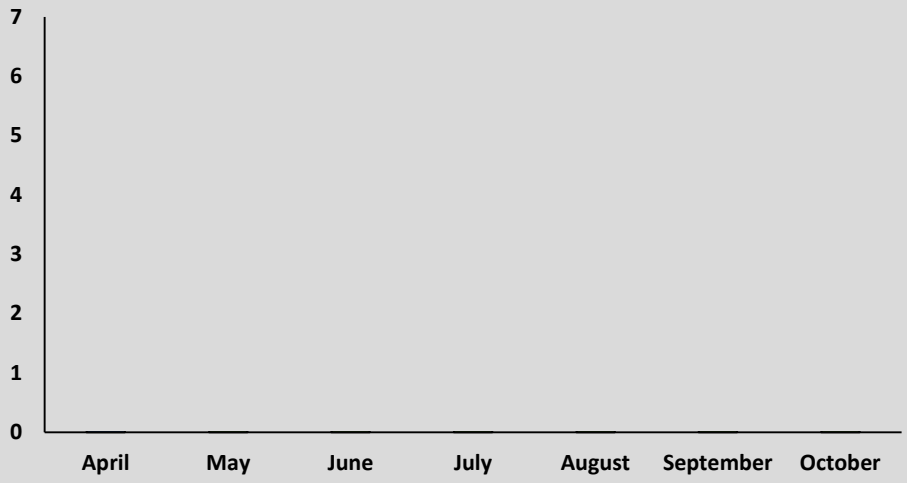
Captain XRT + AMP



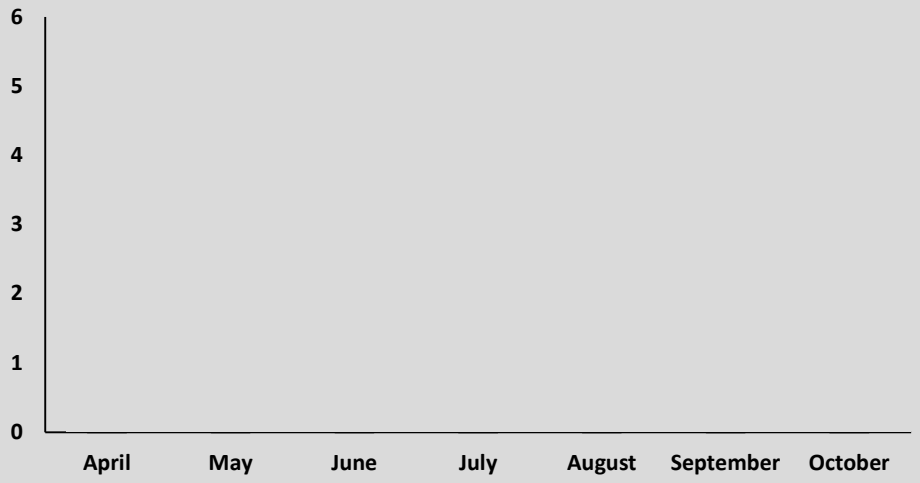
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

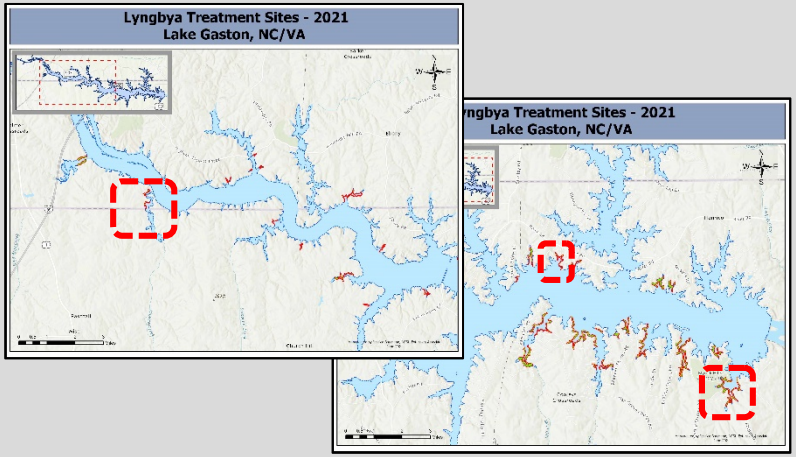


Lees Creek – Multi-year

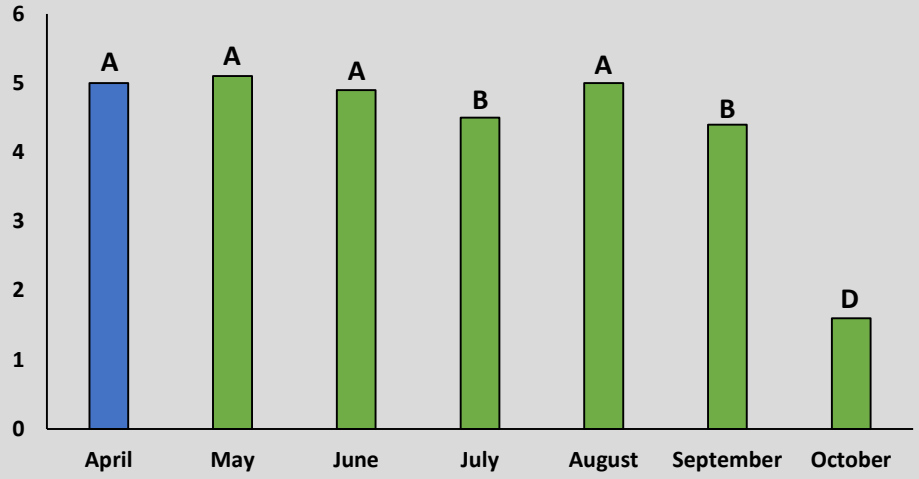


2021 Lyngbya Treatments

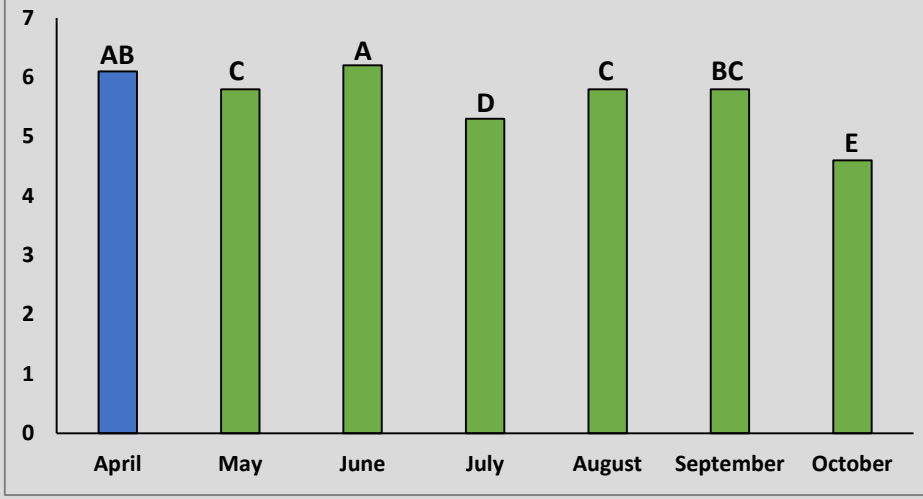
Captain XRT + AMP



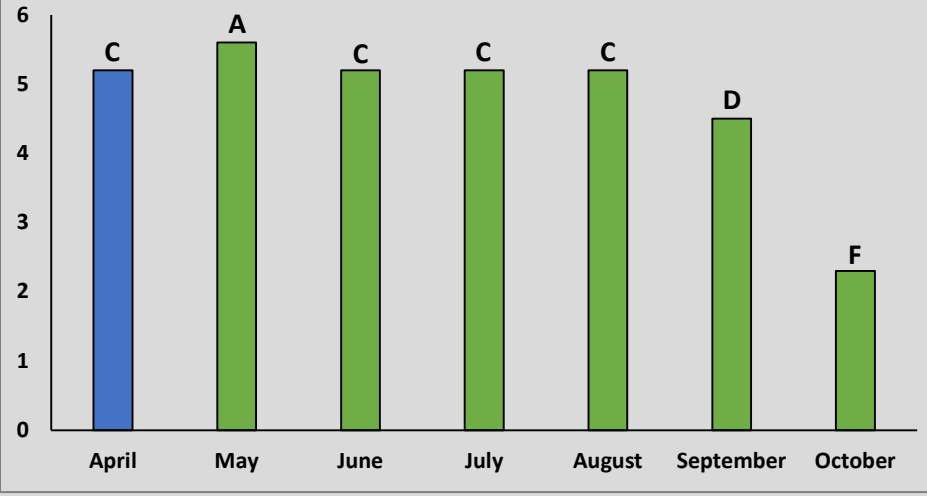
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

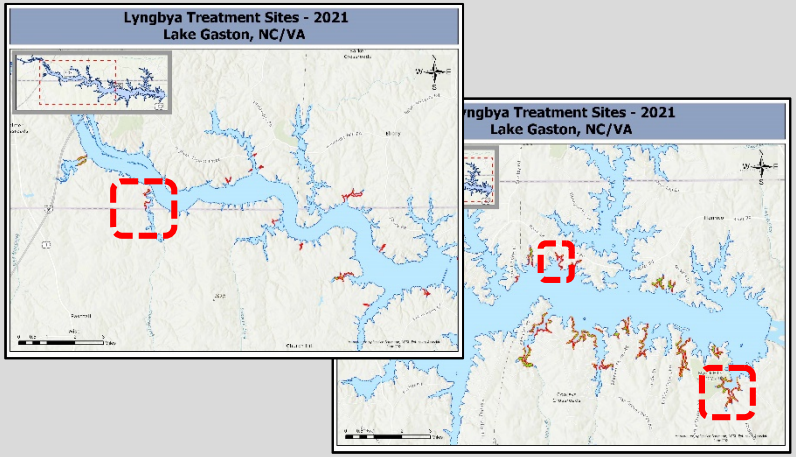


Lees Creek – Multi-year

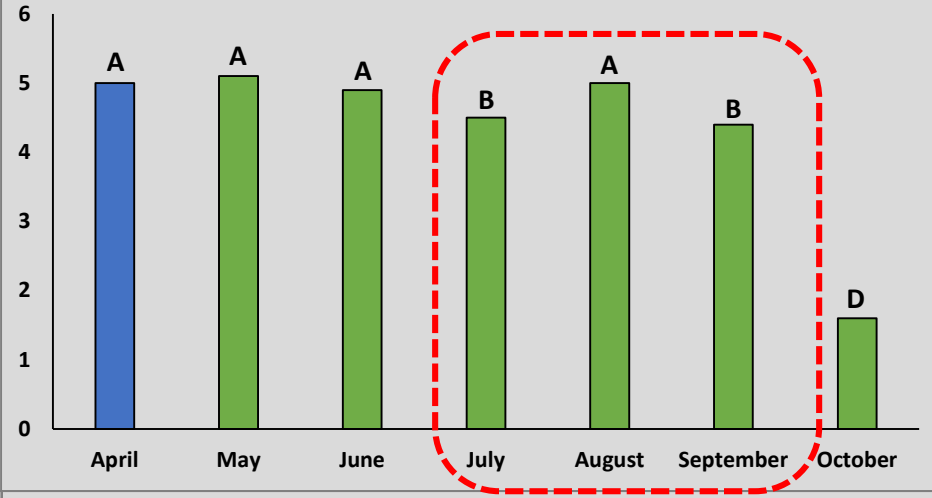


2021 Lyngbya Treatments

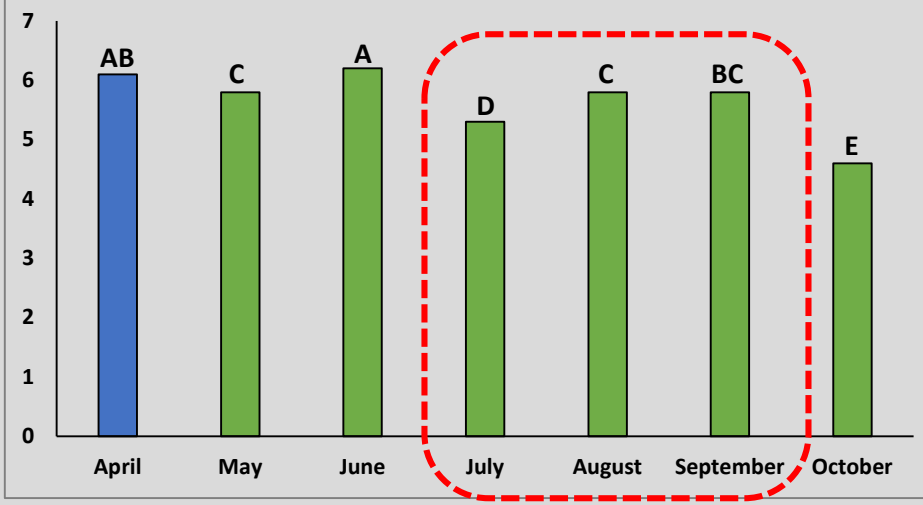
Captain XRT + AMP



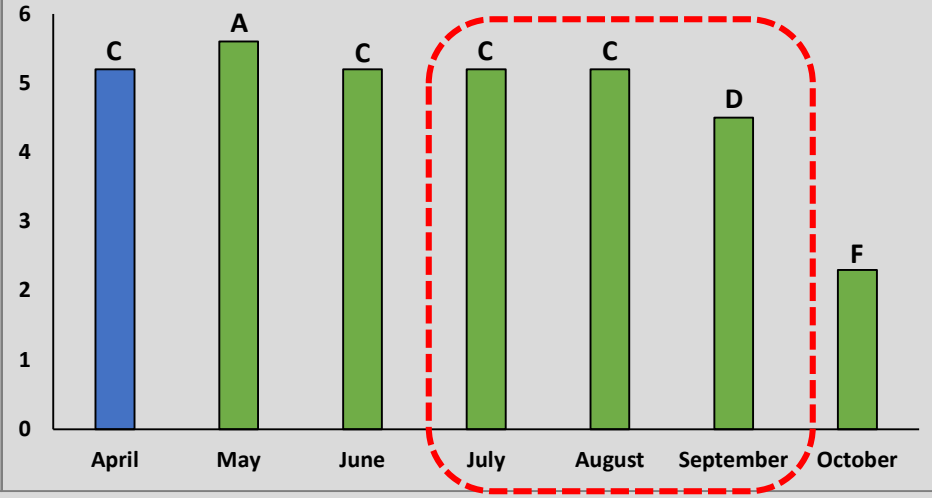
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

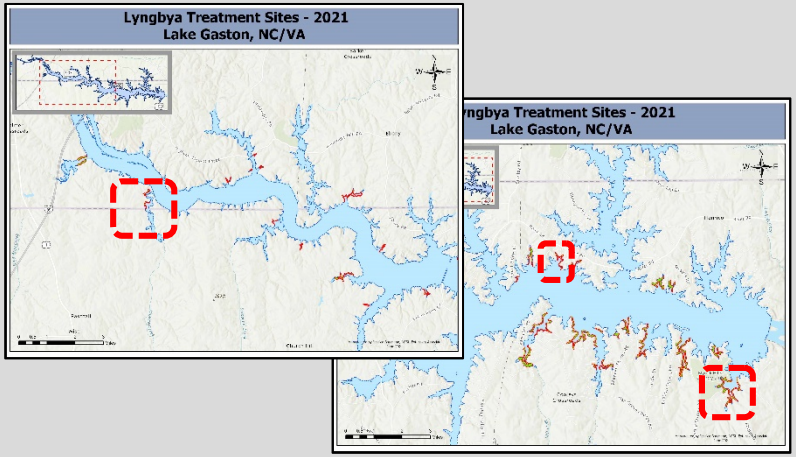


Lees Creek – Multi-year

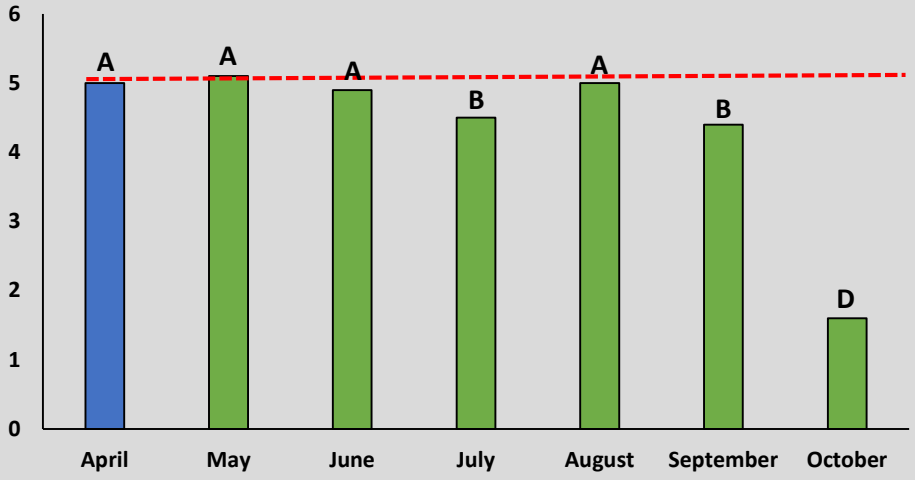


2021 Lyngbya Treatments

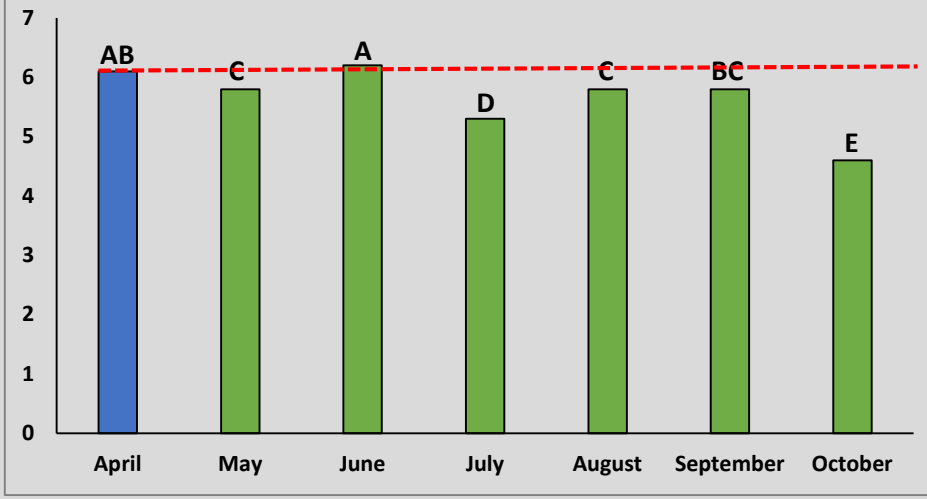
Captain XRT + AMP



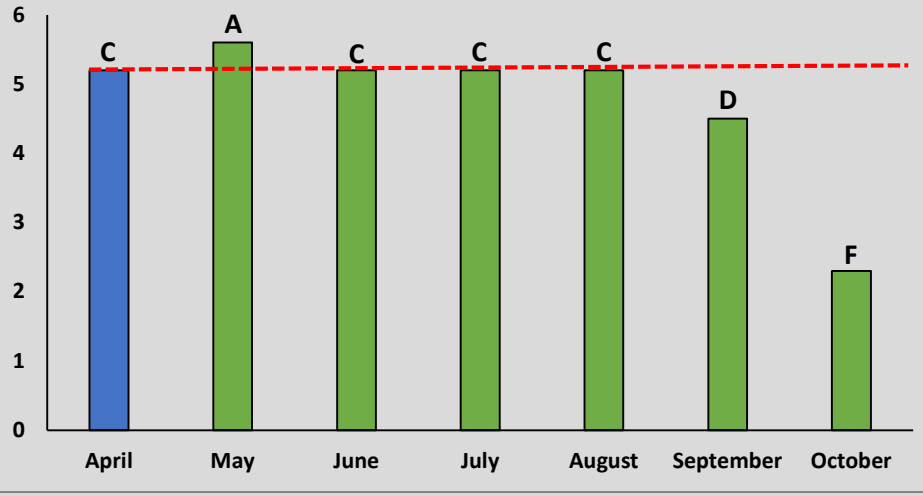
Site 18 Creek – 1st Year



Hawtree Creek - Experimental



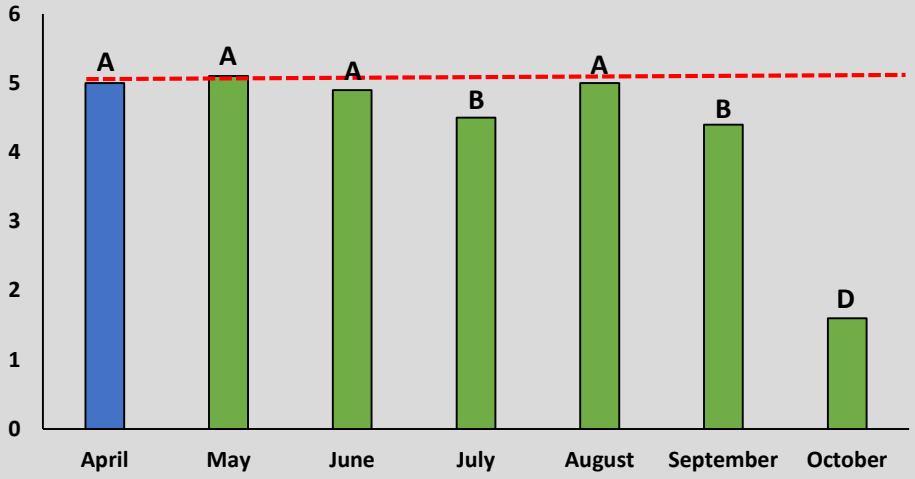
Lees Creek – Multi-year



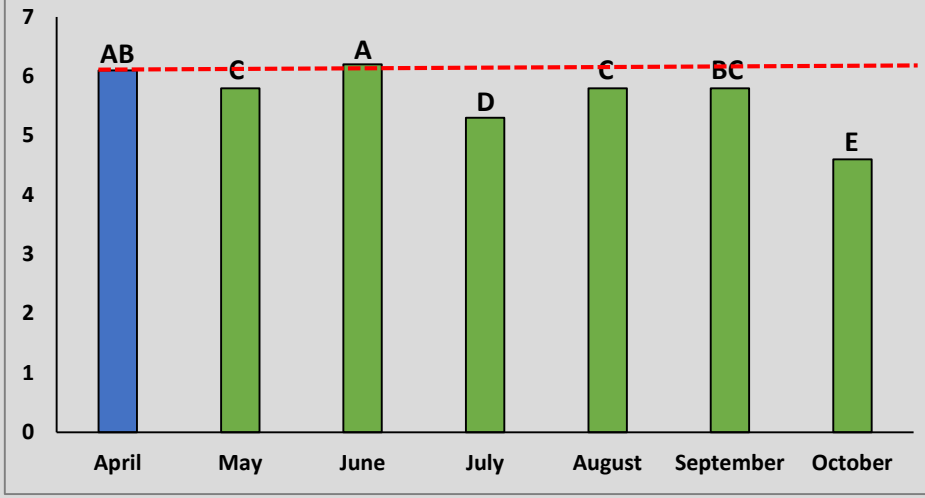
2021 Lyngbya Treatments

Captain XRT + AMP

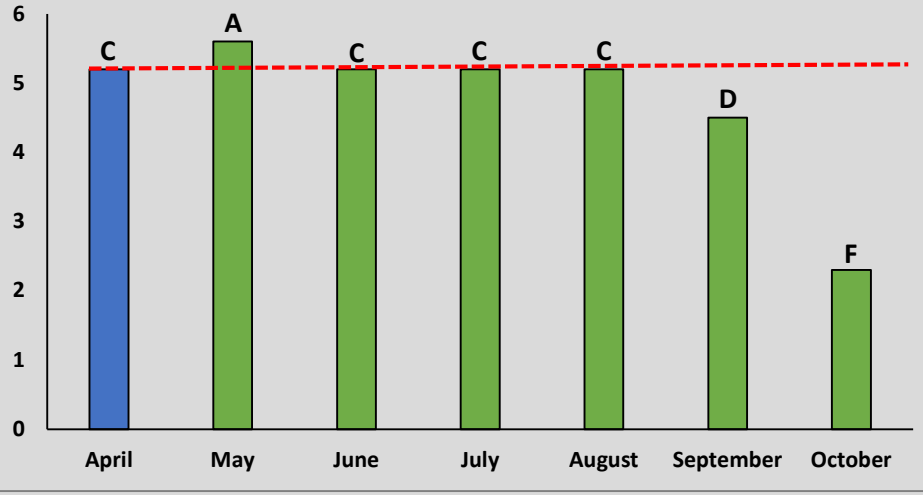
Site 18 Creek – 1st Year



Hawtree Creek - Experimental

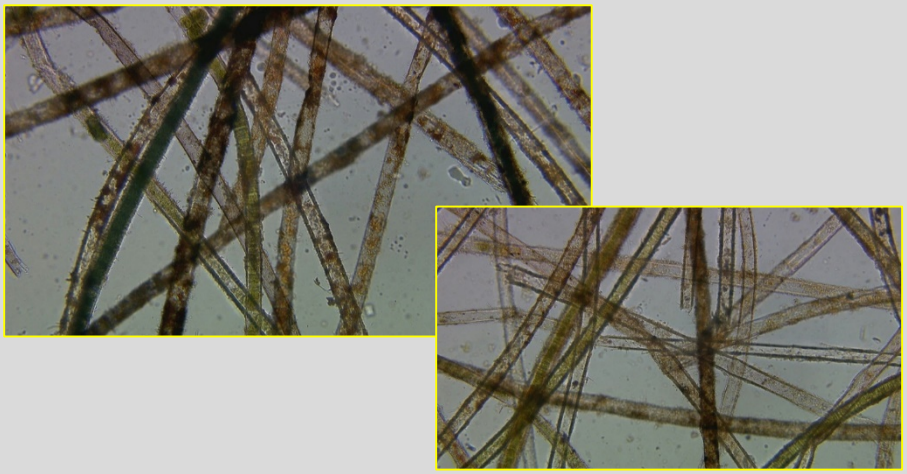


Lees Creek – Multi-year

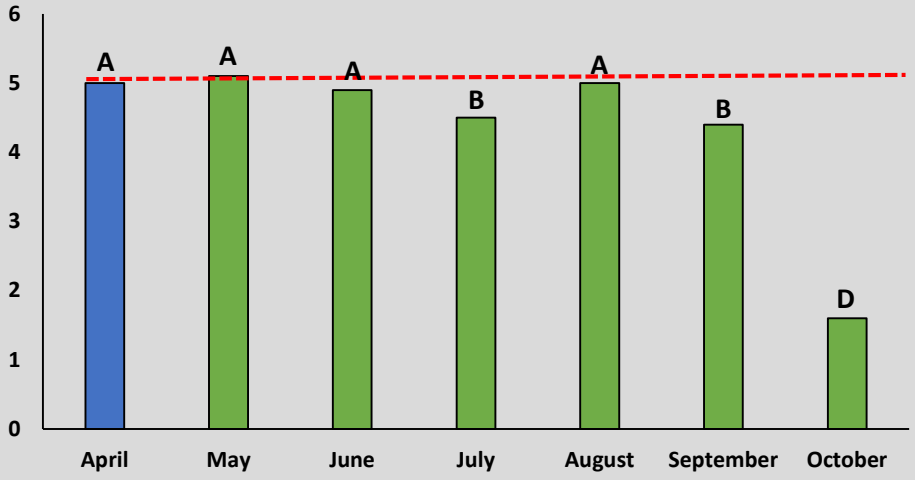


2021 Lyngbya Treatments

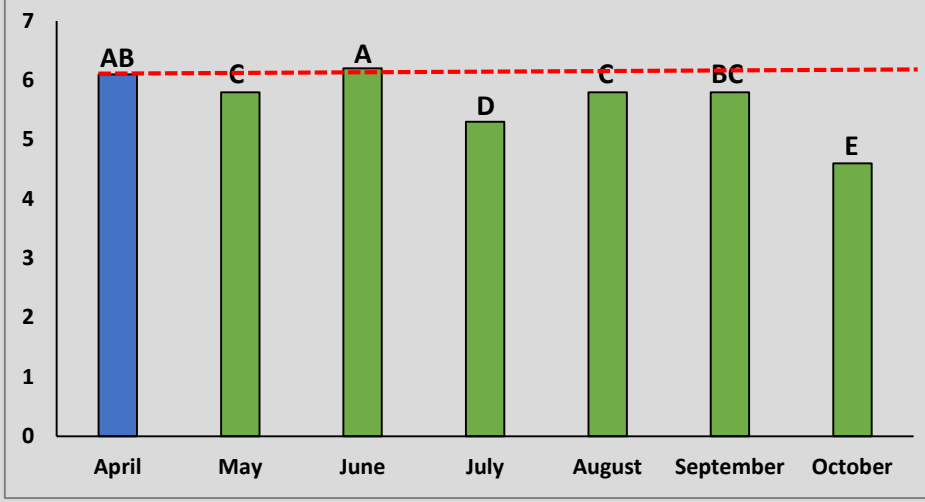
Captain XRT & AMP



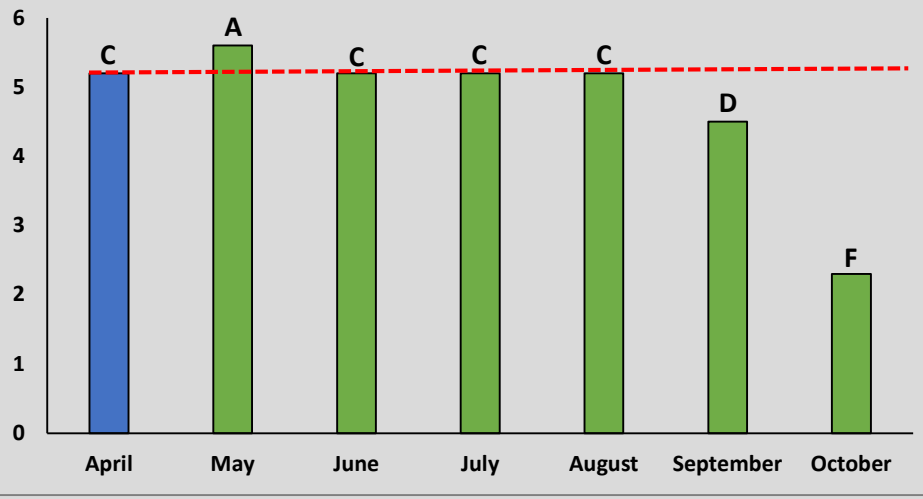
Site 18 Creek – 1st Year



Hawtree Creek - Experimental



Lees Creek – Multi-year



Lyngbya Treatments

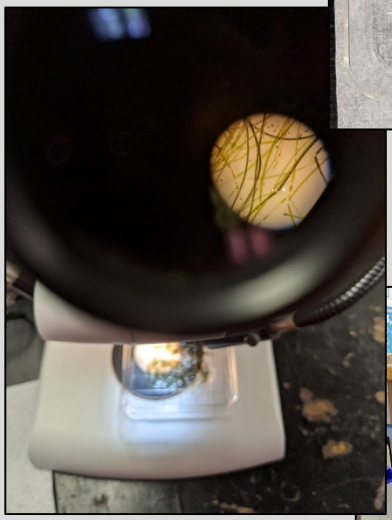
Methods of Evaluation:

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

2021 Lyngbya Treatments

Viability

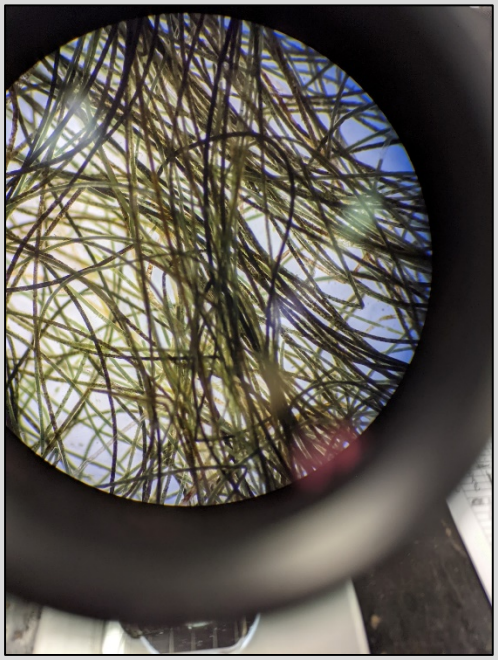
- Field samples were collected in December from:
  - Hawtree (experimental / multi-year)
  - Site 18 & 19 (1st Year)
  - Controls
- Samples were collected from two sites within each treatment area
- Two samples from each site were analyzed
- Viability was quantified by two separate readers

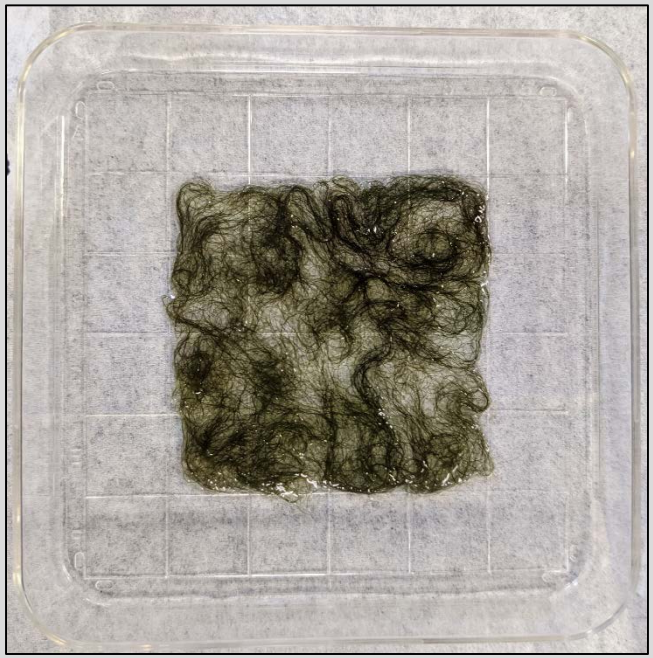


2021 Lyngbya Treatments

Viability

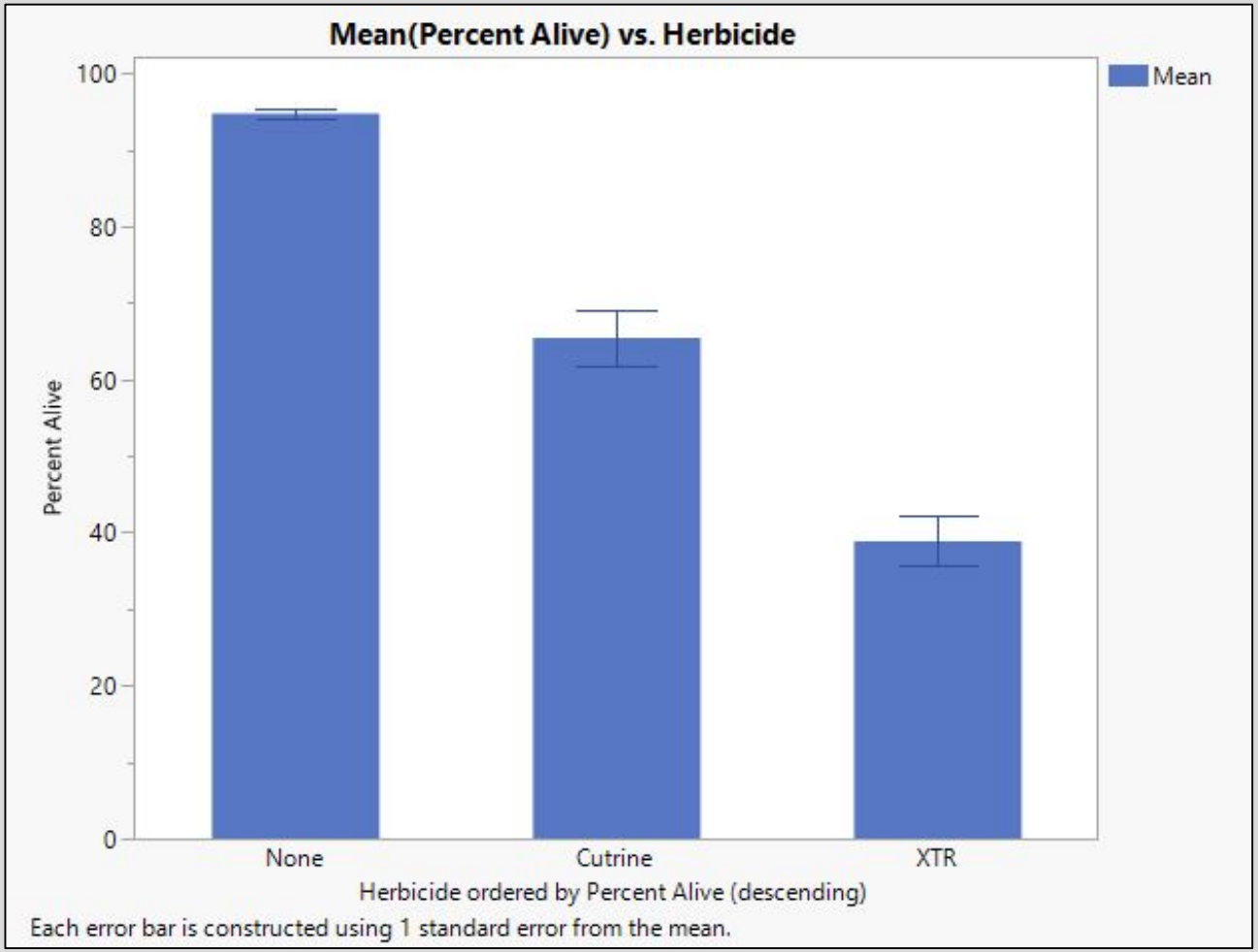
Determine what percent of the lyngbya in the viewing area was alive





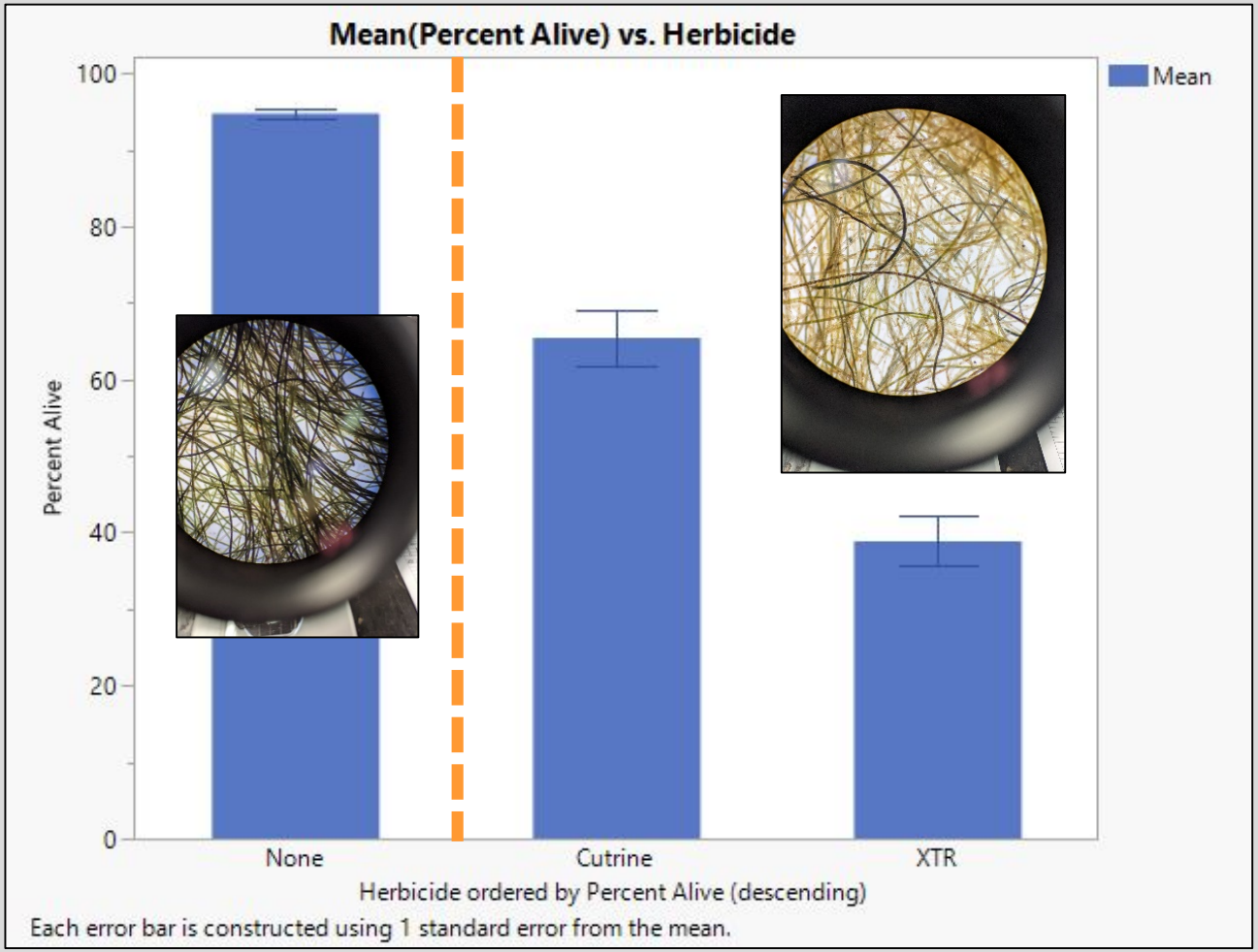
2021 Lyngbya Treatments

Viability – Overall Results



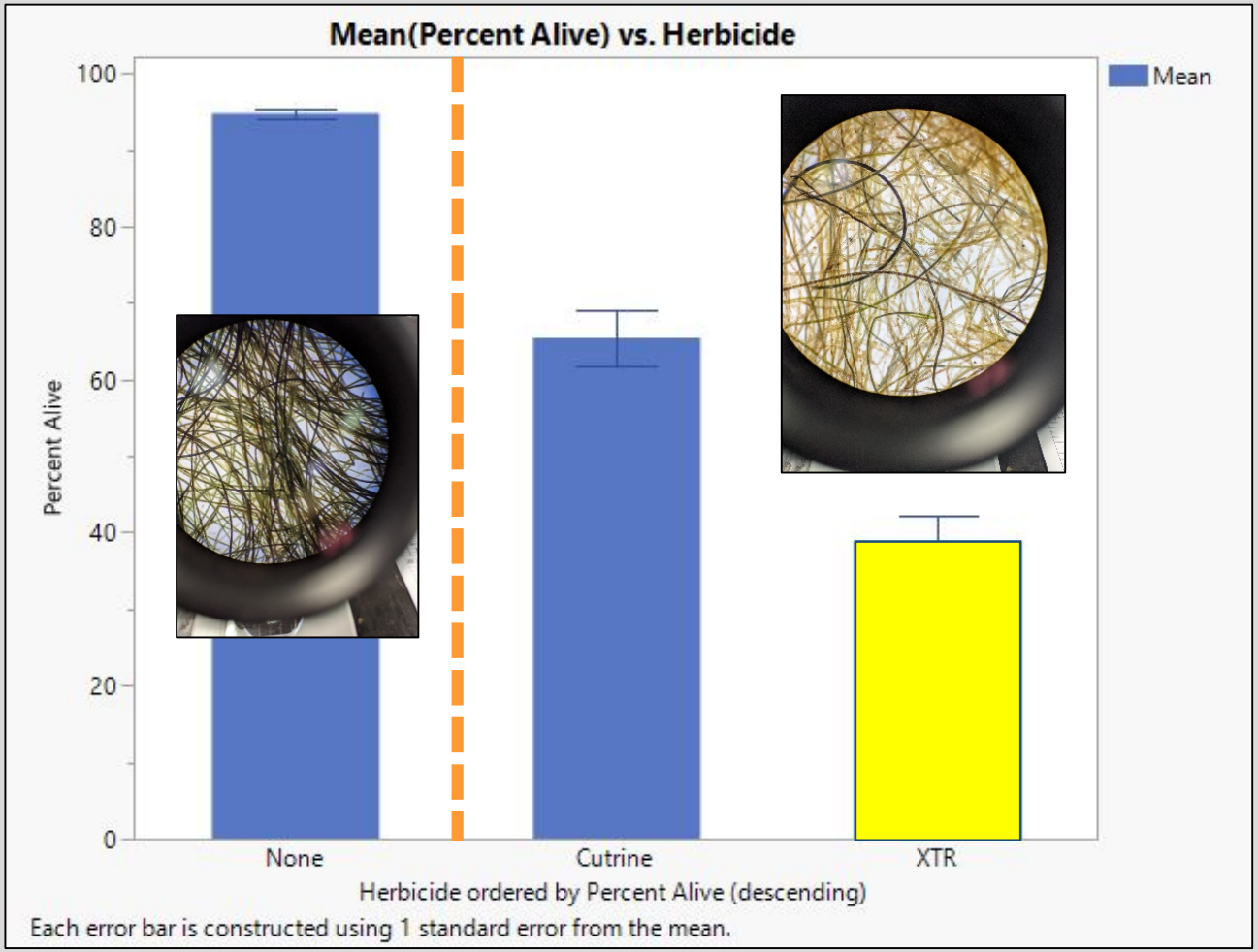
2021 Lyngbya Treatments

Viability – Overall Results



2021 Lyngbya Treatments

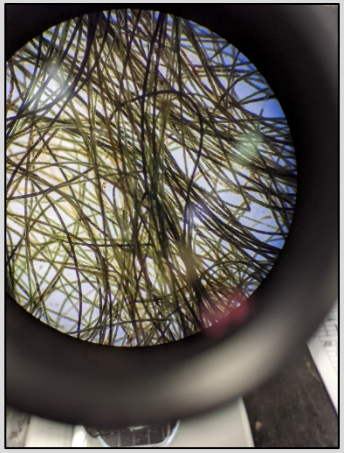
Viability – Overall Results



2021 Lyngbya Treatments

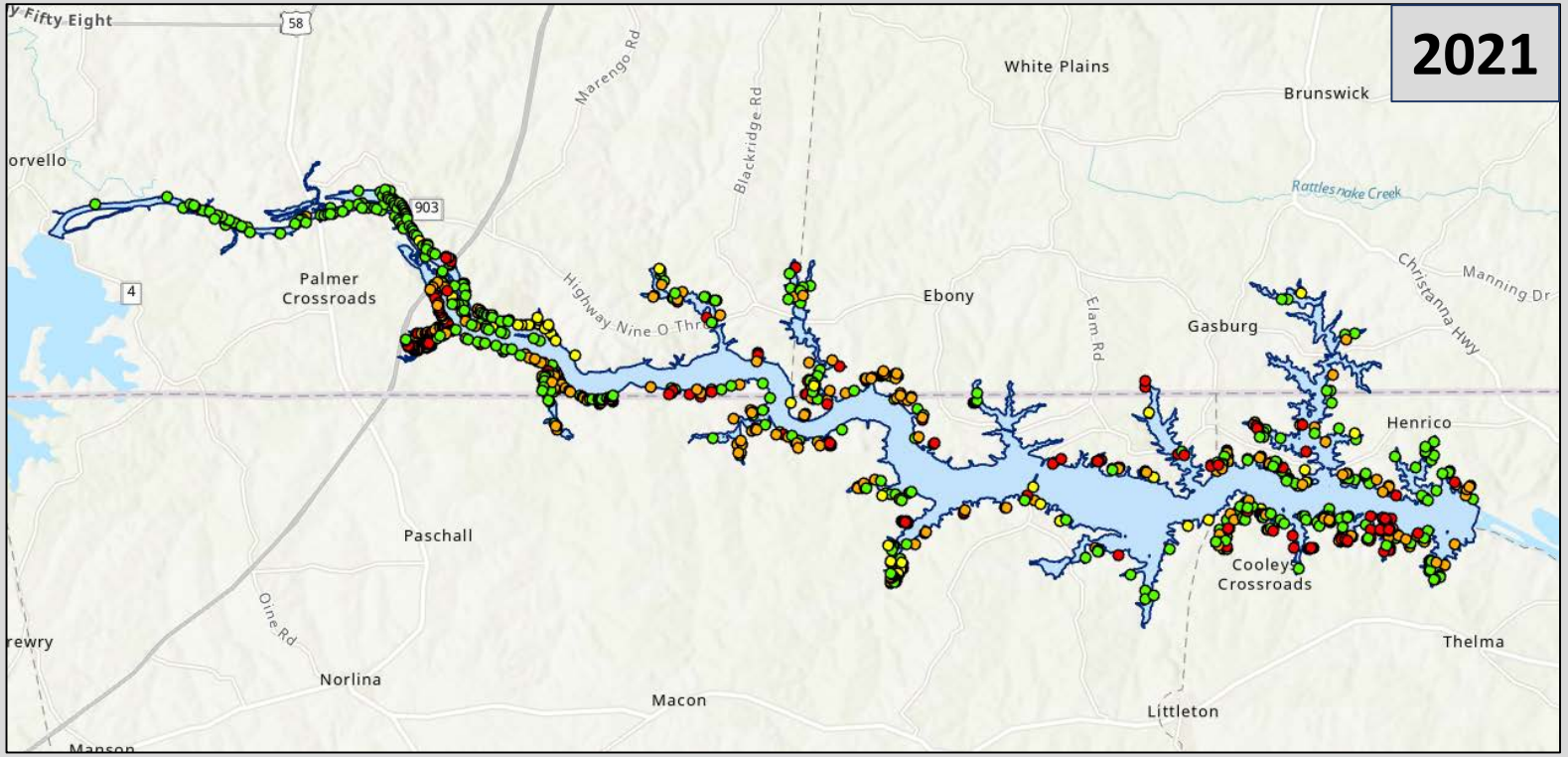
2021 Lyngbya Treatments were successful!

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



2021 Lyngbya Survey

2021 Survey Results

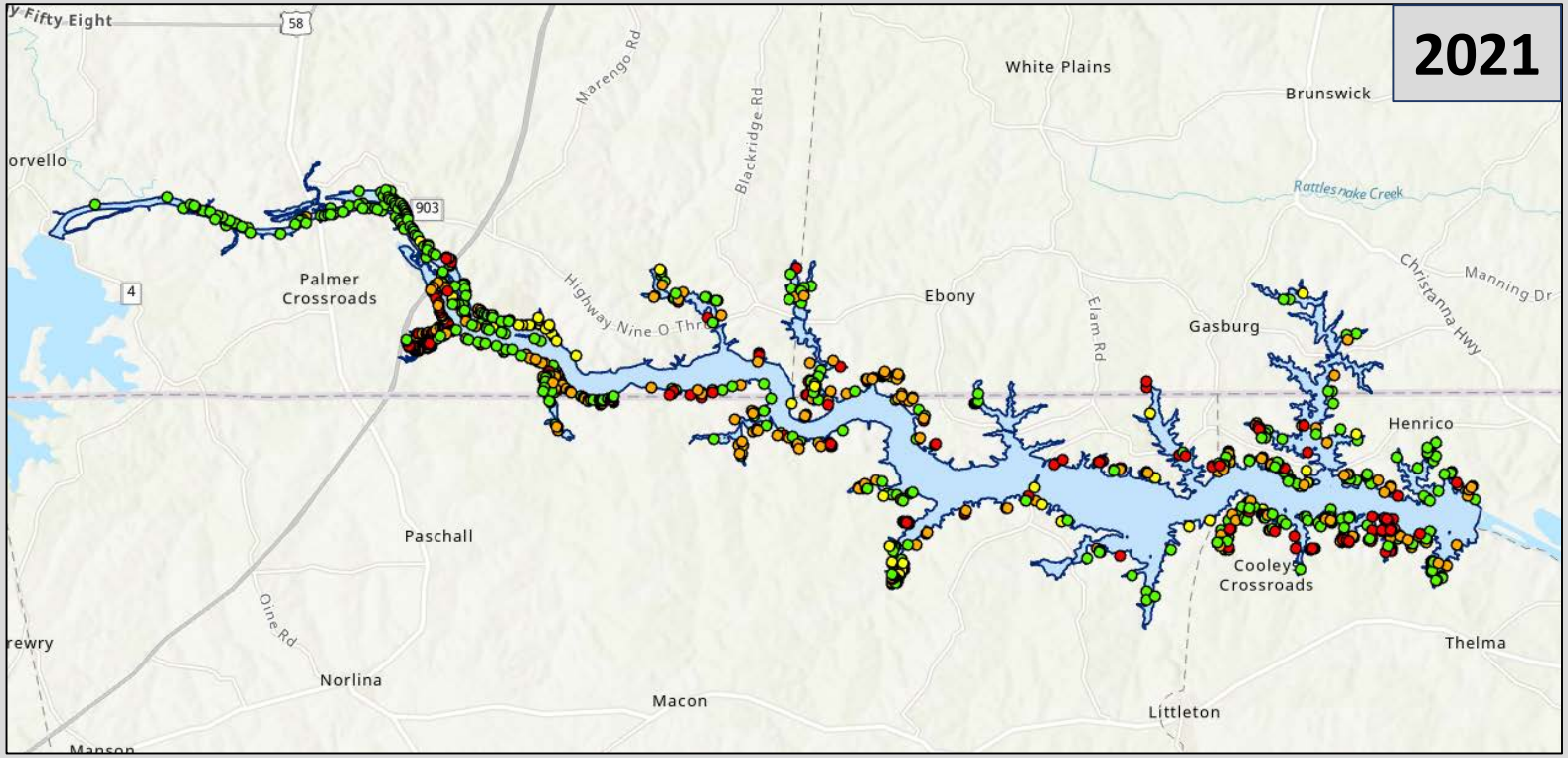


2021 Lyngbya Survey

2021 Survey Results

Total Vegetation: 27 %

Estimated Lyngbya Acreage: 1,317 acres



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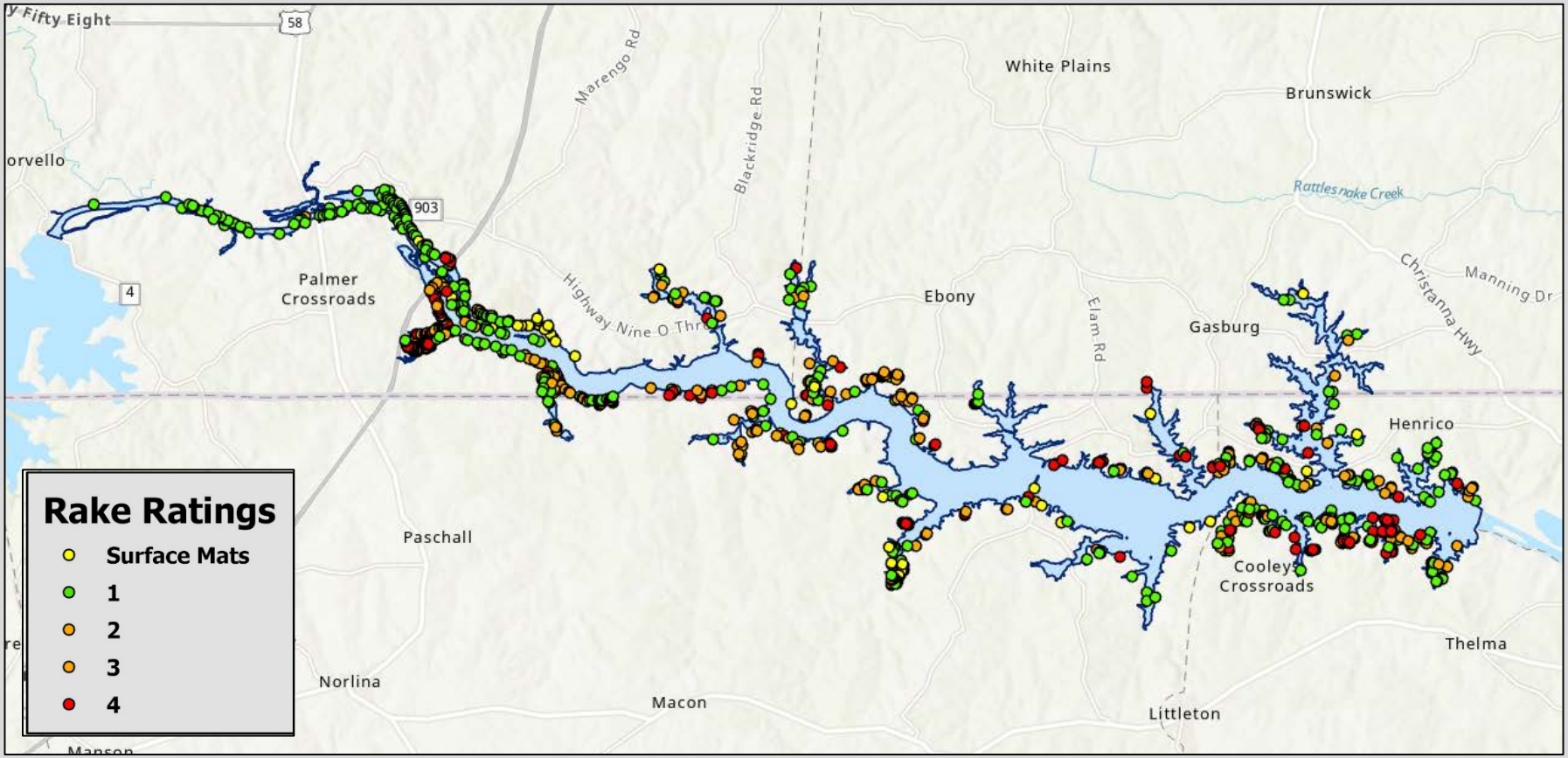

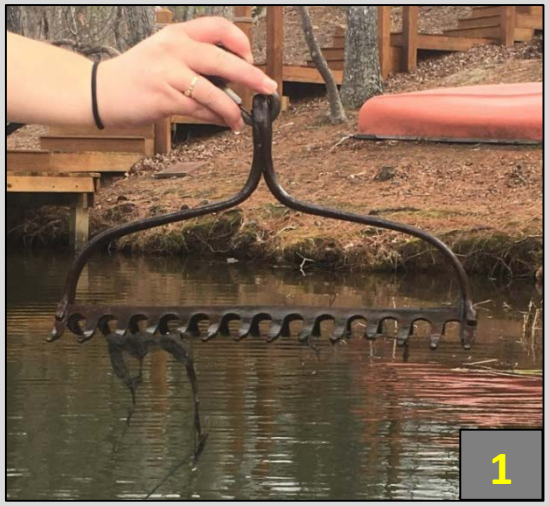
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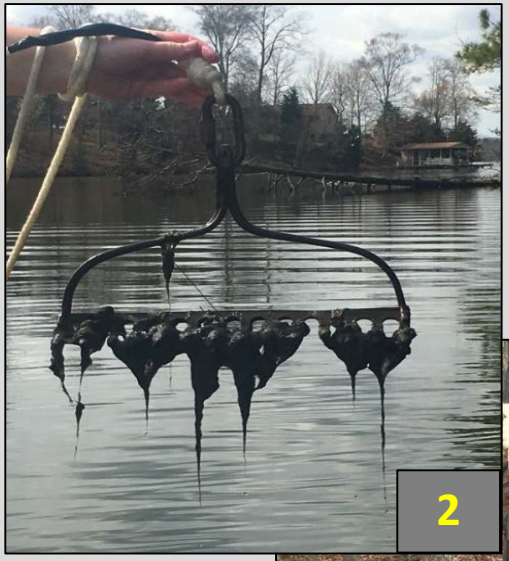
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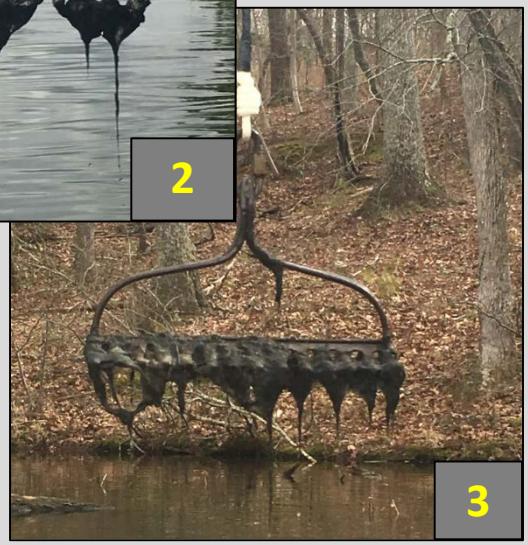
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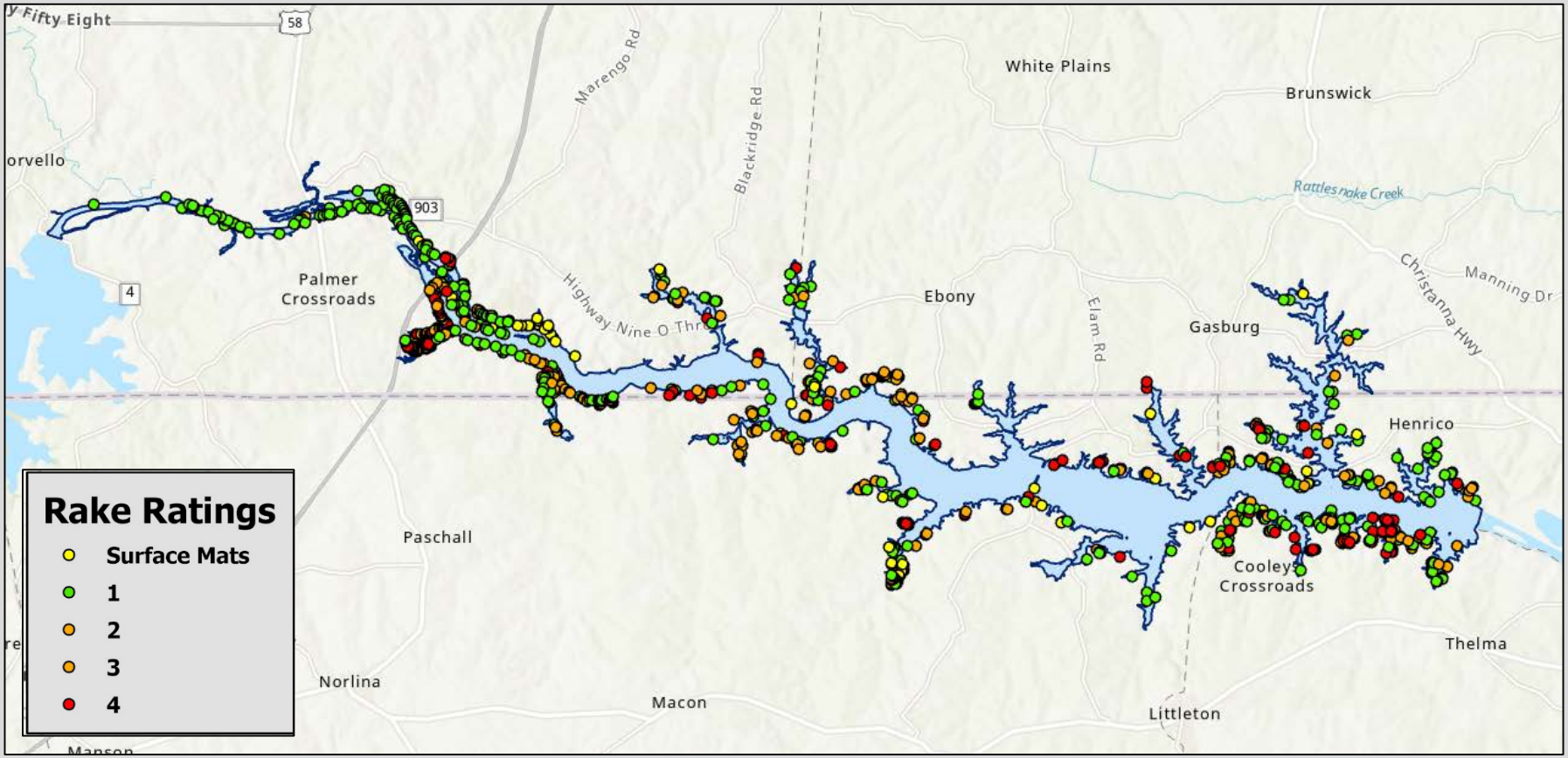
2021 Survey Results



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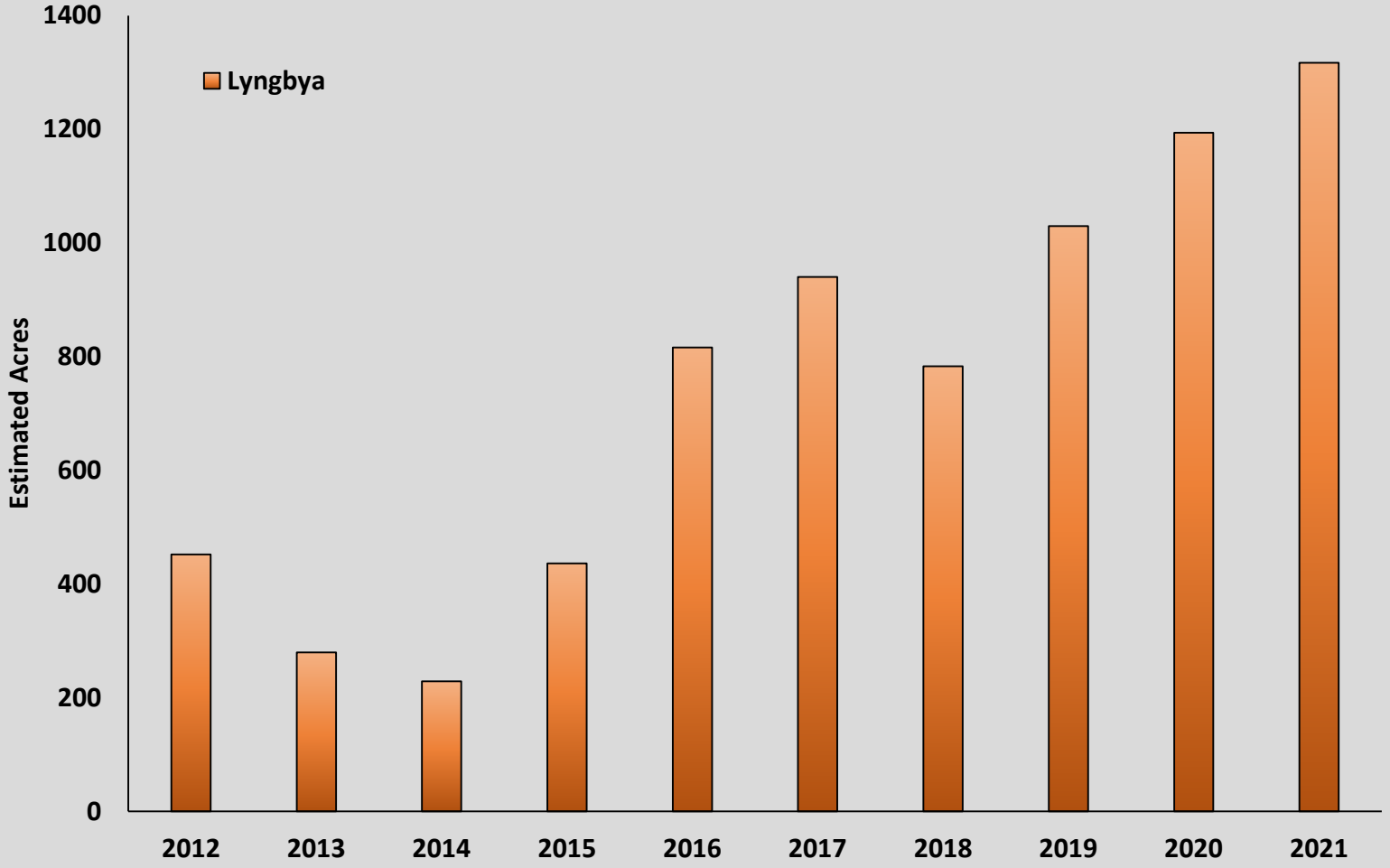

Lyngbya Treatments

2021 Survey Results

2022 Recommendation

Total Vegetation: 27 %

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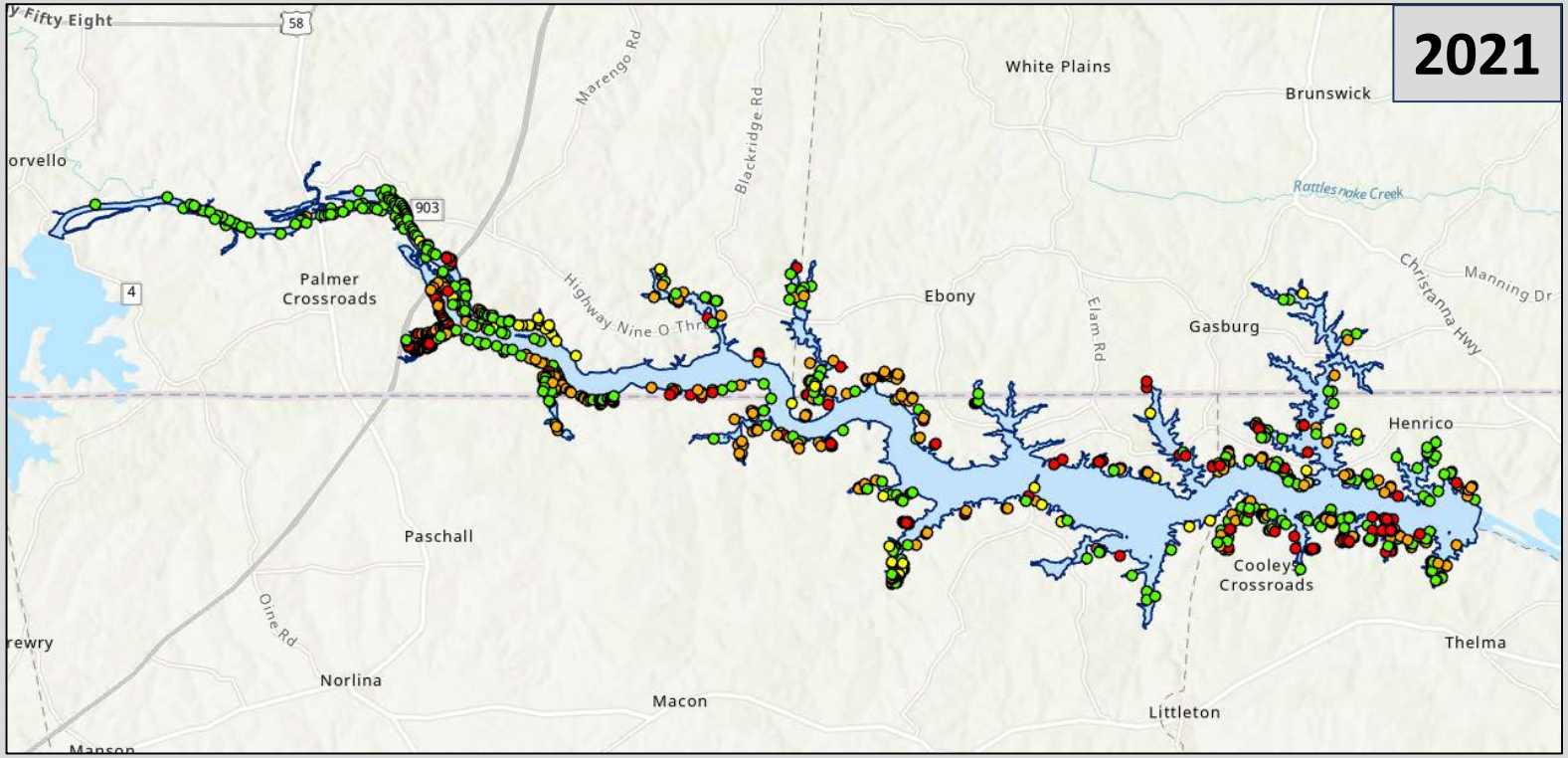

Lyngbya Treatments

2021 Survey Results

Total Vegetation: 27 %

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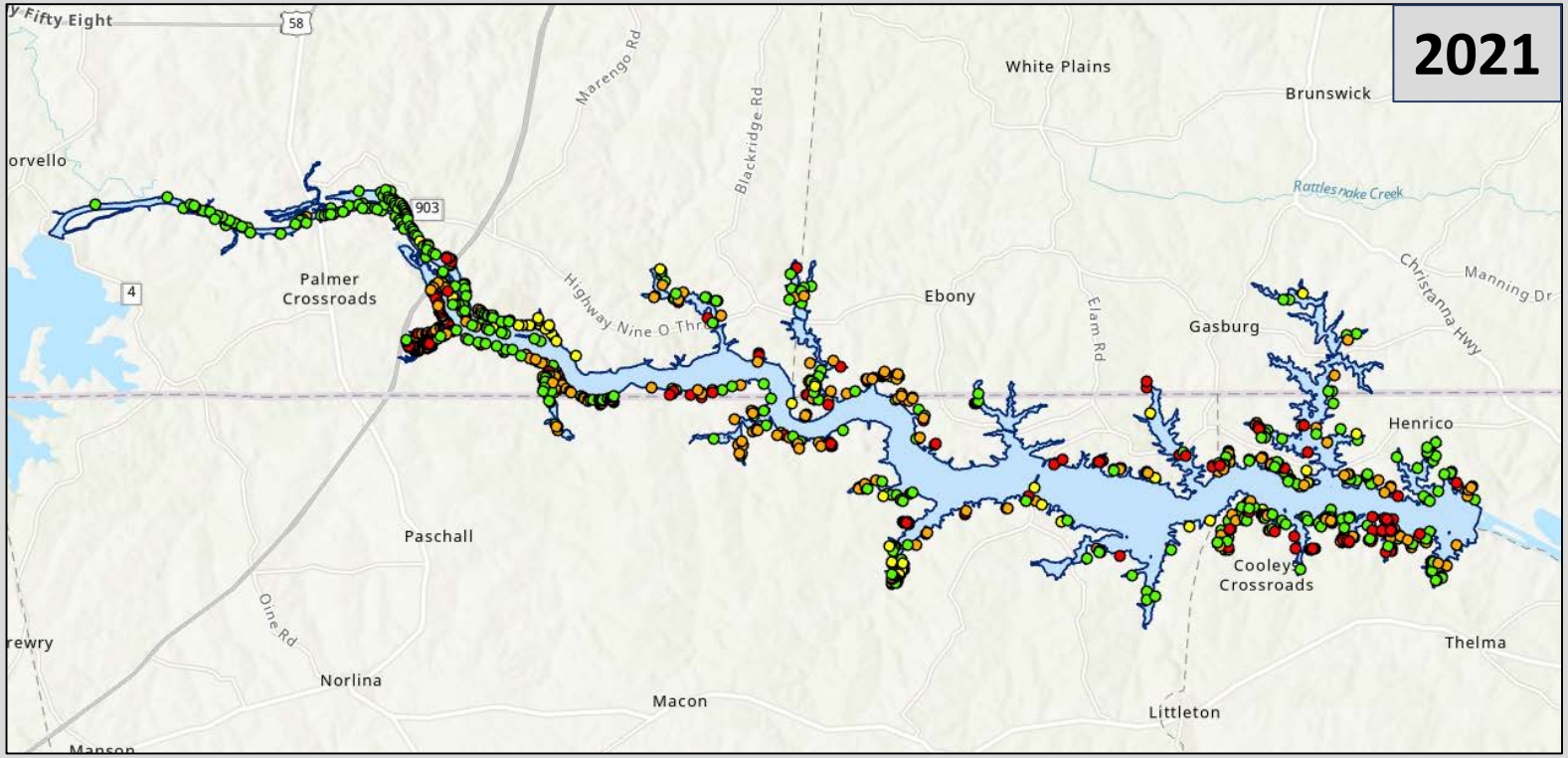
2022 Recommendation

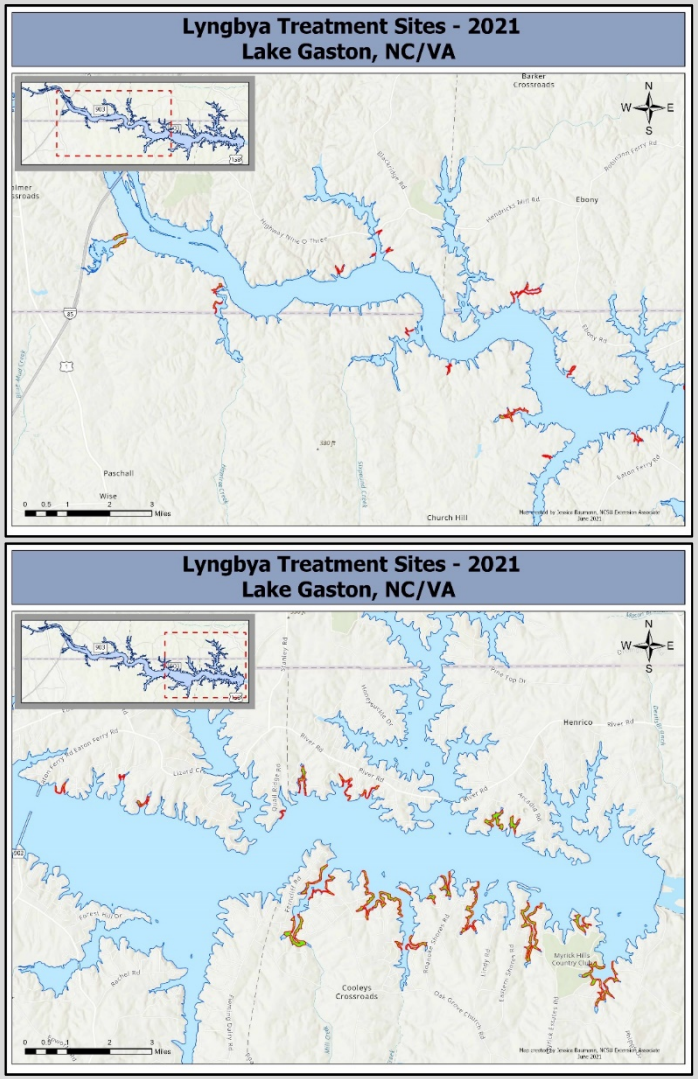
Expand Treatment Program
Maximum Treatment Acres: 500 acres



Lyngbya Treatments

2022 Lyngbya Treatments

- **Current 300 acres of treatment area**
- **Additional acreage will be prioritized based on:**
  - Boat ramps present
  - Dry hydrants present
  - Connection of current treatment plots
  - Public complaints



Future Research Needs

Future Research Needs

Treatment Impacts

Native mussel mortality event following June treatments

- **Impacted Species: Tidewater Mucket**
  - **Unusual to have highly sensitive species in reservoir**
  - **Not much known on Gaston population**
  - **Treatment plan tried to minimize impact with reduced copper rates**

Future Research Needs

Treatment Impacts

- Treatment Modification
  - Mussel beds were located in sandy, shallow habitat
    - New application method able to inject copper in much shallower habitat instead of spraying
  - Lyngbya mats were located in deeper water

Algaecide was not applied in water < 5 feet the remainder of the season to avoid preferred mussel habitat.

****No additional mortality was reported****

Future Research Needs

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    - New application method able to inject copper in much shallower habitat instead of spraying
  - Lyngbya mats were located in deeper water

Future Research Needs to Address Minimizing Treatment Impacts to Native Mussel Populations

Future Research Needs

Human Health Perspective

- Identify if lyngbya is producing toxins
  - Proactive sampling
  - No reported cases!

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  - Collect toxins within water column
- Collaboration with Old Dominion University's, Phytoplankton Analysis Laboratory

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Future Research Needs to Address Potential Negative Human Health Impacts from Lyngbya

2022 TAG Recommendations

Hydrilla

- Treat no more than 154 acres
  - Treatment to cages needs to minimize impacts to native species
- Do not stock Grass Carp

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Lyngbya

- Expand treatments, but treat no more than 500 acres
- Minimize treatment impact to Tidewater Mucket
  - Monitor DO / temp levels during planned application week
- Move forward with treatment expansion using Captain XTR and AMP

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Lyngbya

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- Minimize treatment impact to Tidewater Mucket
  - Monitor DO / temp levels during planned application week
- Move forward with treatment expansion using Captain XTR and AMP

Vegetation Project and Volunteer Survey

- Continue funding and supporting volunteer survey and native vegetation planting
- Manage hydrilla at Beachwood cages
- Complete 5 year management plan
  - Include drone surveys of cages

2022 TAG Recommendations

Future Research Needs

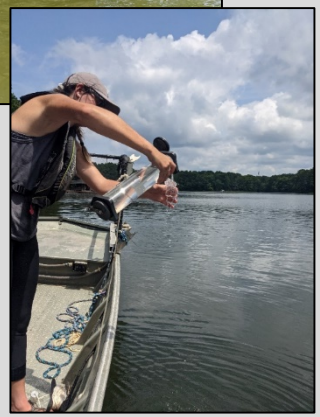
- **Identify research that will further explore potential negative human health impacts of lyngbya and cyanotoxins**

- **Identify research that will reduce potential negative impacts of lyngbya treatments to native mussel populations**

Questions?





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