



One Invader, One Reservoir, 350,000 Reasons to Act

A Presentation on Invasive Species and the threat to Our
Drinking Water Supply

MAWSS Mission and Vision

Our Mission: MAWSS will protect and enhance the health, safety, and economic well being of our community through the responsible management of water resources while providing superior customer service.

Our Vision: MAWSS will be a model utility to create and protect resources for future generations. We will lead our industry and provide service to accommodate regional economic development and growth.



Overview of MAWSS and Its Customers

- MAWSS: Public utility serving Mobile and Baldwin Counties
- Approximately 350,000 residents, plus industry, schools, hospitals
- Provides water and sewer services at lower cost than other regional providers
- Uniquely owns its entire water source and shoreline (minus County / State ROW)
- Revenue is entirely derived from ratepayers – no tax dollars



Raw Water SYSTEMS



J.B. Converse Reservoir

- Surface Area: 3,600 acres
- Watershed covers 103 - 104 sq. miles
- Protection Area: MAWSS manages 9,000 acres of land surrounding the reservoir to protect water quality.
- Purpose: It is the primary water supply for approximately 350,000 customers.



MAWSS
Mobile Area Water & Sewer System



J.B. Converse Dam



Buck's Pump Station
(Mobile River System)



J.B. Converse Spillway



Saraland Reservoir & Pump Station
(Mobile River System)



Gaillard Pump Station
(J.B. Converse)



56 Miles of Pipeline
(J.B. Converse & Mobile River System)



12 Flumes and 1 Aqueduct



42 Miles of Pipeline



11 Miles of Canals

Potable Water SYSTEM



2

**Water
Treatment
Facilities**

- H.E. Myers
- E.M. Stickney



1,613

**Miles of
Pipeline**



5

**Ground
Storage Tanks**



3

Reservoirs



Hydrants

12,457



13

**Booster
Stations**



9

**Elevated
Storage Tanks**



33,188

Valves



Wastewater SYSTEM



2

**Wastewater
Treatment
Facilities**

- Wright Smith
- C. C. Williams



Lift Stations

190



Manholes

28,952



**Severe Weather
Attenuation Tanks (SWATS)**

4



**Miles of
Force Main**

254



Service Laterals

101,906



**Severe Weather
Attenuation Basin (SWAB)**

1



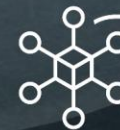
**Miles of
Gravity Sewer**

1,248



**Water & Sewer
Wholesale
Connections**

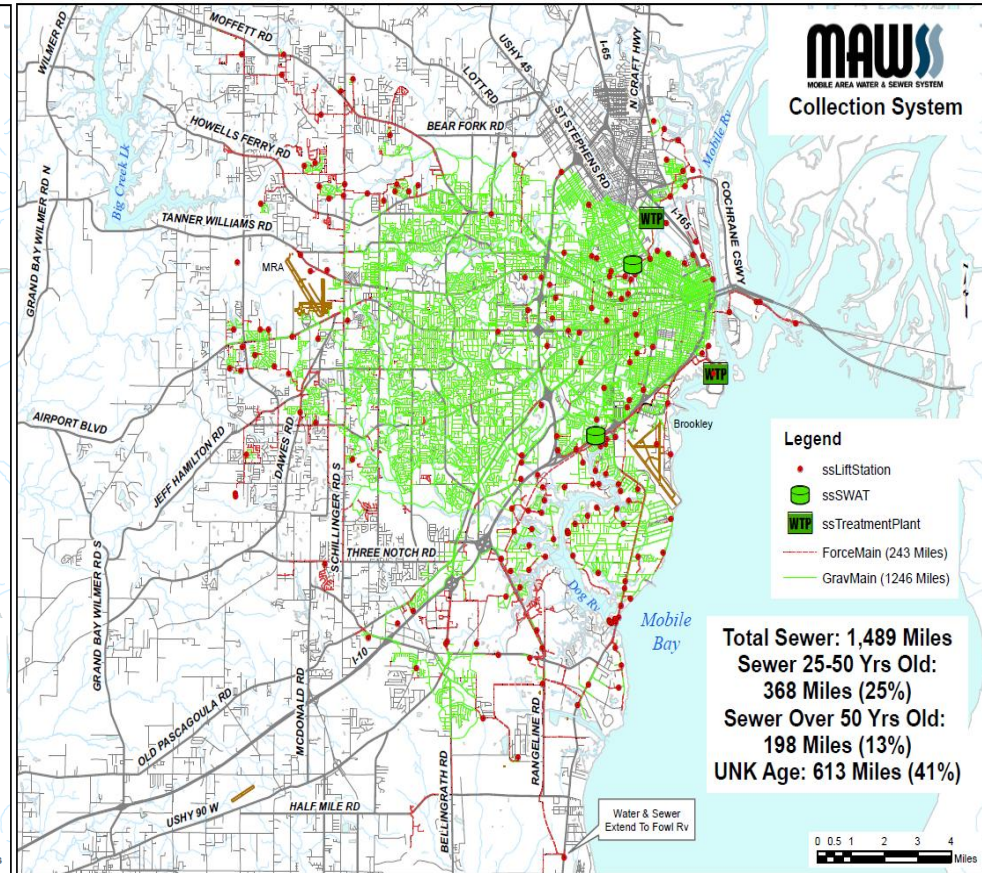
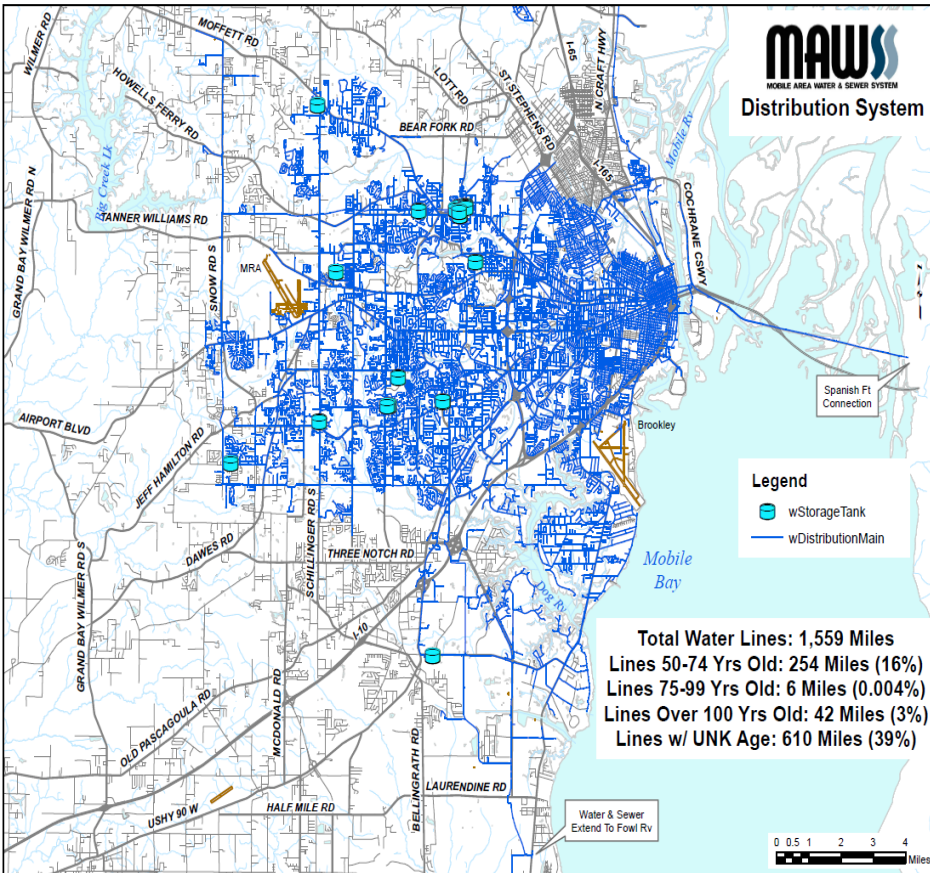
12



**Septic Tank Effluent
Pump Systems**

2

MAWSS Growing Service Area

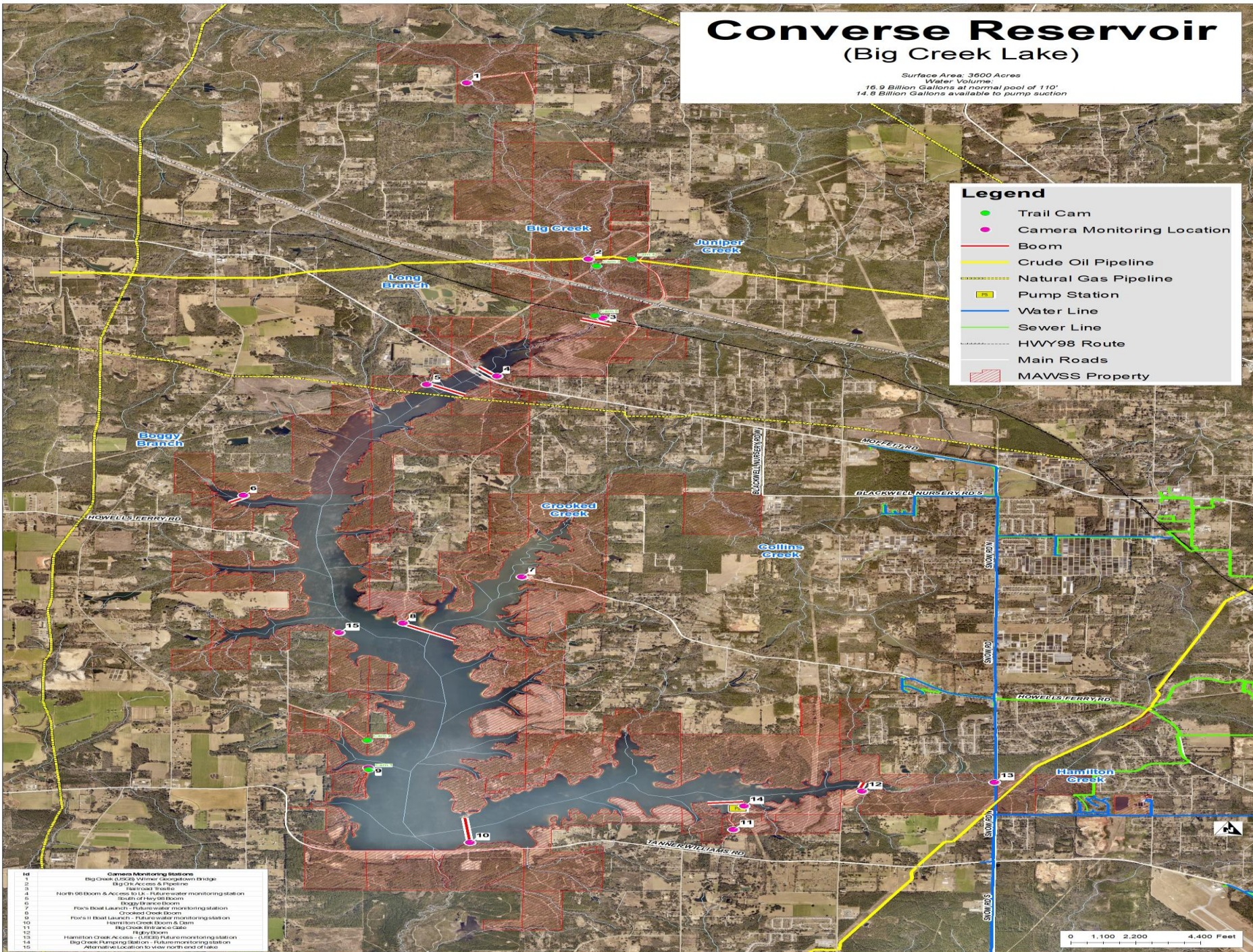


Converse Reservoir (Big Creek Lake)

Surface Area: 3600 Acres
Water Volume:
16.9 Billion Gallons at normal pool of 110'
14.8 Billion Gallons available to pump suction

Legend

- Trail Cam
- Camera Monitoring Location
- Boom
- Crude Oil Pipeline
- - - Natural Gas Pipeline
- Pump Station
- Water Line
- Sewer Line
- HWY98 Route
- Main Roads
- ▨ MAWSS Property



Camera Monitoring Stations	
1	Big Creek (US28) Inland Cagedown Bridge
2	Big Creek Access & Pipeline
3	Hamlet Road Bridge
4	North 66 Boom & Access to UK - Future water monitoring station
5	South of Hwy 66 Boom
6	Boggy Branch Boom
7	Port's Boat Launch - Future water monitoring station
8	Crooked Creek Boom
9	Port's II Boat Launch - Future water monitoring station
10	Hamilton Creek Boom & Dam
11	Big Creek Entrance Gate
12	Big Boom
13	Hamilton Creek Access - US28 Future water monitoring station
14	Big Creek Pumping Station - Future water monitoring station
15	After native location to view north end of lake





History of MAWSS and Converse Reservoir

- The history of water services in Mobile dates to as early as 1814 when Three Mile Creek was the important source of water for the City of Mobile
- 1819 - a public well was installed close to Dauphin St and Royal St at what is now Bienville Square
- In the 1830's - the City indicated they would construct an aqueduct for the purpose of bringing water into the City from a spring at Spring Hill
- In 1886, the Bienville Water Supply Company was organized and a pumping station was constructed on Clear Creek – Many of the water lines were made of wood
- In 1900, the City built a pumping station on Three Mile Creek at the east end of what is now Langan Park
- From 1900 to 1940, the City kept pace with providing water service for population growth
- **With the outbreak of World War II, it became apparent that the existing sources of supply were inadequate and not dependable. This was both an issue of not having sufficient quantity and because the watersheds of both Clear and Three Mile Creeks were becoming more urbanized and the quality of the water was endangered**
- **The new recommendation was creating Converse Reservoir in the western part of Mobile County, It was put in operation in 1952**



Converse Reservoir Facts

Converse Reservoir is the sole water supply for MAWSS ratepayers

3600 acres, produces 60 million gallons per day

Supports essential services like hospitals, schools, and fire protection

Vital for economic development and industrial support

Key advantage for regional affordability and growth – MFRD ISO-1 rating, industrial capacity

Converse Reservoir



Built in

1952



Holds

17

billion gallons
of fresh water

Provides safe drinking
water to more than

350,000

people in Mobile, Prichard, and
surrounding communities



priority is to protect
the water source in a
sustainable manner

There are

9,000

acres of buffer land
surrounding the lake



The lake is
approximately

3,600

acres



Threat of Invasive Species

- Invasive species often introduced via boats from other waters
- 2021: Giant Salvinia discovered in Converse Reservoir
- 2022: Six invasive species found; zebra mussels a major threat
- Two Studies Performed (HDR / Barry Vittor)
- Zebra mussels damage infrastructure and water flow



Potential Invasive Species Threats to the MAWSS Big Creek Lake Water Treatment Facility

Invasive Aquatic Plants

(with a focus on floating and submerged aquatic plants with potential to clog water intake systems and/or disrupt water quality)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>Scientific Name</u>
<i>Currently confirmed present in Big Creek Lake</i>		Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Alligatorweed	<i>Alternanthera philoxeroides</i>	Feathered mosquito-fern	<i>Azolla pinnata</i>
Cuban bulrush	<i>Cyperus blepharoleptos</i>	Giant reed*	<i>Arundo donax</i>
Giant salvinia	<i>Salvinia molesta</i>	Hydrilla	<i>Hydrilla verticillate</i>
Parrotfeather	<i>Myriophyllum aquaticum</i>	Purple loosestrife*	<i>Lythrum salicaria</i>
Primrose willow*	<i>Ludwigia</i> spp.	Water chestnut	<i>Trapa natans</i>
Torpedograss*	<i>Panicum repens</i>	Water hyacinth	<i>Eichhornia crassipes</i>
<i>Species that are not currently confirmed present</i>		Water lettuce	<i>Pistia stratiotes</i>
Brazilian waterweed	<i>Egeria densa</i>	Water-clover	<i>Marsilea</i> spp.
Brittleleaf naiad	<i>Najas minor</i>		
Common reed*	<i>Phragmites australis</i>		

*Species that are mostly considered non-floating aquatics but can create floating mats and islands when combined with other floating aquatic species. Some of these can have dense root systems allowing them to become floating islands.

Invasive Aquatic Mollusks

(with a focus on freshwater lake species with potential to clog water intake systems)

<u>Common Name</u>	<u>Scientific Name</u>
Asian clam	<i>Corbicula fluminea</i>
Quagga Mussel	<i>Dreissena rostriformis bugensis</i>
Zebra mussels	<i>Dreissena polymorpha</i>

Table 2 – Approved Aquatic Herbicides

	bispyribac	carfentrazone	chelated copper	diquat	endothall	flumioxazin ²	glyphosate	imazamox	imazapyr	Penoxsulam ²	triclopyr	2,4-D
Aquatic group & vegetation	Floating plants											
feathered mosquitofern		G		G						E		
giant salvinia ¹		G		G		G	G	E		E		
water chestnut						E		G			G	G
water hyacinth	E	G	G	E			G	E	E	E	E	E
water lettuce	E	E	G	E		E	G		E	E	G	
water clover				E			G				G	
	Submersed plants											
eurasian watermilfoil	G	E	G	E	E	G		G		E	E	E
hydrilla	E		G	G	G	G		G		E		
brazilian waterweed			G	E		E				G		
brittleleaf naiad			G	E	E	E				G		
Parrotfeather ¹				E	E	G		G	G	G	G	E
	Emergent plants											
Alligatorweed ¹	E					G	G	G	E		E	
common reed							E	G	E			
giant reed							E	G	E			
cuban bulrush ¹							G		E	G		
primrose-willow ¹							E	E	E		E	E
purple loosestrife							E		E			
torpedo grass ¹							E		E			

1 - Species that are confirmed present in Big Creek Lake, 2 - Herbicides currently being used to treat vegetation in Big Creek Lake,

E = excellent control, G = good control

Table 3 – Herbicide Evaluation

							Water Quality Impacts (short term & long term, aquatic life and humans)			
Aquatic Herbicide Products (and generics)	Active Ingredient	Target Species	Foliar Application Rate (min-max rate)	Submersed Application Rate (min-max rate)	Cost range per acre (foliar rate)	Cost range per acre (submersed rate*2.5')	Potable Water Use Restrictions	Recreational Restrictions (fishing and swimming)	Aquatic Life Water Quality Criteria*	Human Health Water Quality Criteria*
Herbicides Currently Used at Big Creek Lake										
Schooner-SC, Clipper-SC, Semera-SC	flumioxazin	salvinia, water chestnut, water lettuce, eurasian milfoil, hydrilla, Brazilian waterweed, naiad, parrotfeather, alligatorweed	6-12 fl oz / acre	1.1-2.1 pt / acre-foot	\$15.00 - \$34.22	\$110.00 - \$239.53	No restriction	No restriction	N/A	N/A
Galleon-SC	penoxsulam	mosuitofern, salvinia, water hyacinth, water lettuce, eurasian milfoil, hydrilla, Brazilian waterweed, naiad, parrotfeather, cuban bulrush	2-5.6 fl oz/ acre	4.4-26.1 fl oz / acre-foot	\$42.15 - \$118.02	\$231.82 - \$1375.12	No restriction	No restriction	N/A	N/A

Table 5 – Herbicide Treatment Cost Comparison

Herbicide Treatment Costs								
Product	Group	Active Ingredients	Application rate*	Treatment Effectiveness	Surfactant Cost	Unit cost of Herbicide	Cost per acre	Treatment event**
Galleon	2	Penosulam	2 oz per ac	Excellent	\$ 59.70	\$674.39 per 1 qt	\$84.30	\$1,577.08
Schooner*	14	Flumioxazin	6 oz per ac	Good	\$ 59.70	\$320.00 per 1 gal	\$30.00	\$599.70
Clearcast	2	Imazamox	32 oz per ac	Excellent	\$ 59.70	\$296.43 per 1 gal	\$148.22	\$2,727.57
Stingray	14	Carfentrazone	3.4 oz per ac	Good	\$ 59.70	\$162.51 per 1 qt	\$34.53	\$681.30
Tribune	22	Diquat	64 oz per ac	Good	\$59.70	\$72.00 per 1 gal	\$72.00	\$1,355.70
AquaNeat	9	Glyphosate	80 oz per ac	Good	\$59.70	\$32.50 per 1 gal	\$40.63	\$790.95

* Current Application rate at less than label minimum

**Assumed treatment scenario per treatment map for May 2023

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 1 of 9
			Version	01	
Prepared By	HDR Engineering, Inc. and Thompson Engineering (formerly Barry Vittor & Associates)	Effective Date:	5.2024	Revision Date:	
Standard Operating Procedure					

I. PURPOSE

- The purpose of this Standard Operating Procedure (SOP) is to outline the monitoring and treatment of invasive plant species at Big Creek Lake (BCL), primary water supply of the Mobile Area Water and Sewer System (MAWSS).
- For more information, refer to Big Creek Lake Invasive Species Study (prepared in May 2024 by HDR for MAWSS), Section 2.2 – Invasive Species Management Practices.

II. SCOPE

- To specify the frequency and extent of monitoring activities
- To specify the type, dosage and frequency of herbicide applications.

III. RESPONSIBILITY

- BCL Pump Station Operators and contracted licensed operators are responsible for performing this procedure for monitoring and treatment activities.
- BCL Pump Station Operators must notify their Supervisor of any deviation.
- The MAWSS Engineering Department is responsible for the maintenance of this procedure.
- Operators must wear personal protection equipment according to the task to be performed, but never less than the minimum requirements established by the MAWSS Safety Department.

IV. STANDARD PROCEDURES

A. Monitoring

- A.1. Monitor Permanent Monitoring Plots (P1 to P54 as identified in the attached site map) once per month
- A.2. Complete Work Order Form for each plot inspected.
 - A.2.1. Record the following information for each plot inspected:
 - A.2.1.1. Job code, plot ID number, date, time, weather conditions, water temperature
 - A.2.1.2. Frequency of giant salvinia occurrence within 1/16th grids within a 1-square meter quadrant
 - A.2.1.3. Percent cover of giant salvinia within quadrant (0%, 25%, 50%, 75% or 100%)
 - A.2.1.4. Expand species observations within these quadrants to include estimates of percent cover of other invasive species (identified species include parrotfeather, alligator weed, Cuban bulrush, primrose-willow, torpedo grass)
 - A.2.1.5. Include pictures of inspected areas.
 - A.2.1.6. Include any additional general comments.

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 2 of 9
			Version	01	
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Standard Operating Procedure					

- A.3. Complete additional quarterly monitoring events that cover all of Big Creek Lake shoreline areas between plots to identify new problem areas where additional plots may be helpful.

- A.3.1. Record the following information for each shoreline area inspected between the permanent monitoring plots:
 - A.3.1.1. Job code, shoreline area between permanent monitoring plot, date, time, weather conditions, water temperature
 - A.3.1.2. Percent cover of giant salvinia within the shoreline area (0%, 25%, 50%, 75% or 100%)
 - A.3.1.3. Expand species observations within these shoreline areas to include estimates of percent cover of other invasives (identified species include parrotfeather, alligator weed, Cuban bulrush, primrose-willow, torpedo grass)
 - A.3.1.4. Include pictures of inspected areas.
 - A.3.1.5. Include any additional general comments.
 - A.3.1.6. Evaluate conditions of floating booms and consider additional areas where these may prove effective to slow the spread of invasive species (especially where tributaries and creeks flow into Big Creek Lake)

B. Treatment Activities

- B.1. Treat plots once or twice per month depending on time of year and shoreline between plots at least four times per year.
 - B.1.1. When applying pesticides, the label is the law and must be adhered to.
 - B.1.2. All applications of aquatic herbicides are the sole responsibility of the licensed applicator contracted to carry out such work.
- B.2. Complete work order forms for each herbicide application activity to record the following:
 - B.2.1. Job code, plot ID or other location, date, time, weather conditions, water temperature
 - B.2.2. Checkboxes for additional invasive species known to be present (identified species to date include: parrotfeather, alligatorweed, Cuban bulrush, primrose-willow, torpedo grass)
 - B.2.3. Identify any other newly found invasives
 - B.2.4. Record types and volumes (gallons) of herbicide sprayed and what species were targeted
 - B.2.5. Include any additional general comments.

C. Treatment Schedule

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 3 of 9
			Version	01	
Prepared By	HDR Engineering, Inc. and Thompson Engineering (formerly Barry Vittor & Associates)	Effective Date:	5.2024	Revision Date:	
Standard Operating Procedure					

SPRING	<i>All Permanent Monitoring Plots of BCL should be visited and treated twice per month of this season. Treatment should occur between plots as well, along the entire shoreline of BCL before summer.</i> <i>Biomass has the highest potential to multiply through this season, do not allow any area to go untreated or unmonitored as neglected areas may harbor small infestations that multiply within a shorter timeframe. This material also has the potential to spread to other areas.</i>				
March	All Plots should be treated twice in this month with follow-up treatments after fourteen days, if possible. 1st treatment - Penoxsulam (2-5.6 fl oz/acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant 2nd treatment - Penoxsulam (2-5.6 fl oz/acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant				
April	Shoreline areas between plots should be monitored, assessed, and invasive vegetation treated. All Plots should also be treated once this month. - Shoreline area treatment between plots - Penoxsulam (2-5.6 fl oz/acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant - Plot treatment - Penoxsulam (2-5.6 fl oz/acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant				
May	All Plots should be treated twice in this month with follow-up treatment after fourteen days, if possible. 1st treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant 2nd treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant				

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 4 of 9
			Version	01	
Prepared By	HDR Engineering, Inc. and Thompson Engineering (formerly Barry Vittor & Associates)	Effective Date:	5.2024	Revision Date:	
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SUMMER	<i>First attend to problem plots or areas identified by monitoring event in spring. Problematic areas would be those where biomass persists despite treatment. If possible, do not allow the remaining, less-problematic plots to go untreated each month.</i>				
June	Prioritize treatment of problematic plots. Base priority of problematic areas off of monitoring reports where plots had highest densities of giant salvinia. With remaining time, treat the remaining less-problematic Plots. - Treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant				
July	Prioritize treatment of any problematic areas where monitoring may have identified a significant infestation between established plots. Shoreline areas between plots should be monitored, assessed, and invasive vegetation treated. Once shoreline area between plots have been treated, focus on problematic plots first and (if possible) treat every remaining plot in this month. - Shoreline area treatment between plots - Diquat (0.5-2 gal/acre) + nonionic surfactant - Plot treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant				
August	All plots should be treated once in this month. - Treatment - Imazamox (6-12 fl oz /acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant				

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 5 of 9
			Version	01	
Prepared By	HDR Engineering, Inc. and Thompson Engineering (formerly Barry Vittor & Associates)	Effective Date:	5.2024	Revision Date:	
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FALL	<i>Continue to prioritize problem areas (based on Spring/Summer monitoring reports) through this season where biomass has been shown to persist, either due to recreational activities enabling spread/recruitment or environmental conditions promoting growth.</i>
<i>September</i>	All Plots should be treated once in this month. - Treatment - Imazamox (6-12 fl oz /acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant
<i>October</i>	Shoreline area between plots should be monitored, assessed, and invasive vegetation treated. All plots should also be treated once this month. - Shoreline Treatment - Imazamox (6-12 fl oz /acre) + flumioxazin (6-12 fl oz /acre) + nonionic surfactant - Plot Treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant
<i>November</i>	This month will likely be the last opportunity to deal with larger infestations before average temperature drops and plants move to dormancy over winter. Prioritize areas with the highest concentration of biomass. - Treatment - Diquat (0.5-2 gal/acre) + nonionic surfactant

	Big Creek Lake Invasive Species Monitoring and Treatment		Doc. No.		Page 6 of 9
			Version	01	
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WINTER	<i>Depending on observations and data collected from plot monitoring,, it may not be necessary for each plot (or shoreline areas between plots) to receive treatment each month through winter.</i> <i>Herbicide uptake/efficacy will be reduced but so will opportunity for plant growth. Recommend mix of glyphosate (at max rate as water temperatures below 60°F may limit uptake of herbicide) + carfentrazone + surfactant through winter. To avoid waste of high-cost herbicide containing carfentrazone, only apply herbicides with this active ingredient if water temperature is above 50°F.</i> <i>This will be the last opportunity to eliminate living material in neglected or less problematic areas before spring, ensuring these areas will not harbor viable plant material that may be transported to areas with more favorable growing conditions, either by recreational activities or weather patterns that move biomass around.</i> <i>Avoid targeting necrotic/senescent plant matter and focus on living material, particularly larger individuals which may persist through freezes.</i>
<i>December</i>	Monitor entire shoreline and treat invasive vegetation within plots and areas between plots with equal priority. - Treatment - Glyphosate (7.5 pt/acre) [+ Carfentrazone (3.4-13.5 fl oz/acre) if water temperature >50°F] + nonionic surfactant
<i>January</i>	Monitor entire shoreline and treat invasive vegetation within plots and areas between plots with equal priority. - Treatment - Glyphosate (7.5 pt/acre) [+ Carfentrazone (3.4-13.5 fl oz/acre) if water temperature >50°F] + nonionic surfactant
<i>February</i>	Monitor entire shoreline and treat invasive vegetation within plots and areas between plots with equal priority. - Treatment - Glyphosate (7.5 pt/acre) [+ Carfentrazone (3.4-13.5 fl oz/acre) if water temperature >50°F] + nonionic surfactant

2026 SECOND QUARTER EXOTIC SPECIES MONITORING AT BIG CREEK LAKE



INTRODUCTION

The second quarter exotic species monitoring of Big Creek Lake for 2026 was conducted on June 26th and 29th to document the presence of non-native Giant Salvinia (*Salvinia molesta*), Cuban Bulrush (*Cyperus blapharolentos*), and Pantropical Beakrush (*Rhynchospora corymbosa*). Seventy-one permanent monitoring stations were visited to estimate site-specific cover of the three species along with the mapping of incidental observations made between the stations. The following report provides the results of the second quarter monitoring effort and gives recommendations for the management of the exotic species.

BACKGROUND & METHODS

Seventy-one (71) stations were established in the summer of 2024 at Big Creek Lake to serve as permanent monitoring locations to track the presence/absence of Giant Salvinia and to visually estimate its cover (Figure 1). Monitoring conducted in October 2025 visited 67 stations, while the March 2026 (first quarter assessment) collected data at 68 of the 71 monitoring plots. This current assessment visited all 71 monitoring plots. Within the general area of each station marker, the presence or absence of Giant Salvinia was recorded along with an estimate of its cover, using the following six cover classes (Table 1).

Table 1. Categories of cover used in the data collection.

COVER CLASS (Percent)	DESCRIPTION
5 %	Small scattered fragments (very sparse)
10%	Larger fragments to small clumps (less sparse)
25%	Small clumps (closer together)
50%	Larger clumps to mat forming
75%	Not quite solid mat
100%	Solid mats

The monitoring stations were visited on June 26th and 29th, 2026 by motorized boat. Between stations, the observers slowly cruised the accessible shoreline and recorded incidental observations of Giant Salvinia, Cuban Bulrush and Pantropical Beakrush where herbicide treatment might be required.

RESULTS

Giant Salvinia (*Salvinia molesta*)

Table 2 gives the percent cover of Giant Salvinia recorded at each station for the June 2026 assessment and also the previous March 2026 survey results for comparison.

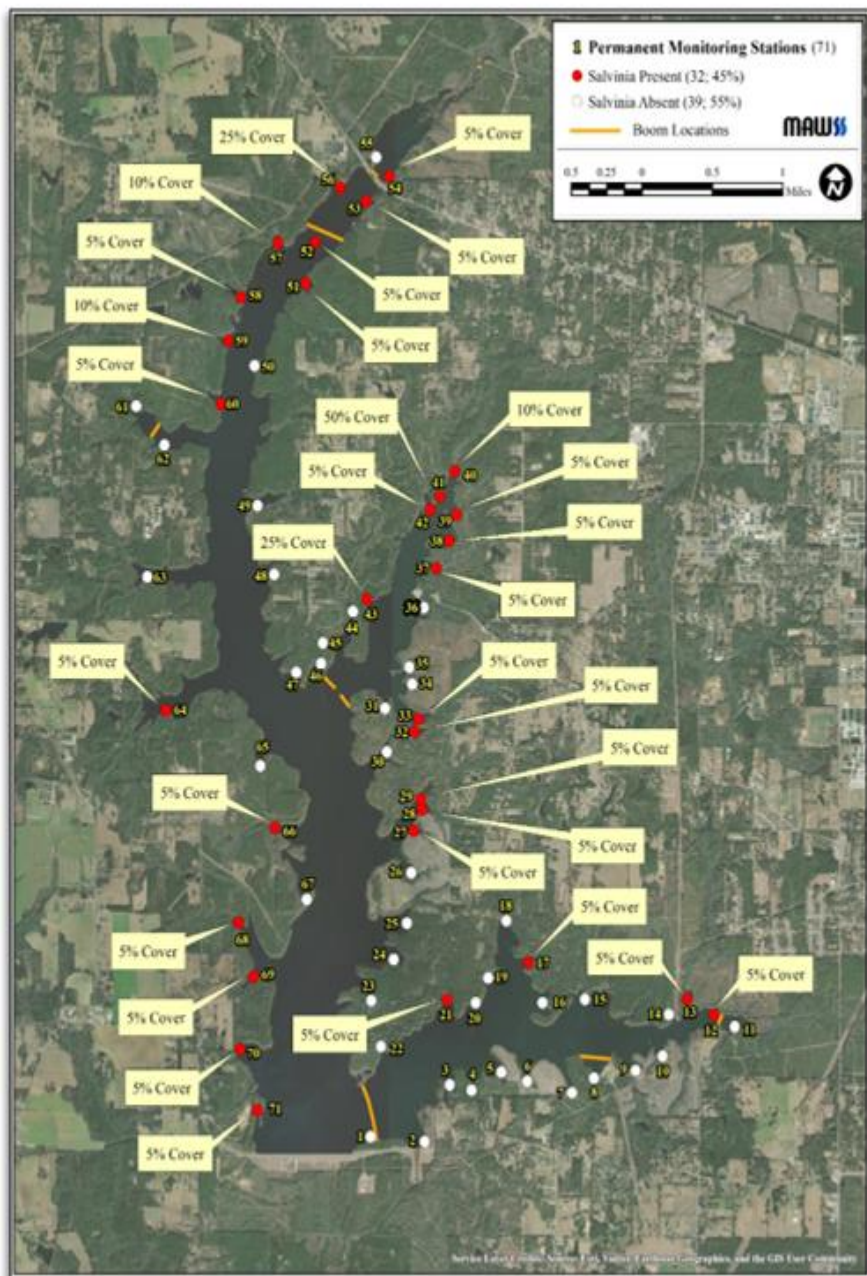


Figure 2. Giant Salvinia Presence/Absence with estimated cover at Monitoring Stations (June 2026)

Table 2. Cover of Giant Salvinia at the monitoring plots for the June and March surveys

STATION	JUNE 2026 COVER (%)	MARCH 2026 COVER (%)
12	5%	Not Present
13	5%	Not Present
15	Not Present	5%
17	5%	Not Present
18	Not Present	Not Visited; Assumed Present
21	5%	5%
23	Not Present	5%
24	Not Present	10%
27	5%	Not Present
28	5%	Not Present
29	5%	10%
32	5%	5%
33	5%	5%
34	Not Present	5%
36	Not Present	25%
37	5%	5%
38	5%	Not Present
39	5%	5%
40	10%	5%
41	50%	50%
42	5%	5%
43	25%	25%
50	5%	Not Present
51	5%	Not Present
52	5%	Not Present
53	5%	5%
54	5%	5%
55	Not Present	5%
56	25%	75%
57	10%	25%
58	5%	50%
59	10%	25%
60	5%	Not Present
64	5%	Not Visited
66	5%	5%
68	5%	5%
69	5%	Not Present
70	5%	Not Present
71	5%	5%

Giant Salvinia was documented at 32 of the 71 stations visited during the June 2026 monitoring (45%; **Figure 2**, **Table 2** above). The species was recorded at twelve stations where it had not been observed in March (stations 12, 13, 17, 27, 28, 38, 50, 51, 52, 60, 69, & 70). Seven stations (15, 18, 23, 24, 34, 36, & 55) lacked Giant Salvinia where it was present during the first quarter monitoring (March 2026).

Estimated *Salvinia* cover for the June assessment ranged between 5% (26 stations) to 50% (station 41) giving an overall average of 3.7 % across all 71 monitoring stations (**Figure 2**). The March 2026 survey reported an average cover of 5.6% across 67 sampled plots. Thirteen plots remained unchanged in their estimated cover from the March 2026 assessment (21, 32, 33, 37, 39, 41, 42, 43, 53, 54, 66, 68, 71; **Table 2**). Of these 13 plots, 11 (85%) had a cover of 5% (the lowest cover category). Plot 41 had a cover of 50% and Plot 43 had a cover of 25% in the two surveys.

Significant reductions in cover were noted at two stations. Plot 56 decreased from an estimated cover of 75% in March to 25% in the present survey, while Plot 58 went from 50% to 5%. Plots 57 and 59 showed a smaller decrease with both dropping from 25% to 10%.

Incidental observations of Giant *Salvinia* encountered between plots were mapped using GPS. **Figure 3** illustrates the location of [468 point](#) locations marking the incidental occurrences of Giant *Salvinia*.

Cuban Bulrush (*C. blepharoleptos*) & Pantropical Beakrush (*R. corymbosa*)

Occurrences of Cuban Bulrush were limited to the head of Crooked Creek. Six incidental observations of the species were noted between stations 37 and 41 (**Figure 4**). Three observations of the species were made in the March assessment from the same general area.

Pantropical Beakrush was found at the head of Crooked Creek, where large number of plants persist around the general vicinity of Plot 40 (**Figure 4**). Evidence of herbicide treatment was noted at this location, but continued spraying is needed to control the species.

A second large area of Pantropical Beakrush was documented in March 2026 at the northern end of the lake, occurring both north and south of the Highway 98 bridge. The June 2026 survey did not identify plants at any of the previous locations in this area.

While the June 2026 assessment found fewer occurrences of Pantropical Beakrush, it is unknown whether this reduction is due to targeted treatment by the herbicide applicators, or an artifact of seasonality. The species flowers and fruits in early spring and dies back quickly making it difficult to observe later in the season.

SUMMARY AND RECOMMENDATIONS

The June 2026 assessment revealed a decline in the average cover of Giant *Salvinia* since the March survey (3.7% versus 5.6%) suggesting that herbicide treatments appear to be working in areas where control efforts are ongoing. However, the species was detected in new areas, suggesting continued spread. Both Cuban bulrush and Pantropical Beakrush are still present at the head of Crooked Creek, while Pantropical Beakrush may still be present near the head of the lake near Highway 98. Continued monitoring and follow-up spot treatments on newly detected plants across Big Creek Lake is recommended.



Figure 4. Mapped Occurrences of Cuban Bulrush and Pantropical Beakrush (June 2026)

J.B. Converse Reservoir

Invasive Species monitoring
stations

Herbicide Application Gallons sprayed ZONES

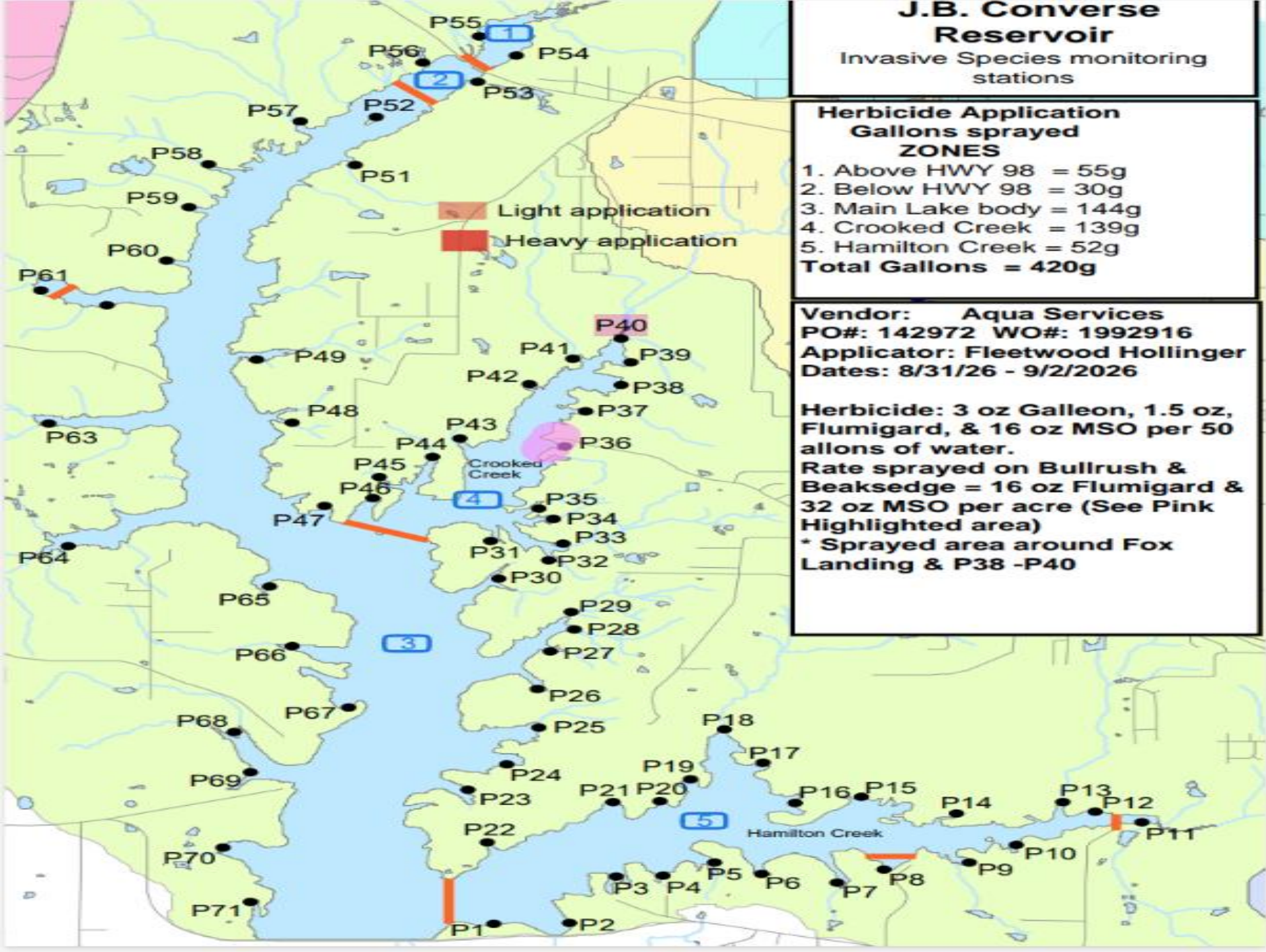
1. Above HWY 98 = 55g
 2. Below HWY 98 = 30g
 3. Main Lake body = 144g
 4. Crooked Creek = 139g
 5. Hamilton Creek = 52g
- Total Gallons = 420g**

Vendor: Aqua Services
PO#: 142972 **WO#:** 1992916
Applicator: Fleetwood Hollinger
Dates: 8/31/26 - 9/2/2026

Herbicide: 3 oz Galleon, 1.5 oz,
Flumigard, & 16 oz MSO per 50
allons of water.

**Rate sprayed on Bullrush &
Beaksedge = 16 oz Flumigard &
32 oz MSO per acre (See Pink
Highlighted area)**

*** Sprayed area around Fox
Landing & P38 -P40**



Crooked Creek One Year Ago





Converse Reservoir

STOP!!!

**The Spread
of
Invasive Species**

Crooked Creek
7-21-21



Crooked Creek
5-12-22



<https://www.youtube.com/watch?v=WdnQGOyZ7iE> (Canyon Lake)

<https://nas.er.usgs.gov/queries/SpeciesAnimatedMap.aspx?speciesID=5> (Zebra Map)

<https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=5> (Fact Sheet)

Zebra mussels have invaded Holt Lake; Boaters can help prevent their spread

USACE. MOBILE DISTRICT

Published May 19, 2021



[PRINT](#) | [E-MAIL](#)

[Final Zebra Mussels PSA.PDF](#)

MOBILE, Ala. – The U.S. Army Corps of Engineers, Mobile District (USACE) advises the public that Zebra mussels have become established in Holt Lake, imperiling Alabama’s freshwater resources. The decisions of boaters will largely determine the invasive mussel’s spread and impact.

Alabama is home to beautiful and extremely valuable freshwater resources. Our state is known for its incredible fish, mussel, crayfish, snail, and turtle diversity. Among these groups, however, the [mussels](#) stand out as especially impressive. Around two-thirds of mussel species present in North America can be found in our waters. Several of these are Alabama endemics, meaning they cannot be found anywhere else in the world! There is one mussel, however, that many of us hoped would never reach our freshwater ecosystems.

The zebra mussel, *Dreissena polymorpha*, is included among the [world’s worst invasive species](#) due to its devastating ecological and economic impacts. Since arriving to the Great Lakes in the 1980’s from eastern Europe via ballast water release, they have spread across much of the nation, negatively impacting freshwater biodiversity, ecosystem function, and vital infrastructure along the way. Zebra mussels can attach themselves to solid objects, leading to dense infestations. Resultantly, they are notorious for [damaging boats](#), clogging water intake and filtration pipes, and threatening native mussel species.

Boat engines can overheat if the mussels colonize on motors, while attachment to hulls can lead to reduced speed, lower fuel efficiency, and/or handling issues. Basic infrastructure – including that of lakeshore municipalities, power plants, and irrigation systems – has been known to suffer from zebra mussel related problems, as well. Further, the zebra mussel not only competes with native mussel species for resources and space, but can also colonize on top of native species which may result in smothering and starvation.

Unfortunately, an established zebra mussel population has recently been recognized in [Holt Lake](#), and small numbers have also been spotted at other locations on the Black Warrior and Tombigbee Waterway. [Army Corps of Engineers](#) personnel and state biologists are working to determine the current scope of the invasion and how best to minimize zebra mussel impacts.

Though established, reproducing, populations of zebra mussels are currently only recognized in Holt Lake, their spread potential is immense. This is especially true as large numbers of microscopic, planktonic, young can be easily transported without detection. After zebra mussels become established in a lake or reservoir they are generally there to stay, but boaters can make a huge difference by protecting new areas from invasion.

Proper cleaning, draining, and drying of boats is so important for preventing invasion spread that several states have passed legislation enforcing the issue of citations to anyone failing to follow boat hygiene protocols. So far, however, this is not the case in Alabama. The decision to protect our freshwater resources from zebra mussels rests entirely on individual boaters.

To adequately clean a boat after leaving zebra mussel infested waters, power washing – either at home or at a self-service car wash, and preferably with hot water – is required after draining. Additionally, any equipment that has touched water (such as minnow buckets, tie downs, anchors, etc.) should be cleaned with a dilute bleach solution. Further, one to two weeks of dry quarantine are generally recommended. More detailed cleaning procedures may be found [here](#).

Caleb Shuler, Army Corps of Engineers Natural Resource Specialist at the Holt Resource Office has advice for boaters leaving Holt Lake —

“When you are done fishing for the day make sure and pull your boat plug when you are safely out of the water. This is a good opportunity to make sure all standing water has a chance to drain. Empty minnow buckets, livewells and anything that was exposed or might be holding lake water. Please make sure your boat and trailer are completely dry and cleared of debris and vegetation before you decide to recreate on a new body of water.”

Effect on Water Systems

- Zebra mussels clog pumps and pipes
- Cost more than \$1 billion annually to US water utilities – costs are borne by ratepayers
- Harm water quality and water pressure
- Nearly impossible to effectively clean boats
 - Drain boat
 - 140 degree wash of entire boat and trailer
 - Bleach on all soft surfaces
 - 2 week quarantine



*Figure 2: Zebra Mussels in Small-Diameter Pipe
(Source: Associated Press, 2014)*

The map displays the Mawson Lakes Water Supply Scheme, highlighting the Mawson Lakes Water Treatment Plant (MAWSS) property in red. The scheme includes several creeks: Big Creek, Juniper Creek, Long Branch, Bloody Branch, Crooked Creek, College Creek, and Hamilton Creek. The map also shows the location of the Mawson Lakes Water Treatment Plant (MAWSS) property, which is shaded in red. The map includes a legend with the following items:

- Camera Monitoring Locations (indicated by pink dots)
- Boom (indicated by a red line)
- Crude Oil Pipeline (indicated by a yellow line)
- Natural Gas Pipeline (indicated by a black line)
- Pump Station (indicated by a yellow square with a black 'X')
- Water Line (indicated by a blue line)
- Sewer Line (indicated by a green line)
- HWY98 Route (indicated by a thick black line)
- Main Roads (indicated by thin grey lines)
- MAWSS Property (indicated by a red hatched area)

Other features on the map include the Mawson Lakes Water Treatment Plant (MAWSS) property, the Mawson Lakes Water Treatment Plant (MAWSS) property, and the Mawson Lakes Water Treatment Plant (MAWSS) property. The map also shows the location of the Mawson Lakes Water Treatment Plant (MAWSS) property, which is shaded in red. The map includes a legend with the following items:

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- Sewer Line (indicated by a green line)
- HWY98 Route (indicated by a thick black line)
- Main Roads (indicated by thin grey lines)
- MAWSS Property (indicated by a red hatched area)

- MAWSS implemented a major watershed management plan
- Protects shoreline and watershed to ensure water quality

A blurred background image of a city skyline, featuring several tall buildings and a prominent skyscraper with a pointed top. The word "Questions?" is overlaid in the center in a large, black, sans-serif font.

Questions?