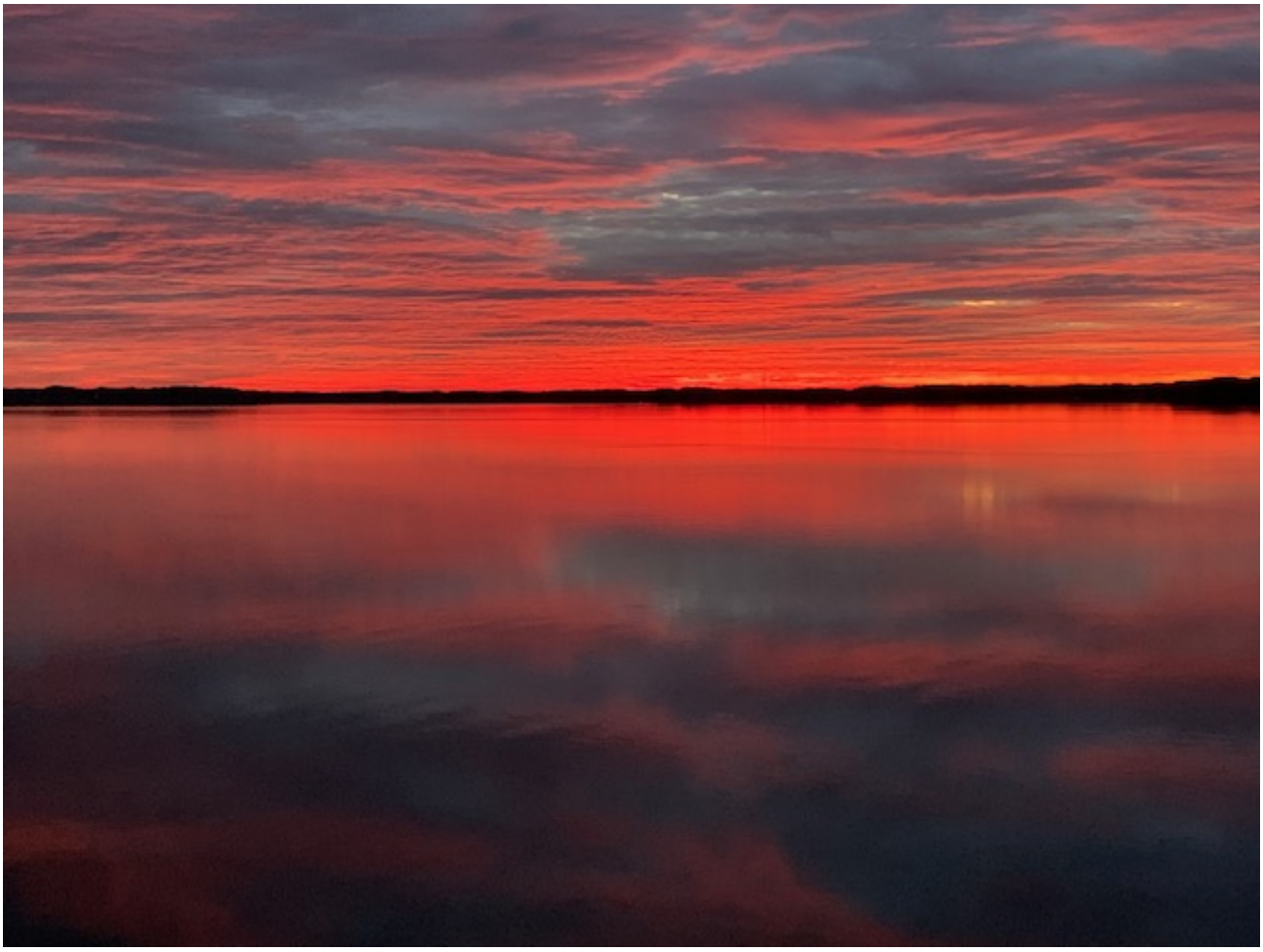
AQUATIC VEGETATION MANAGEMENT PROGRAM

LAKE GASTON

2019 TREATMENT SUMMARY AND RECOMMENDATIONS



PREPARED BY

PLM LAKE AND LAND MANAGEMENT CORPORATION

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I. INTRODUCTION

A. Description and Purpose of Lake Gaston

Lake Gaston is a 20,300 acre impoundment on the Roanoke River located on the North Carolina and Virginia borders. Gaston Reservoir comprises lands within Warren, Halifax, and Northampton counties in North Carolina, and Brunswick and Mecklenburg counties in Virginia. It is operated by Dominion for power generation and coincidently serves a flood control role. The high quality water also provides a water source for cities in the region. Gaston has a diverse fisheries population including largemouth bass, striped bass, walleye, catfish and various pan fish.

The overall goal is to develop and maintain a healthy lake ecosystem based on a diverse plant community dominated by native species. Such a lake would meet the recreational needs of lake users, sustain the local economy and ecosystem, provide desirable water quality, fish and wildlife habitat, and ultimately reduce the need for expensive annual control of invasive exotic species.

This goal will be achieved by accomplishing the following objectives:

- Communicate to the public the need for aquatic vegetation and the distinction between desirable native vegetation and infestations of noxious weeds.
- Determine the amount of aquatic and riparian vegetation needed for the development of a healthy Lake Gaston ecosystem.
- Establish and maintain this acreage by re-vegetation with desirable native species while reducing the noxious exotic vegetation that appears in the lake.
- Develop an assessment program for identifying where nuisance plants occur, and how to quantitatively assess management success.
- Develop a long-term aquatic plant management plan that has as a principle goal the removal of *Hydrilla, Lyngbya* and other nuisance plants or their maintenance at manageable levels.
- Aggressively manage *Hydrilla, Lyngbya* and other nuisance species now to reduce the total population levels. Utilize public input from all stakeholders to establish priority areas for vegetation management.
- Identify other potential nuisance invasive plants either currently in Lake Gaston (e.g., *Egeria* and Eurasian watermilfoil) or that could infest the lake (e.g., giant *salvinia*) and include them in the management plan.
- Determine the specific infestations to be treated and treatments to be utilized. Use cost-effective, leading edge technology and continually evaluate new methods of controlling exotic vegetation.
- Utilize a variety of herbicides and application protocols to minimize the development of genetic resistance in target species.

- Evaluate the role of grass carp as a management tool in Lake Gaston. Determine and insert the number of grass carp per infested acre that can be introduced and maintained to control invasive species without detrimentally affecting desirable species of native vegetation.

- Develop a prevention program, which might include public education and signage at boat launches, to prevent the introduction of plants into the lake or transporting them to other lakes. Also inform the public of the need to control erosion and nutrient inputs from septic fields and yard runoff.

- Develop an adequate sustainable funding source for the management of aquatic vegetation in Lake Gaston.

- Improve communications with stakeholders to keep them advised of successes, failures and changes in management actions.

B. How Certain Plant Species ("Weeds") Interfere With Management Goals

Recreation users and property owners have become increasingly frustrated at the persistence of the weed and algae problem. Herbicide treatments have been effective in some areas, however funding and flow patterns have limited treatments. Landowners are heavily affected by *Hydrilla and Lyngbya,* because it can prevent launching boats, accessing docks, skiing, bank fishing and swimming in some parts of the lake. Some lake users find the large colonies unsightly which impacts the aesthetic quality of the area for visitors and companies looking for relocation sites. Nuisance aquatic vegetation can also clog industrial water intake screens, potentially reduce local property values, decrease native plant diversity and create mosquito habitat. The problems are most severe in late summer and fall when the vegetation and algae is topped out at the water's surface.

II. 2019 AQUATIC VEGETATION MANAGEMENT PLAN

A. General Management Philosophy

Weed control is part of the overall Lake Gaston restoration program. We are focused on the species and communities we want in place of the weed species, rather than on simply eliminating weeds. We have set priorities for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities. We have taken action only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods.

We used an adaptive management strategy. First, we established and recorded the goals for the site. Second, we identified species that could block us from reaching these goals and assigned priorities based on the severity of their impacts. Third, we considered methods for controlling unwanted species or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fourth, we developed weed control plans based on this information, and then implemented them. Fifth, we monitored the results of our management actions and evaluated them in light of the site goals. Finally, this information was used to modify and improve control priorities, methods and plans, starting the cycle again.

B. How Priorities Were Determined

Ultimately, we set priorities in the hope of minimizing the total, long-term impact of noxious aquatic vegetation. Therefore, we act to prevent new infestations and assign highest priority to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site. We also consider the difficulty of control, giving higher priority to infestations we think we are most likely to control with available technology and resources.

While PLM Lake and Land Management does not have control over research programs, as a stakeholder it is important that we openly communicate with the research teams, assist where possible to use consistent methodology for field data collection, and coordinate our collective resources to provide the best value to Lake Gaston.

For the purpose of this determination, the herbicide Sonar (fluridone) is considered to be the primary herbicide control technology for Hydrilla, augmented with the use of contact herbicides. For Lyngbya, research treatment areas have been utilized to determine the best algecide.

C. Summary of Specific Actions

Hydrilla and Lyngbya are the most invasive species that currently threaten the ecological goals for the site. The ultimate goal is to contain the current infestation and eventually reduce it to a level that is ecologically insignificant. Due to the size of the infestation and the economics of the situation, we are not able to manage the lake on a compressive level. Budget dollars are allocated to high value targets while working as part of an integrated management approach using biological, chemical, and mechanical methods.
It could take years to achieve the management goal based on current available technology, funding and its long term impact on *Hydrilla and Lyngbya*.

Our best opportunity is to efficiently manage our herbicide applications to get a projected multiple year control of the target species. This opportunity is complicated by the fact that Sonar (fluridone) requires an extended contact time and the lake is a flowing system. In addition, the growth cycle of *Hydrilla* is such that new plants can grow from tubers. Early season control methods are required to control the plant to reduce overall tuber production thereby reducing the overall population.

PLM and SePRO developed a treatment prescription for the approved 2019 sites. Applications of Sonar (pellet formulations) were split to maintain a low dose concentration for an extended period of time. Multiple applications were necessary based on the amount of water exchange in each treatment area. In addition to water flow, variables such as sediment type and water bathymetry had to be considered.

PLM Management Objectives

- Reduce biomass of noxious submersed vegetation (focus on *Hydrilla and Lyngbya*).
- Maintain public boat access and water hydrant site quality.
- Allocate available public funds equitably between states and counties.
- Meet overall aquatic vegetation management objectives of LGWCC as qualified by a third party survey.

III. Treatment Summary

A . *Hydrilla* Treatments

The following table lists the selected site with the associated acres treated with Sonar during the 2019 treatment season.

2019 Hydrilla Treatments

			Sonar H4C		
			Volume (lbs of Sonar ONE)		
Treatment Area	Acres	AVG Depth	June 25th	July 29th	Aug 20th
Lizard Creek	163.42	5	1600	800	460

Total Acres Treated 163.42

B. *Lyngbya* Treatments

Lyngbya treatments were introduced for the first time in 2015 on Lake Gaston in an initial attempt to research the best combination of algaecides that have the best efficacy. Research, thus far, has brought us to the following applications broken down between the three product vendors: UPI/Biosafe, Lonza and SePRO

UPI/ Biosafe Treatments

Hawtree North	**Date**	**June 6th**	**July 11th**	**Aug 8th**	**Sept 13th**	**Oct 29th**
	Time					
	avg depth (ft)	*5*	*5*	*5*	*5*	*5*
	acres	*6.17*	*6.17*	*6.17*	*6.17*	*6.17*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	15.4	15.4	15.4	15.4	15.4
Green Clean 5.0 (gallons)	5.00	154.3	154.3	154.3	154.3	154.3
Green clean Pro (lbs.)	0	0	0	0	0	0
Cygnet (gallons)	2.0%	6	6	6	6	6
Total Spray Volume-inc H2O (gallons)		300	300	300	300	300

Hawtree West	**Date**	**June 6th**	**July 11th**	**Aug 8th**	**Sept 13th**	**Oct 29th**
	Time					
	avg depth (ft)	*2*	*2*	*2*	*2*	*2*
	acres	*1.74*	*1.74*	*1.74*	*1.74*	*1.74*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	1.74	1.74	1.74	1.74	1.74
Green Clean 5.0 (gallons)	5.00	17.4	17.4	17.4	17.4	17.4
Green clean Pro (lbs.)	50	174	174	174	174	174
Cygnet (gallons)	2.0%	1.75	1.75	1.75	1.75	1.75
Total Spray Volume-inc H2O (gallons)		90	90	90	90	90

UPI/ Biosafe Treatments Contd.

Hawtree East	**Date**	**June 6th**	**July 11th**	**Aug 8th**	**Sept 13th**	**Oct 29th**
	Time					
	avg depth (ft)	*3*	*3*	*3*	*3*	*3*
	acres	*2.33*	2.33	2.33	*2.33*	*2.33*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	3.5	3.5	3.5	3.5	3.5
Green Clean 5.0 (gallons)	5.00	35.0	35.0	35.0	35.0	35.0
Green clean Pro (lbs.)	50	350	350	350	350	350
Cygnet (gallons)	2.0%	2.25	2.25	2.25	2.25	2.25
Total Spray Volume-inc H2O (gallons)		120	120	120	120	120

Smith North	**Date**	**June 5th**	**July 10th**	**Aug 7th**	**Sept 12th**	**Oct 29th**
	Time					
	avg depth (ft)	*4*	2.33	2.33	*4*	*4*
	acres	*8.43*	*8.43*	*8.43*	*8.43*	*8.43*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	16.86	16.86	16.86	16.86	16.86
Green Clean 5.0 (gallons)	5.00	168.6	168.6	168.6	168.6	168.6
Green clean Pro (lbs.)	0	0	0	0	0	0
Cygnet (gallons)	2.0%	8	8	8	8	8
Total Spray Volume-inc H2O (gallons)		400	400	400	400	400

Smith South	**Date**	**June 5th**	**July 10th**	**Aug 7th**	**Sept 12th**	**Oct 29th**
	Time					
	avg depth (ft)	*4*	*3*	*3*	*3*	*3*
	acres	*10.44*	*10.44*	*10.44*	*10.44*	*10.44*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	20.88	20.88	20.88	20.88	20.88
Green Clean 5.0 (gallons)	5.00	208.8	208.8	208.8	208.8	208.8
Green clean Pro (lbs.)	0	0	0	0	0	0
Cygnet (gallons)	2.0%	10	10	10	10	10
Total Spray Volume-inc H2O (gallons)		500	500	500	500	500

UPI/ Biosafe Treatments Contd.

Great Creek	**Date**	**June 6th**	**July 11th**	**Aug 8th**	**Sept 13th**	**Oct 29th**
	Time					
	avg depth (ft)	*3*	*3*	*3*	*3*	*3*
	acres	*1.41*	*1.41*	*1.41*	*1.41*	*1.41*
	Rate (ac/ft)	**Volume**				
Hydrothol (gallons)	0.50	2.1	2.1	2.1	2.1	2.1
Green Clean 5.0 (gallons)	5.00	21.2	21.2	21.2	21.2	21.2
Green clean Pro (lbs.)	0	0	0	0	0	0
Cygnet (gallons)	2.0%	3	3	3	3	3
Total Spray Volume-inc H2O (gallons)		150	150	150	150	150

Lonza

Lees Creek - 1	**Date**	**June 3rd**	**July 8th**	**Aug 5th**	**Sept 13th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	2.87	2.87	2.87	2.87	2.87
	Rate (ac/ft)	**Volume**				
Algimycin (gallons)	2.13	18.3	18.3	18.3	18.3	18.3
AMP activator (gallons)	0.5	4.3	4.3	4.3	4.3	4.3
Total Spray Volume-inc H2O (gallons)		140	140	140	140	140

Lees Creek - 2	**Date**	**June 3rd**	**July 8th**	**Aug 5th**	**Sept 13th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	1.64	1.64	1.64	1.64	1.64
	Rate (ac/ft)	**Volume**				
Algimycin (gallons)	2.13	10.5	10.5	10.5	10.5	10.5
AMP activator (gallons)	0.5	2.5	2.5	2.5	2.5	2.5
Total Spray Volume-inc H2O (gallons)		80	80	80	80	80

Lonza Contd.

Lees Creek - 3	**Date**	**June 3rd**	**July 8th**	**Aug 5th**	**Sept 13th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	5.34	5.34	5.34	5.34	5.34
	Rate (ac/ft)	**Volume**				
Algimycin (gallons)	2.13	34.1	34.1	34.1	34.1	34.1
AMP activator (gallons)	0.5	8.0	8.0	8.0	8.0	8.0
Total Spray Volume-inc H2O (gallons)		270	270	270	270	270

Pretty Creek Upper	**Date**	**June 3rd**	**July 8th**	**Aug 5th**	**Sept 13th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	12.90	12.90	12.90	12.90	12.90
	Rate (ac/ft)	**Volume**				
Algimycin (gallons)	2.13	82.4	82.4	82.4	82.4	82.4
AMP activator (gallons)	0.5	19.4	19.4	19.4	19.4	19.4
Total Spray Volume-inc H2O (gallons)		650	650	650	650	650

Rocky Branch	**Date**	**June 3rd**	**July 8th**	**Aug 5th**	**Sept 13th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	3.66	3.66	3.66	3.66	3.66
	Rate (ac/ft)	**Volume**				
Algimycin (gallons)	2.13	23.4	23.4	23.4	23.4	23.4
AMP activator (gallons)	0.5	5.5	5.5	5.5	5.5	5.5
Total Spray Volume-inc H2O (gallons)		185	185	185	185	185

SePRO

Lyons Creek	**Date**	**June 4th**	**July 9th**	**Aug 6th**	**Sept 10th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	9.65	9.65	9.65	9.65	9.65
	Rate (ac/ft)	**Volume**				
Captain XTR (gallons)	1.50	43.4	43.4	43.4	43.4	43.4
Diquat (gallons)	0.15	4.3	4.3	4.3	4.3	4.3
Total Spray Volume (gallons)		400	400	400	400	400

Pretty Creek Lower	**Date**	**June 4th**	**July 9th**	**Aug 6th**	**Sept 10th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	25.9	25.9	25.9	25.9	25.9
	Rate (ac/ft)	**Volume**				
Captain XTR (gallons)	0.75	58.3	58.3	58.3	58.3	58.3
Diquat (gallons)	0.15	11.7	11.7	11.7	11.7	11.7
Total Spray Volume (gallons)		800	800	800	800	800

St. Tammany	**Date**	**June 4th**	**July 9th**	**Aug 6th**	**Sept 10th**	**Oct 28th**
	Time					
	avg depth (ft)	3	3	3	3	3
	acres	5.61	5.61	5.61	5.61	5.61
	Rate (ac/ft)	**Volume**				
Captain XTR (gallons)	1.50	25.2	25.2	25.2	25.2	25.2
Diquat (gallons)	0.15	2.5	2.5	2.5	2.5	2.5
Total Spray Volume (gallons)		300	300	300	300	300

Final Herbicide Inventory

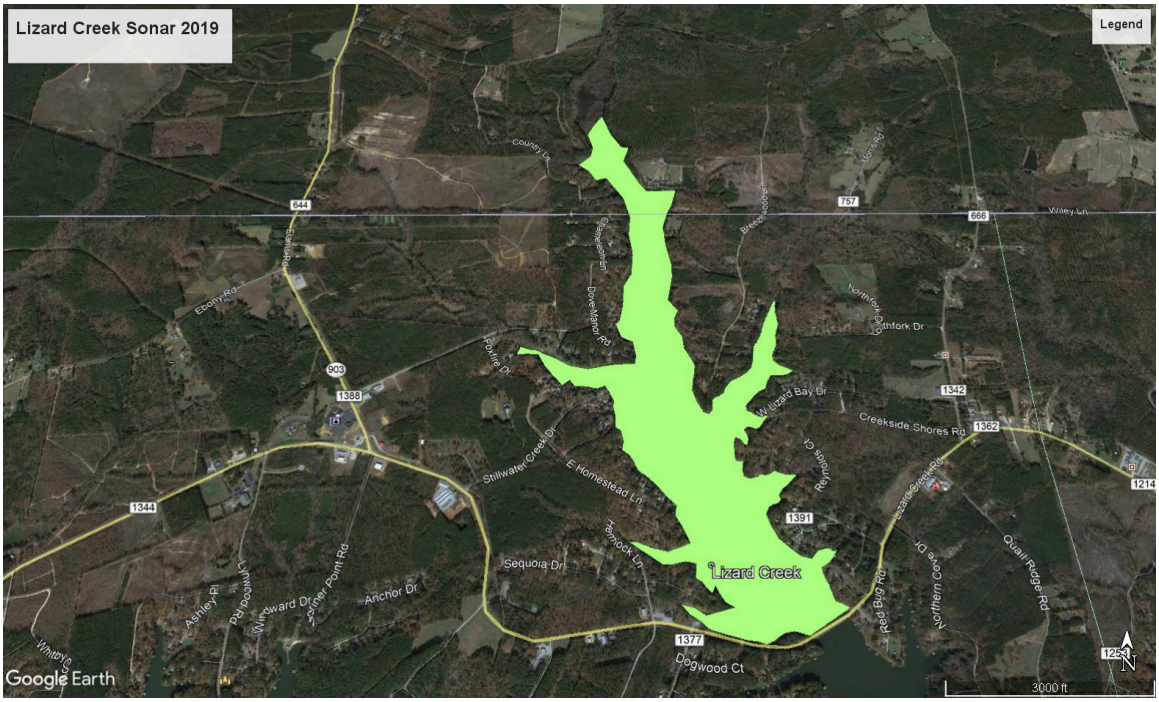
Product	Quantity	Product	Quantity
Activator	1.53ga	Green Clean Pro	2 #
Algimycin	1.5 ga	Hydrothol 191	1.6 ga
Captain XTR	1.20 ga	Komeen	49 ga
Clearigate	19.70 ga	Poly Control 2	0 ga
Cygnet Plus	.39 ga	Sonar H4C	4 #
Defoamer	0 qts	Sonar SRP	50.7 #
Green Clean	0 ga	Diquat (Tribune)	.5 ga

IV. 2019 RECOMMENDATIONS

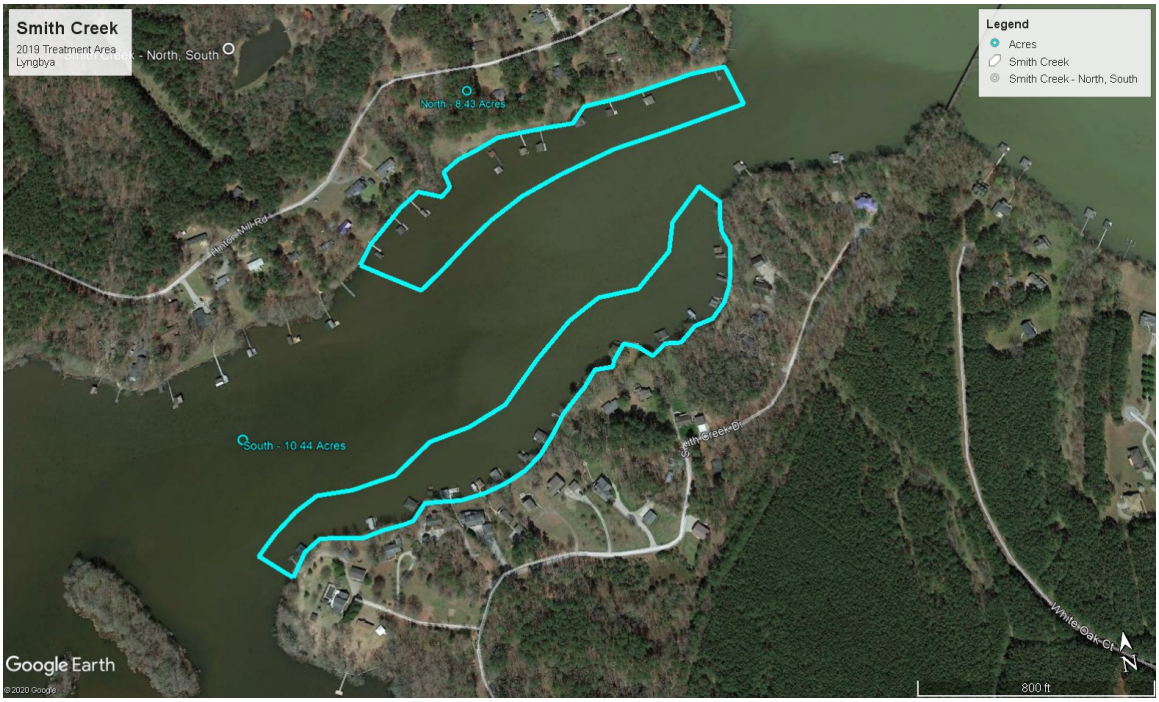
- Expand the herbicide treatment program for 2019 in an effort to minimize the potential for *hydrilla* recovery following previous years of successful reduction of tubers, biomass and acres of infestation.
- Continue to treat early in the *hydrilla* growth season to promote management program for biomass and tuber reduction over time.
- Evaluate sites for multiyear Sonar treatment approach vs. an approximate three year treatment cycle using tuber research studies conducted by North Carolina State University (NCSU).
- Coordinate treatments and monitoring efforts with ongoing re-vegetation research.
- Coordinate private and public treatments to promote overall objective.
- Monitor and continue aggressive treatment plans of *lyngbya*.
- Integrate management strategies between LGWCC, LGSB (TAG), NCSU, SePRO and PLM.

V. Treatment Area Maps

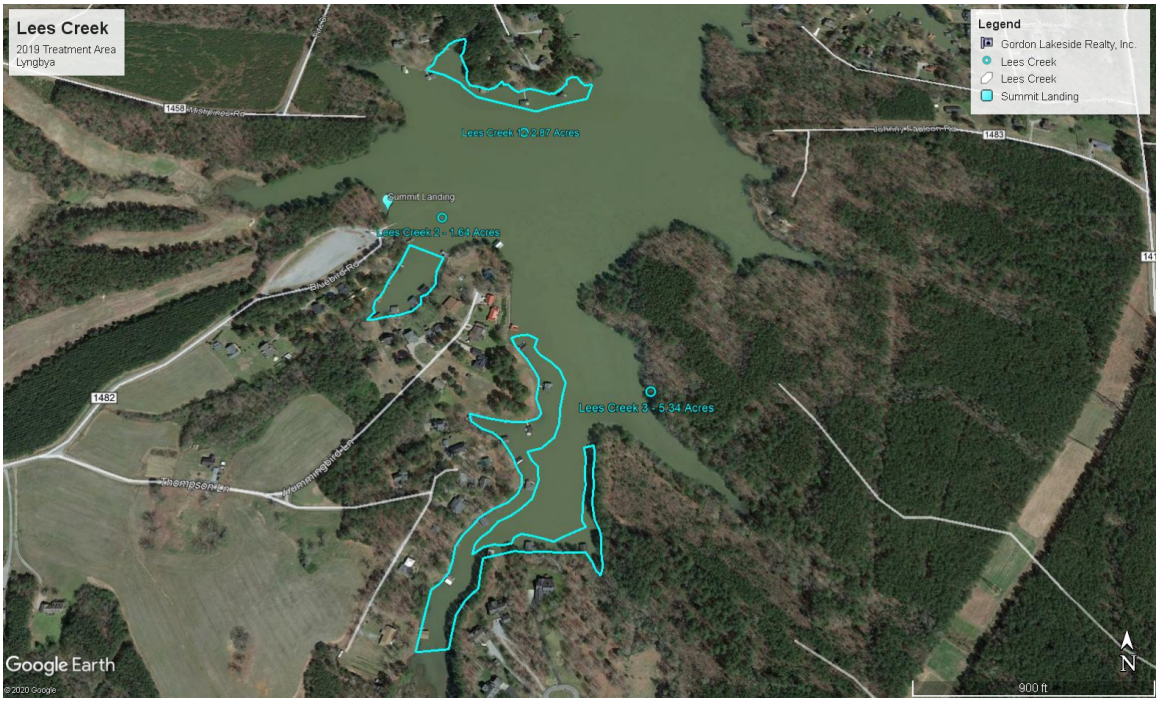
Following:

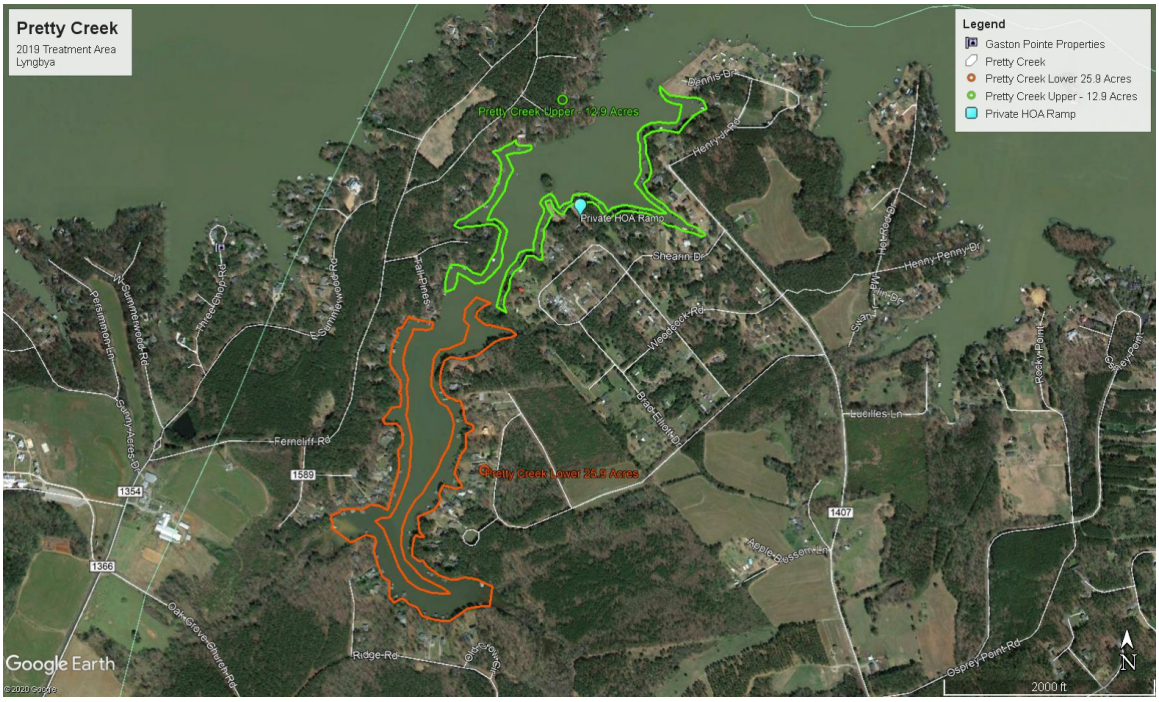

Lizard Creek Sonar 2019
Legend
Lizard Creek
Google Earth
3000 ft
N

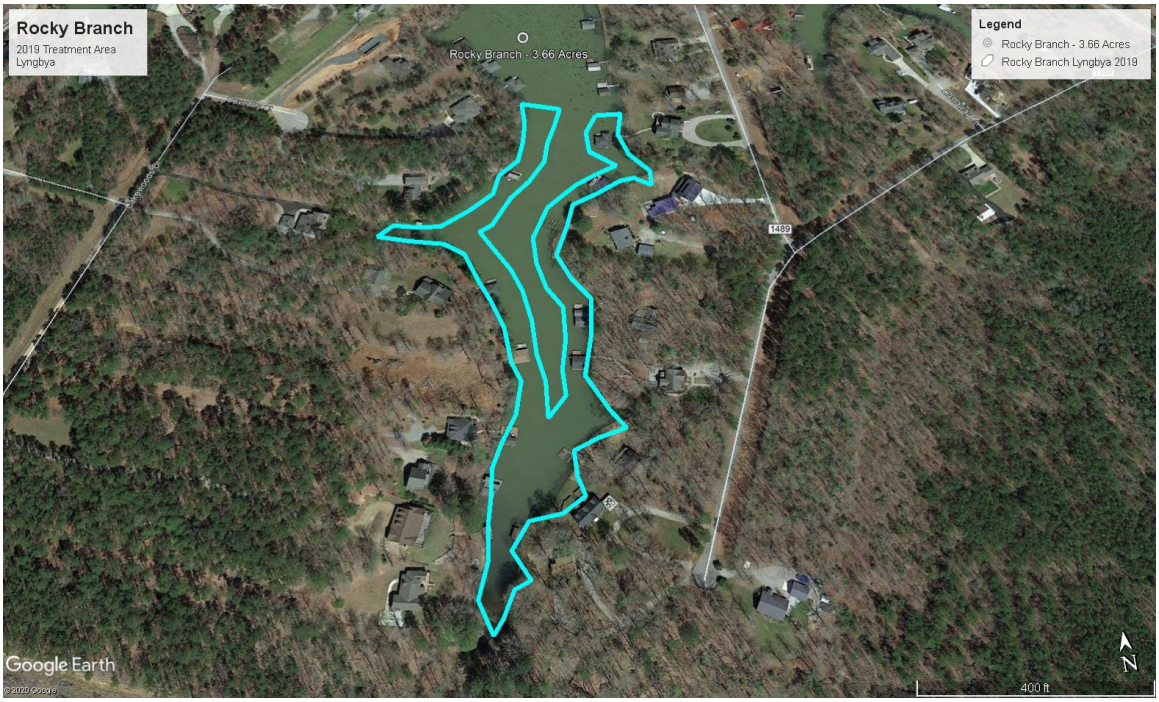

Hawtree Creek
2019 Treatment Area
Lyngbya
Legend
Acres
Hawtree
Hawtree Creek - North, West, East
Hawtree Creek - North, West, East
East - 2.83 Acres
West - 1.74 Acres
Google Earth
1000 ft
N


Smith Creek
2019 Treatment Area
Lyngbya
Smith Creek - North, South
North - 8.43 Acres
South - 10.44 Acres
Legend
Acres
Smith Creek
Smith Creek - North, South
Google Earth
800 ft
N


Great Creek
2019 Treatment Area
Lyngbya
Great Creek - 1.41 Acres
Legend
Americamps-Lake Gaston
Great Creek - 1.41 Acres
Great Creek - Lyngbya 2019
Google Earth
200 ft
N


Lees Creek
2019 Treatment Area
Lyngbya
Legend
Gordon Lakeside Realty, Inc.
Lees Creek
Lees Creek
Summit Landing
Lees Creek 1 - 2.87 Acres
Summit Landing
Lees Creek 2 - 1.64 Acres
Lees Creek 3 - 5.34 Acres
1482
1483
Google Earth
900 ft
N


Pretty Creek
2019 Treatment Area
Lyngbya
Legend
Gaston Pointe Properties
Pretty Creek
Pretty Creek Lower 25.9 Acres
Pretty Creek Upper - 12.9 Acres
Private HOA Ramp
Pretty Creek Upper - 12.9 Acres
Private HOA Ramp
Pretty Creek Lower 25.9 Acres
Ferncliff Rd
1589
1384
1366
1407
Google Earth
2000 ft
N


Rocky Branch
2019 Treatment Area
Lyngbya
Rocky Branch - 3.66 Acres
Legend
Rocky Branch - 3.66 Acres
Rocky Branch Lyngbya 2019
1489
Google Earth
© 2020 Google
400 ft
N


Lyons Creek
2019 Treatment Area
Lyngbya
Lyons Creek - 9.65 Acres
Legend
Lyons Creek - 9.65 Acres
Lyons Creek- lyngbya 2019
Hallock Ct
Lyons Creek Rd
Google Earth
© 2020 Google
600 ft
N


St. Tammany
2019 Treatment Area
Lyngbya
Legend
Handgun Application Area
LGWCC Lyngbya
St. Tammany - 5.61 Acres
St. Tammany 5.61 Acres
St-Tammany-Dr
Google Earth
© 2020 Google
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