Post-Treatment Assessment for Aquatic Plant Control ERDC Demonstration Project

Stewart Park, Cayuga Lake, Ithaca, New York 2021

Prepared for:

United States Army Corps of Engineers
Buffalo District

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Buffalo District
BUILDING STRONG®

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ACRONYMS AND ABBREVIATIONS

cfs	cubic feet per second
ERDC	Engineer Research and Development Center
GPS	Global Positioning System
HPLC	high-performance liquid chromatography
Hydrilla	*Hydrilla verticillata*
JV	Environmental Assessment Services, LLC and Ecology and Environment, Inc. Joint Venture
µg/L	micrograms per liter
NYSDEC	New York State Department of Environmental Conservation
PIS	point intercept survey
ppb	parts per billion
Project	Stewart Park, Cayuga Lake Hydrilla Demonstration Project
SePRO	SePRO Corporation
SLM	SOLitude Lake Management, LLC
TAT	turnaround time
USACE	United States Army Corps of Engineers (Buffalo District)
USGS	United States Geological Survey

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1. INTRODUCTION

The Stewart Park, Cayuga Lake Hydrilla Demonstration Project (the Project) is a field-scale demonstration of a technology developed under the United States Army Corps of Engineers – Buffalo District's (USACE's) Aquatic Plant Control Research Program to manage monoecious hydrilla (*Hydrilla verticillata*; Hydrilla) in a high water exchange environment.

This report contributes to the Year 4 post-treatment monitoring and assessment of herbicide efficacy on Hydrilla by summarizing herbicide treatment methodology and contact time, and identifying lessons learned to benefit future work.

1.1. Background

Hydrilla is a very aggressive, invasive submerged aquatic plant. Treatment of Hydrilla at the southern end of Cayuga Lake began in 2013, and the USACE began leading herbicide application efforts in 2018, as discussed below. Given the ease with which this plant spreads by fragments, its proximity to the Erie Canal, and the heavy use of the waterway, this infestation has caused urgent concern regarding spread to other areas of Cayuga Lake, the Finger Lakes, the Erie Canal system, and, potentially, the Great Lakes. These concerns provided the impetus for implementing this Project.

The majority of the Hydrilla treated as a part of the first year of the Project was identified along the shoreline of Stewart Park. Two copper spot treatments were conducted in 2018. During the second year of treatment to control and eradicate Hydrilla, treatment occurred within a 70-acre treatment area that focused on application of fluridone (Sonar® H4C) along approximately 3,500 linear feet of shoreline at Stewart Park. Additionally, during the second year of treatment (2019), a 6.5-acre area near the Cornell Community Sailing Center, northeast of the 70-acre treatment area near Stewart Park, was treated with fluridone and chelated copper (Harpoon®). During the third year of the Project (2020), three areas were treated with fluridone (Sonar® H4C): a reduced treatment area along the same 3,500 linear feet of shoreline at Stewart Park (approximately 40.5 acres), a 7.4-acre treatment area near the Cornell Community Sailing Center, and an approximately 3.1-acre area within Cayuga Lake Inlet along the shoreline east of Cass Park. Additionally, spot treatment with copper ethylene diamine complex (chelated copper; Harpoon®) occurred in Cayuga Lake and in Fall Creek.

Based on observations made in the fall of 2020, a treatment plan was developed with the Hydrilla Task Force to control monoecious Hydrilla beds in the southern end of Cayuga Lake, Cayuga Inlet, Cascadilla Creek, and Fall Creek (see Figure 1-1). Four general treatment areas were established for treatment with fluridone (Sonar® H4C and/or Sonar® Genesis):

- Fall Creek: 22.5 acres starting at Fall Creek from the State Route 13 bridge to the confluence with Cayuga Lake, including the Fall Creek lagoon, Stewart Park lagoon, and Golf Course lagoon (see Figure 1-2).
- Cayuga Lake East: 55 acres at the southern end of Cayuga Lake offshore of Stewart Park and the Cornell Community Sailing Center; three total areas – Stewart Park 1, Stewart Park 2, and the Cornell Community Sailing Center (see Figure 1-3).
- Cayuga Lake West: 12.5 acres comprising two different areas near Treman State Marine Park west of the confluence with the Cayuga Inlet – Treman State Marine Park 1 and Treman State Marine Park 2 (see Figure 1-4).
- Cayuga Inlet: 9.8 acres comprising four different areas within the Cayuga Inlet – Treman State Marine Park Boat Launch, Cass Park, Cornell Crew Bay, and Cascadilla Creek (see Figure 1-5).

With the exception of Fall Creek, the remainder of the treatment areas were treated with Sonar® H4C. The Fall Creek treatment area was treated with both Sonar® H4C and Sonar® Genesis. Additionally, spot treatment with copper ethylene diamine complex (chelated copper; Harpoon®) occurred in three plots off of the Cayuga Inlet in Cascadilla Creek and the Cornell Crew Bay (see Figures 1-1 and 1-6). These treatment areas were delineated by the USACE using aquatic plant survey data from 2020 and 2021.

Implementation of the Project has been a collaborative effort between the USACE Engineer Research and Development Center (ERDC); the USACE Buffalo District; Environmental Assessment Services, LLC–Ecology and Environment, Inc. (member of WSP) Joint Venture, (JV); the New York State Department of Environmental Conservation (NYSDEC); the City of Ithaca; the Tompkins County Soil and Water Conservation District; the Tompkins County Health Department; the Finger Lakes Partnership for Regional Invasive Species Management; the Cayuga Lake Watershed Network; and the applicator, SOLitude Lake Management, LLC (SLM). Although the USACE was not required to obtain an Article 15, New York Code of Rules and Regulations Part 327 aquatic pesticide permit for the Project, reasonable and appropriate measures were taken to meet the intent and conditions that would be associated with such a permit.

1.2. Purpose and Scope

The purpose of the Project is to perform a field-scale demonstration of a technology developed under the Aquatic Plant Control Research Program to evaluate the effectiveness of aquatic herbicides to manage monoecious Hydrilla in high water exchange environments. The USACE is also funding a separate research project titled “Improving Chemical Control in High Water Exchange Environments in Northern Waters”; this research has been ongoing since 2010. This method and the underlying concepts are being tested against monoecious Hydrilla for the Tonawanda Creek/Erie Canal Demonstration Project in Western New York and the Wells College Bay Demonstration Project, as well as this Project.

The findings in this program will provide valuable information for developing future guidance for managing this invasive aquatic plant that is expanding in high water exchange systems throughout the northeastern United States.

This post-treatment report includes a summary of the herbicide treatment methodology, including quantity of herbicide used and total acreage treated; a discussion of herbicide contact time and dispersion through the system; and a discussion of the monitoring that accompanied the herbicide application. Lastly, the report provides conclusions, in the form of lessons learned, to help inform future treatment projects.

Figure 1-1 2021 Fluridone Treatment Areas- Summer 2021
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Cayuga Inlet
- Cayuga Lake East
- Cayuga Lake West
- Fall Creek

N

0 1,000 Feet

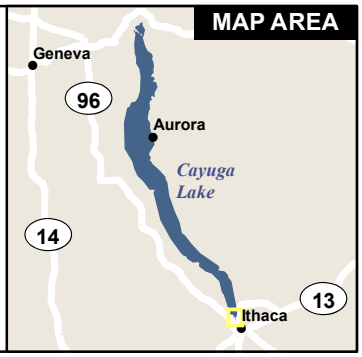

Figure 1-2 2021 Fluridone Treatment Areas at Fall Creek Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Fall Creek (18.7 acres)
- Fall Creek Lagoon (0.7 acres)
- Golf Course Lagoon (0.6 acres)
- Stewart Park Lagoon (2.5 acres)
- Cayuga Inlet
- Cayuga Lake East
- Fall Creek

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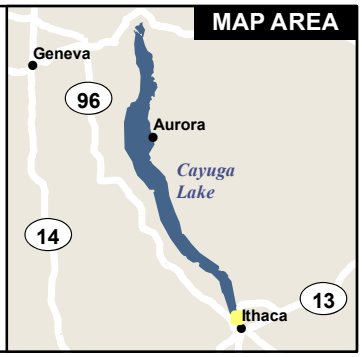

Figure 1-3 2021 Fluridone Treatment Areas at Cayuga Lake East
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Stewart Park 1 (35.9 acres)
- Stewart Park 2 (12.5 acres)
- Cornell Community Sailing Club (6.8 acres)
- Cayuga Lake East
- Fall Creek

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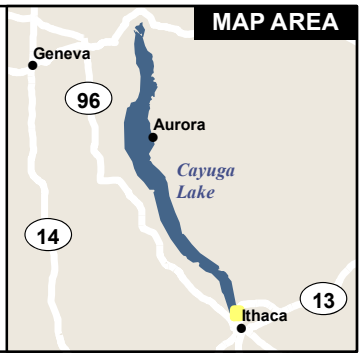

Figure 1-4 2021 Fluridone Treatment Areas at Cayuga Lake West
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Treman State Marine Park 1 (11.6 acres)
- Treman State Marine Park 2 (2.0 acres)
- Cayuga Lake West

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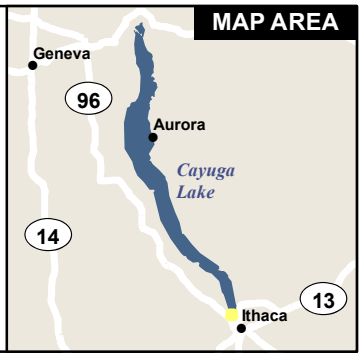
0 250 Feet



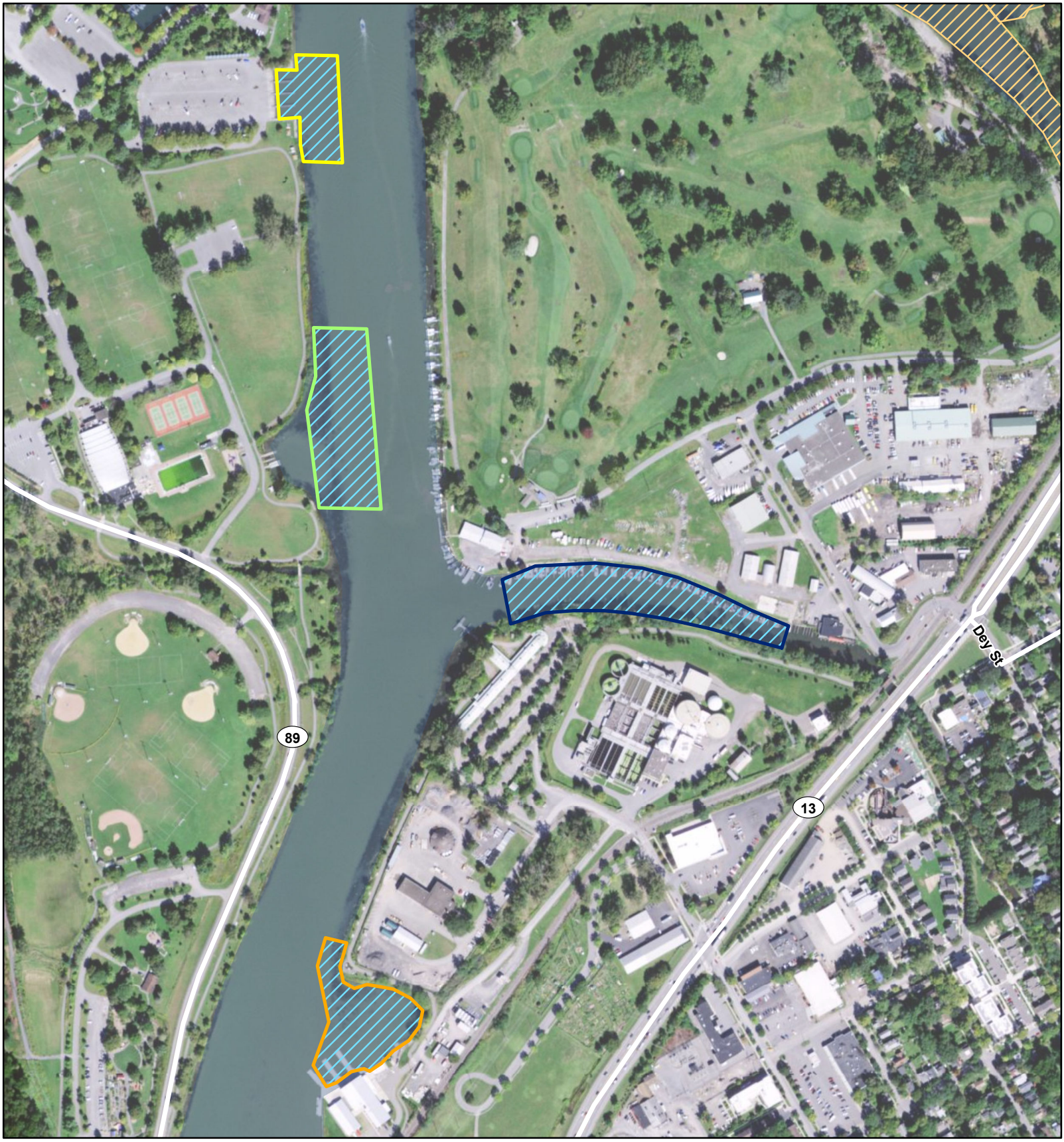


Figure 1-5 2021 Fluridone Treatment Areas at Cayuga Inlet
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Cascadilla Creek (3.3 acres)
- Cass Park (3.1 acres)
- Cornell Crew Bay (2.3 acres)
- Treman State Marine Park Launch (1.5 acres)
- Cayuga Inlet
- Fall Creek

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0 500 Feet

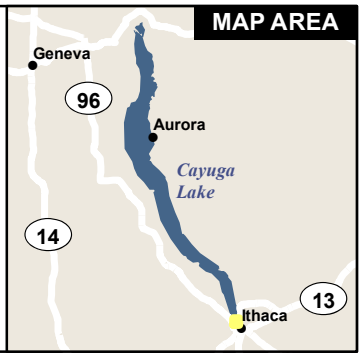


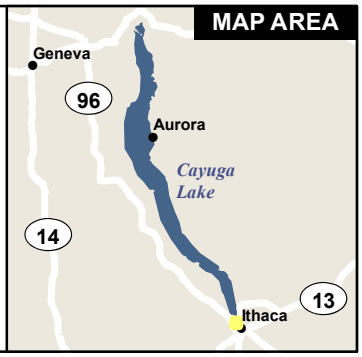
Figure 1-6 2021 Copper Spot Treatment Areas- Summer 2021
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Cayuga Inlet
- Copper Spot Treatment Areas

N

0 500 Feet



2. OVERVIEW OF HERBICIDE TREATMENT AND MONITORING

Treatment of Hydrilla for the Project focused on the application of the aquatic herbicides fluridone (Sonar® 4HC and Sonar® Genesis) and chelated copper (Harpoon®) within Cayuga Lake near Stewart Park and the Cornell Community Sailing Center in Ithaca, within Cayuga Lake near Treman State Marine Park, two areas within and two areas adjacent to the Cayuga Inlet, and within a portion of Fall Creek. The following sections outline the public notification that preceded treatment, herbicide treatment methodology, and quantity of herbicide used.

2.1. Public Notification

Public awareness and understanding of the Project were important to successful implementation. The USACE and its interagency partners conducted outreach activities to potentially affected users in advance of treatment. The following outreach and notification activities associated with treatment near Ithaca included were conducted:

- Collaboration was conducted with stakeholders regarding the development of treatment plans for 2021 by conference call and virtual meetings.
- Dates for the initial treatments were provided to NYSDEC, the Tompkins County Health Department, the City of Ithaca, the Bolton Point Water Treatment Plant, and the Cayuga Lake Watershed Network; and email reminder notifications were sent out 24 hours prior to each treatment.
- Written notifications were sent by certified mail approximately 14 days prior to the first fluridone treatment to all riparian owners/users within the half-mile buffer (north and south) of the treatment areas.
- Agency notification letters were distributed approximately nine days prior to the first fluridone treatment.
- Yellow warning signs were deployed and maintained at public access points along the lakeshore at the commencement of each treatment. The signs indicated applicable water use restrictions regarding irrigation and drinking, culinary, or food processing purposes. The signs also displayed water use restrictions that were in effect for the duration of the treatment or until testing determined that the threshold concentrations had been met. Additionally, signage was posted prior to the chelated copper spot treatment in Cascadilla Creek and Cornell Crew Bay, both off of the Cayuga Inlet.

The Tompkins County Soil and Water Conservation District posted and maintained the yellow warning signs (as described above) to meet the intent of permit requirements. Application dates and times were updated on the signs prior to each of the 11 fluridone treatments. As in the first year of the Project, NYSDEC did not require any newspaper notifications of the treatment activities.

2.2. Herbicide Treatment Methodology

The aquatic herbicide fluridone (Sonar® H4C) was applied in designated sections of Cayuga Lake during 10 treatment events that occurred between July 1 and September 2, 2021 (see Table 2-1). Fluridone (Sonar® H4C) was applied in Fall Creek during 10 treatment events, beginning one week earlier than treatment in the lake; treatment events occurred between June 24 and August 26, 2021. Fall Creek was also treated with a second type of fluridone (Sonar® Genesis) via an injection system. Treatments via the injection system started on June 24, 2021 and concluded on October 3, 2021. Lastly, fluridone (Sonar® H4C) was applied in the Cayuga Inlet treatment area during eight treatment events between July 15 and September 2, 2021, and chelated copper (Harpoon®) was applied on August 20, 2021. The herbicide

applications were completed by SLM in accordance with the *Performance Work Statement or Contract Aquatic Plant Control ERDC Demonstration Project Stewart Park, Cayuga Lake, Ithaca, NY,* dated April 2021 (USACE 2021).

Herbicide Transfer

A Vortex granular spreader and backpack blowers were used for the fluridone (Sonar® H4C) and chelated copper (Harpoon®) treatments. Backpack blowers were used in the Fall Creek treatment areas. The boats used for the treatments were either a jon boat or airboat. Herbicide transfer occurred at the Allen H. Treman State Park launch, where the chemical delivery truck was able to park so that access was maintained to the launch for other users during the herbicide transfer process. The fluridone was delivered in 40-pound buckets, and the chelated copper was delivered in 40-pound bags. The empty buckets and bags were triple rinsed on site and recycled at the SLM Cortland Office location through Casella Waste Management. SLM staff wore personal protective equipment during the transfer from the truck to the treatment system.

With respect to the injection system used in Fall Creek, herbicide transfer of Sonar® Genesis occurred at the injection system location off of Pier Road. Chemical delivery trucks parked adjacent to the injector, where SLM staff transferred the herbicide in boxes comprising four 1-gallon containers. SLM staff filled the injection system on six separate occasions, depending on the herbicide level within the holding tank. The injection system was loaded by pouring one-gallon jugs of Sonar® Genesis into the top opening of the 30-gallon tank in the injection system enclosure. Containers were once again rinsed on site and recycled at the SLM Cortland Office location. Refer to Section 2.3.1 for additional discussion regarding the injection system.

Herbicide Application

A Vortex granular spreader was used throughout the treatment season. The boats had a global positioning system (GPS) navigation system, with all the treatment sectors preloaded. Treatment passes were made parallel to the shoreline. The quantity of herbicide needed for each section was determined by the total acreage and volume of the treatment areas. All of the predetermined product was applied to each section before moving to the next adjacent section. The herbicide used in each treatment area is detailed in Section 2.3.

For all 10 fluridone treatments on Cayuga Lake, the boat was launched at the Allen H. Treman State Park launch. SLM staff arrived at the boat launch between 7:30 a.m. and 8:30 a.m. on each scheduled treatment day. The staff included a lead applicator and an assistant/technician who assembled the treatment systems before going out for treatment. Treatment started around 8:30 a.m., and applications were completed in approximately 3 hours each week.

2.3. Quantity of Herbicide Used and Total Area Treated

As indicated in Section 1.1, the Project was divided into four general treatment areas: Fall Creek, Cayuga Lake East, Cayuga Lake West, and the Cayuga Inlet (see Figure 1-1). Within each of these general areas, individual treatment plots were established. Each area is discussed separately below, with respect to the quantity of herbicide used and the total area treated. To develop the treatment plan for each treatment area, the sprouting dynamics of Hydrilla tubers and condition of plants were monitored by the USACE and partners prior to and several weeks after treatment to determine optimal timing of treatment, length of exposure, and concentration of herbicide required for effective control of Hydrilla.

2.3.1. Fall Creek

The Fall Creek treatment area included Fall Creek from the State Route 13 bridge to the confluence with Cayuga Lake, including the Stewart Park, Fall Creek, and the golf course lagoons. Together, these areas made up 22.5 acres. Due to the average flow rate of the creek (75 cubic feet per second [cfs]), the main creek area was treated using two formulations of fluridone: 1) liquid fluridone (Sonar® Genesis) via an injection system, and 2) fluridone pellets (Sonar® H4C).

Injection System: Liquid Fluridone

A 24-volts-of-direct-current injection system was installed near the State Route 13 bridge to treat the creek to maintain a 2.5 parts per billion (ppb) daily rate. The injection unit contains a 30-gallon tank equipped with a tank level indicator, which was maintained between 10% and 90% capacity throughout the entire treatment. On a daily basis during operation of the injection system, flow rate was recorded using the United States Geological Survey (USGS) Station 04234000 Fall Creek, near Ithaca. Using the reported flow rate from the USGS station, a pump rate was calculated to deliver the appropriate application rate to each injector, with the goal of maintaining a target dose of 2 to 3 ppb. An upper flow limit of 80 cfs was established for the injection system, based on the herbicide budget for the system and the initial plan for treatment of the median summer discharge rate of 50 cfs for 90 days. However, 2021 had more precipitation than was seen in 2020. Flow rates ranged from approximately 6 to 400 cfs between June 4 and October 30, 2020 compared with approximately 82 to 4,500 cfs in 2021 for the Fall Creek gage (USGS 2021). Based on historical data, the median flow rate for Fall Creek between July and October ranges between approximately 30 and 70 cfs. In 2021, flow rates between July and October ranged from approximately 55 to 4,500 cfs. This resulted in higher flows in the creek and less time that the injection system was in operation. The system operated for a total of 45 days, with occasional operation above the 80 cfs threshold in the beginning and the end of the application period. At the end of operation, there were approximately 16 gallons Sonar® Genesis remaining in the tank. The tank is stored at the SOLitude Cortland warehouse for the winter. Summary injection details are provided in Table 2-1.

Pellet Fluridone Application

Ten fluridone treatments were scheduled for the Fall Creek treatment area during 2021. Because the water in Fall Creek becomes warmer earlier in the year than Cayuga Lake and Cayuga Inlet, the Fall Creek treatment area applications started one week earlier than those in the lake and inlet. The 2021 treatment plan specified that the first two treatments consist of applications of fluridone at a rate of 20 parts per billion (ppb), and the third through tenth treatments at a rate of 9 ppb (see Table 2-2), which was slightly less than the 10 ppb used in 2020. The reason for the decreased application rate for the third through tenth treatments was that the main channel of Fall Creek was to be treated with Sonar Genesis and because of that, a slightly lower application rate could be used in the off-channel areas, as it was assumed that some of the herbicide from the main channel would assist in control of the off-channel areas. The goal was to maintain a concentration of 1 to 3 ppb over the course of the treatment, as the target concentration of fluridone in the water column for effective control of Hydrilla is 1 to 3 ppb. Sonar H4C is a slow-release, pellet formulation of fluridone. Therefore, application rates are higher than the target concentration for the water column. All application rates are in accordance with approved herbicide product label. Treatments occurred approximately seven days apart.

Table 2-1 Fluridone (Sonar® Genesis) In-Line Injector Application Summary by Treatment Date for Fall Creek

Date	Fall Creek Flow Rate (cfs)	Application Rate (ppb)	Total Volume Sonar® Genesis Added (gallons)	Tank Level (%)	Volume Added (gallons)	PPH (pulse per hour)	Event Detail
6/24/21	60	2.5	20	62	20	1100	initial start up
6/25/21	53.2	2.5		59.3		971	
6/26/21	44	2.5		53.6		806	
6/27/21	42.2	2.5		49.7		770	
6/28/21	36.4	2.5		45.4		660	
6/29/21	38	2.5				660	
6/30/21	140	2.5		39.2		2566	
	111	2.5		37		2034	
7/1/21	200	2.5		22.6		3666	
7/2/21	155	2.5		16.8		2841	
	124	2.5	20	78.7	20	2273	
7/3/21	106	2.5		69.5		1943	
	149	2.5		66		2731	
7/4/21	105	2.5		56.9		1924	
	90	2.5		51.1		1650	
7/5/21	77	2.5		47.3		1411	
7/6/21	59.4	2.5		39.8		1081	
7/7/21	190	2.5		33.5		3482	
	140	2.5		27.5		2600	
7/8/21		2.5	20	88.4	20	----	pump off
7/9/21	998						pump off
7/10/21							pump off
7/11/21							pump off
7/12/21	957						pump off
7/13/21	337						pump off
7/14/21	505						pump off
7/15/21	295						pump off
7/16/21	214						pump off
7/17/21	187						pump off
7/18/21	455						pump off
7/19/21	318						pump off
7/20/21	183						pump off
7/21/21	327						pump off

Date	Fall Creek Flow Rate (cfs)	Application Rate (ppb)	Total Volume Sonar® Genesis Added (gallons)	Tank Level (%)	Volume Added (gallons)	PPH (pulse per hour)	Event Detail
7/22/21	190						pump off
7/23/21	137						pump off, low power alarms
7/24/21	109						pump off
7/25/21	104						pump off
7/26/21							pump off
7/27/21	87						pump off
7/28/21							pump off, repairs by MH, JG
7/29/21	77			88.3		1141	pump on again
7/30/21	79					1141	
7/31/21	74.1			73.4		1141	
8/1/21	92						pump off
8/2/21	471						pump off
8/3/21							pump off
8/4/21							pump off
8/5/21							pump off
8/6/21	72.7			68.6		1320	pump on again
8/7/21	65.9			60.3		1191	
8/8/21	68.6					1191	
8/9/10	69.3					1191	
8/10/21	69.9			39.5		1191	
8/11/21	68.6					1191	
8/12/21	68.8		20		20	1191	20 gallons added
8/13/21	61.5					1136	
8/14/21	56.8			84.9		1026	
8/15/21	69.9			78.8		1265	
8/16/21	53.2					1265	
8/17/21	51.1			66.1		935	
8/18/21	1170			57.8			pump off
8/19/21	2640						pump off
8/20/21							pump off
8/21/21	620						pump off
8/22/21							pump off
8/23/21	309						pump off
8/24/21	233						pump off

Date	Fall Creek Flow Rate (cfs)	Application Rate (ppb)	Total Volume Sonar® Genesis Added (gallons)	Tank Level (%)	Volume Added (gallons)	PPH (pulse per hour)	Event Detail
8/25/21	180			57.8			pump off
8/26/21	155						pump off
8/27/21							pump off
8/28/21							pump off
8/29/21							pump off
8/30/21	149						pump off
8/31/21	134						pump off
9/1/21	116						pump off
9/2/21	132						pump off
9/3/21	111						pump off
9/4/21	98.2						pump off
9/5/21	94.5						pump off
9/6/21	125						pump off
9/7/21	98.4			57.2			pump off
9/8/21	89.2						pump off
9/9/21	261						pump off
9/10/21	180						pump off
							pump off
9/12/21	94.5						pump off
9/13/21	155						pump off
9/14/21	164						pump off
9/15/21	126						pump off
9/16/21	312						pump off
9/17/21	161						pump off
9/18/21	132			58		2419	pump on
9/19/21	108					1979	
9/20/21	96.4			32.4		1760	
9/21/21	84.2					1540	
9/22/21	78.4			12.3		1430	
9/23/21	78.4		25 by Jason	9.2	25 by Jason		pump off at 7am, rain coming
9/24/21	408			92.8			pump off
9/25/21							pump off
9/26/21	155						pump off
9/27/21	149			93.3		2731	pump on
9/28/21	141					2566	

Date	Fall Creek Flow Rate (cfs)	Application Rate (ppb)	Total Volume Sonar® Genesis Added (gallons)	Tank Level (%)	Volume Added (gallons)	PPH (pulse per hour)	Event Detail
9/29/21	115					2108	
9/30/21	102					1870	
10/1/21	85.8			41.6		1558	
10/2/21	85.5					1558	
10/3/21	129			23.5			system off
10/4/21	470		15 gallons	73.2	15 gallons		
10/5/21	1040						
10/6/21	337						
10/7/21	241						
10/8/21	190						
10/9/21	161						
10/10/21	152						
10/11/21	129						

Key:
cfs = cubic feet per second
ppb = parts per billion

Table 2-2 Fluridone (Sonar® H4C) Herbicide Application Summary by Treatment Date for Fall Creek

Date	Application Rate (ppb)	Total Pounds of Sonar® H4C		
		Golf Course Lagoon	Stewart Park Lagoon	Fall Creek Lagoon
06/24/2021	20	3	12	3
07/01/2021	20	3	12	3
07/08/2021	9	1	5	1
07/15/2021	9	1	5	1
07/23/2021	9	1	5	1
07/29/2021	9	1	5	1
08/05/2021	9	1	5	1
08/12/2021	9	1	5	1
08/20/2021	9	1	5	1
08/26/2021	9	1	5	1
Total Pounds		**14**	**64**	**14**

Key:
ppb = parts per billion

2.3.2. Cayuga Lake East

The Cayuga Lake East treatment area included a total of 55 acres at the southern end of Cayuga Lake offshore of Stewart Park and the Cornell Community Sailing Center. Three areas—Stewart Park 1, Stewart Park 2, and the Cornell Community Sailing Center—made up this general treatment area.

Ten fluridone treatments were scheduled for the Cayuga Lake East treatment area during summer 2021. Analysis of water monitoring data from 2019 and 2020 indicate that concentrations of fluridone in the water column necessary to control Hydrilla can be achieved with slightly lower application rates; this is an indication of lower water exchange or better retention time. Fluridone inputs from the Fall Creek treatment plot were also factored into determining appropriate application rates for the Cayuga Lake East treatment area. The Cayuga Lake West and Cayuga Lake Inlet treatment areas do not exhibit the same beneficial retention periods and therefore have higher application rates compared to the Cayuga Lake East treatment area. The treatment plan specified that the first two treatments would consist of fluridone applications at a rate of 20 ppb each, and the third through tenth treatments would be applied at a rate of 9 ppb (see Table 2-3). As indicated in Section 2.3.1, the goal was to maintain a concentration of 1 to 3 ppb over the course of the treatment, as the target concentration of fluridone in the water column for effective control of Hydrilla is 1 to 3 ppb. Sonar H4C is a slow-release, pellet formulation of fluridone. Therefore, application rates are higher than the target concentration for the water column. All application rates are in accordance with approved label. Treatments occurred approximately seven days apart.

Table 2-3 In-lake Fluridone Herbicide Application Summary by Treatment Date for Cayuga Lake East

Date	Application Rate (ppb)	Total Pounds of Sonar® H4C		
		Stewart Park 1	Stewart Park 2	Cornell Community Sailing Center
07/01/2021	20	246	104	86
07/08/2021	20	246	104	86
07/15/2021	9	111	47	39
07/23/2021	9	111	47	39

Date	Application Rate (ppb)	Total Pounds of Sonar® H4C		
		Stewart Park 1	Stewart Park 2	Cornell Community Sailing Center
07/29/2021	9	111	47	39
08/05/2021	9	111	47	39
08/12/2021	9	111	47	39
08/20/2021	9	111	47	39
08/26/2021	9	111	47	39
09/02/2021	9	111	47	39
Total Pounds		**1,380**	**584**	**484**

Key:
ppb = parts per billion

2.3.3. Cayuga Lake West

The Cayuga Lake West treatment area included a total of 12.5 acres at the southern end of Cayuga Lake west of the confluence with Cayuga Inlet. Two areas—Treman State Marine Park 1 and Treman State Marine Park 2—made up this general treatment area.

Ten fluridone treatments were scheduled for the Cayuga Lake West treatment area during summer 2021. The treatment plan specified that the first two treatments would consist of application of fluridone at a rate of 20 ppb, and the third through tenth treatments at a rate of 13.75 ppb (see Table 2-4). As indicated in Section 2.3.1, the goal was to maintain a concentration of 1 to 3 ppb over the course of the treatment. Sonar H4C is a slow-release, pellet formulation of fluridone resulting in higher application rates than the target concentration for the water column. All application rates are in accordance with approved label. Treatments occurred approximately seven days apart.

Table 2-4 In-lake Fluridone Herbicide Application Summary by Treatment Date for Cayuga Lake West

Date	Application Rate (ppb)	Total Pounds of Sonar® H4C	
		Treman State Marine Park 1	Treman State Marine Park 2
07/01/2021	20	135	30
07/08/2021	20	135	30
07/15/2021	13.75	93	21
07/23/2021	13.75	93	21
07/29/2021	13.75	93	21
08/05/2021	13.75	93	21
08/12/2021	13.75	93	21
08/20/2021	13.75	93	21
08/26/2021	13.75	93	21
09/02/2021	13.75	93	21
Total Pounds		**1,014**	**228**

Key:
ppb = parts per billion

2.3.4. Cayuga Inlet

The Cayuga Lake Inlet treatment area consisted of 9.8 acres comprising four different areas within the Cayuga Inlet—Treman State Marine Park Boat Launch, Cass Park, Cornell Crew Bay, and Cascadilla Creek. Ten herbicide applications were scheduled for the Cayuga Lake Inlet treatment area during summer 2021; however, delays in obtaining the Canal Work Permit resulted in the first application being delayed two weeks. Because of this delay, the herbicide application rates were revised from the original treatment plan, which called for two weeks at an application rate of 20 ppb, followed by eight weeks at 13.75 ppb, to 20 ppb for the first six applications, then 16.75 ppb for the seventh, and 13.75 ppb for the eighth and final application (see Table 2-5). As indicated in Section 2.3.1, the goal was to maintain a concentration of 1 to 3 ppb over the course of the treatment. Sonar® H4C is a slow-release, pellet formulation of fluridone resulting in higher application rates than the target concentration for the water column. All application rates are in accordance with approved herbicide product label.

Table 2-5 In-lake Fluridone Herbicide Application Summary for Cayuga Inlet

Date	Application Rate (ppb)	Total Pounds of Sonar® H4C			
		Treman State Marine Park Boat Launch	Cass Park	Cornell Crew Bay	Cascadilla Creek
7/15/2021	20	15	34	14	20
7/23/2021	20	15	34	14	20
7/29/2021	20	15	34	14	20
8/5/2021	20	15	34	14	20
8/12/2021	20	15	34	14	20
8/20/2021	20	15	34	14	20
8/26/2021	16.25	12	27	11	16
9/2/2021	13.75	10	23	10	14
	Total Pounds	**112**	**254**	**105**	**150**

Key:
ppb = parts per billion

Additionally, beginning the week of July 23, 2021, an additional area of Hydrilla was identified outside the existing Cornell Crew Bay treatment area. The treatment area was expanded to encompass the additional area and to accommodate that addition, some of the herbicide applied in the southern end of the bay was relocated. The treatment of the revised Cornell Crew Bay treatment area continued through the end of the season.

A chelated copper spot treatment application occurred within the Cayuga Inlet along with one of the fluridone treatment events, on August 20, 2021, at an application rate not to exceed 1,000 ppb (1 part per million; see Table 2-6). Spot treatment areas consisted of three individual, predetermined treatment areas within Cascadilla Creek and Cornell Bay and totaled 5.58 acres (see Figures 1-1 and 1-2). The chelated copper spot treatment was identified as being necessary due to the fact that Hydrilla patches in both Cascadilla Creek and Cornell Bay were not being sufficiently impacted by the fluridone (Sonar® H4C).

Table 2-6 In-lake Chelated Copper Herbicide Application Summary for Cayuga Inlet

Date	Plot /Acres	Target Concentration/Application Rate (ppb)	Total Pounds of Harpoon® Granular
8/20/2021	Cornell Crew Bay	1,000	732
	Cascadilla Creek	1,000	732
		Total Pounds	**1,464**

Key:
ppb = parts per billion

2.4. Water Quality Sampling Methodology

As discussed above, for the Fall Creek, Cayuga Lake East, and Cayuga Lake West general treatment areas, fluridone was applied during 10 treatment events. Fall Creek was treated between June 24 and August 26, 2021. Cayuga Lake East and West were treated between July 1 and September 2, 2021. The Cayuga Inlet general treatment area was treated with fluridone during eight treatment events between July 15, 2021, and September 2, 2021. The JV and USACE performed in-lake water quality sampling to determine the fluridone concentrations and dispersion of herbicide. The JV sampled weekly between June 28 and September 2, 2021, and the USACE performed water quality sampling at 15 sites on three dates during the season: July 15, August 12, and September 8, 2021. The JV also collected one additional sample in October following the conclusion of the Sonar® Genesis application in Fall Creek. Refer to Appendix A for analytical results of the sampling.

2.4.1. JV Sampling

The JV collected 13 in-lake water samples across the four treatment areas and three reference locations (outside of a treatment area) following each of the fluridone treatment events except for the first one, as only Fall Creek was treated at the end of June (see Figure 2-1 and Table 2-7 for sample locations). The purpose of the sampling was to determine the fluridone concentrations just prior to the next planned treatment event so that herbicide application could be refined, if necessary, to maintain the proper concentrations throughout each event (i.e., to ensure follow-up applications would not exceed approved rates/concentrations). The sampling events were weather-dependent and scheduled so that results from each event were available for review by the Project team prior to the next application. Weekly sampling events occurred approximately four days following each application.

No samples were collected for the copper spot treatment.

Table 2-7 In-Lake Water Fluridone Sample Collection Sites Stewart Park, Cayuga Lake Hydrilla Demonstration Project

Treatment Areas	Sample Location	Latitude[a]	Longitude[a]
Fall Creek	FC	42.45940000000	-76.50750000000
Cayuga Lake East	SP1	42.46180000000	-76.51180000000
Cayuga Lake East	SP2	42.46200000000	-76.50830000000
Cayuga Lake East	SP3	42.46260000000	-76.50490000000
Cayuga Lake East	SP4	42.46450000000	-76.50150000000
Cayuga Lake East	CS1	42.46660000000	-76.50100000000
Cayuga Lake East	CS2	42.46880000000	-76.50190000000

Treatment Areas	Sample Location	Latitude[a]	Longitude[a]
Cayuga Lake West	TSMP1	42.46390000000	-76.52160000000
Cayuga Lake West	TSMP2	42.46320000000	-76.51790000000
Cayuga Inlet	TSMPL	42.45620000000	-76.51190000000
Cayuga Inlet	CP	42.45350000000	-76.51150000000
Cayuga Inlet	CC	42.45170000000	-76.50790000000
Cayuga Inlet	CCB	42.44760000000	-76.51120000000
Non-treated areas	OutN	42.47630000000	-76.50760000000
Non-treated areas	OutW	42.47040000000	-76.52690000000
Non-treated areas	OutS	42.44050000000	-76.51500000000

Note:
[a] Latitude and longitude are provided in decimal degrees (WGS84).

All of the samples, with the exception of the Fall Creek water sample, were collected with a stainless-steel Kemmerer bottle sampler. The Fall Creek water sample was collected at elbow depth. The 16 in-lake sampling locations were as follows (see Figure 2-1):

- Thirteen samples within the treatment areas – one within the Fall Creek treatment area, six within the Cayuga Lake East treatment area, two within the Cayuga Lake West treatment area, and four within the Cayuga Lake Inlet treatment area;
- One sample approximately 1/2 mile north of the Cayuga Lake East treatment block along the eastern shoreline (OutN);
- One sample approximately 1/2 mile north of the Cayuga Lake West treatment area along the western shoreline (OutW); and
- One sample approximately 1/2 mile south of the Cayuga Inlet treatment area (OutS).

With the exception of the Fall Creek water samples, samples from each location listed in Table 2-7 were collected approximately 1 foot from the lake bottom to be representative of the fluridone concentrations where the plants were actively growing. The depth at each sample location was determined from the boat using a sounding tape to confirm the depth at each location.

For samples collected using a Kemmerer, before water samples were collected, the Kemmerer sampler was locked in the "open" position and completely submerged and rinsed in the surface water at each sample location. The Kemmerer was lowered so that the bottom edge of the cylinder was approximately 1 foot above the lake bottom for sample collection. After the messenger was sent down to "close" the Kemmerer sampler, each sample was retrieved and transferred into a brown high-density polyethylene 30-milliliter sample bottle provided by the laboratory. All samples were stored to avoid light exposure and shipped in coolers to SePRO Corporation (SePRO) in Whitakers, North Carolina, for analysis.

In-lake fluridone water samples were analyzed using a high-performance liquid chromatography (HPLC) method specific for fluridone. The standard operating procedure for measuring fluridone is a proprietary HPLC method developed by SePRO. The laboratory reported results for fluridone at a reporting limit of 1 ppb (micrograms per liter [µg/L]). Quality control samples were collected in the field during the post-application sampling period and consisted of field duplicate sample pairs collected at the same location at the rate of 5%.

Figure 2-1 2021 In-Lake and Drinking Water Sample Locations
Cayuga Lake, Tompkins County, New York

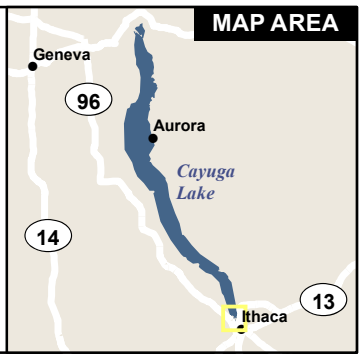
2021 Hydrilla Treatment Areas

- Cayuga Inlet
- Cayuga Lake East
- Cayuga Lake West
- Fall Creek

- Fluridone Sample Sites- USACE
- Fluridone Sample Sites- EAS E&E JV

N

0 1,000 Feet



2.4.2. USACE Sampling

The USACE collected water samples at 27 sampling locations on three dates following the fluridone treatments. Sampling events occurred on July 15, August 10, and September 8. Samples were collected from within and adjacent to the four general treatment areas: Fall Creek, Cayuga Lake East, Cayuga Lake West, and Cayuga Inlet (see Figure 2-1 and Table 2-8). Two samples were collected at each location, with the exception of the Golf Course lagoon (Site 1A) and Fall Creek Lagoon (Site 1B), which, due to shallow water depth, only had one sample taken at elbow depth. At all other sites, one sample was collected in the middle of the water column, and one was collected at the lake bottom with a water pump lowered to appropriate depth in the water column to address dilution and spread of herbicide. Due to the granular nature of fluridone, sampling in the middle and bottom of the water column is more likely to pick up herbicide residues than sampling at the water's surface. SePRO completed the analysis of the USACE samples using FasTEST analysis via a proprietary HPLC method. The laboratory reported results for fluridone at a reporting limit of 1 ppb (1 µg/L).

Table 2-8 Water Fluridone Sample Collection Sites Grouped by Treatment Area, Stewart Park, Cayuga Lake Hydrilla Demonstration Project

Treatment Areas	Sample Location
Fall Creek	FC
Cayuga Lake East	OutN
	SP1
	SP2
	SP3
	SP4
	CS1
	CS2
Cayuga Lake West	OutW
	TSMP1
	TSMP2
Cayuga Inlet	OutS
	TSMPL
	PC
	CC
	CCB

2.5. Results

The results for the JV fluridone water samples are presented in four separate tables, one for each general treatment area. Table 2-8 lists the sample locations associated with each treatment area. Non-treatment area samples are also included for comparison. The Fall Creek results are shown in Table 2-9, Cayuga Lake East results are shown in Table 2-11, and Cayuga Lake West results and Cayuga Inlet results are presented in Table 2-13 and Table 2-15, respectively. In general, the highest concentrations of fluridone were detected in the areas within Cayuga Lake East.

2.5.1. Fall Creek Sampling

JV Sampling

For samples taken within Fall Creek proper, fluridone concentrations were below detection limits, with the exception of the samples collected on July 6, 2021, and August 16, 2021, both of which were 3.8 ppb. That higher value may have been influenced by the Sonar® Genesis applications upstream. As indicated in Table 2-1, Sonar® Genesis was applied at a rate of 20 ppb on July 6, 2021, and 9 ppb on August 16, 2021. Additionally, the Sonar® Genesis injection system was online on August 9, 2021, which may have contributed to the 1.0 ppb concentration of the sample collected on August 9, 2021.

Table 2-9 Fall Creek Treatment Area – JV Water Sampling Results for Fluridone (ppb)

Date	Sample Location	Fluridone Concentration (ppb)[a]
6/28/2021	**FC**	<1
7/6/2021	**FC**	**3.8**
7/12/2021	**FC**	<1
7/19/2021	**FC**	<1
7/26/2021[b]	**FC**	<1
8/2/2021	**FC**	<1
8/9/2021	**FC**	**1.0**
8/16/2021	**FC**	**3.8**
8/23/2021	**FC**	<1
8/31/2021	**FC**	<1
9/7/2021	**FC**	<1

Note:
[a] Two reported results in a single cell indicate an instance where a field duplicate sample was collected.
[b] The 7/22 treatment was delayed one day due to weather/lake conditions; it occurred on 7/23.
Bold denotes a sample location within application area as well as positive sample detections.
Key:
ppb = parts per billion

USACE Sampling

Only a slight variation in herbicide residues was detected within the water column, as evidenced by differences in fluridone concentration between middle and bottom samples taken at the IFS1 MID/BOT locations (see Table 2-10). The slightly higher mid-water concentration at this location on August 10, 2021, would be expected given the fact that Sonar® Genesis (liquid) via the injection system was being used in this location. Samples taken within the Golf Course lagoon (IFS 1A) evidenced higher concentrations than those taken at the other sample sites within this treatment area on two of the three sampling dates, potentially due to it being the smallest treatment area and its position off of the creek, which may have meant slower flow and less mixing with the creek. Those factors may have facilitated less mixing within

the lagoon. Sampling results from September 8, 2021, 13 days after the final Sonar® H4C treatment within the lagoons, indicate that concentrations were 1.1 ppb or below at all locations. Despite most locations showing concentrations less than the ideal concentrations needed for effective control, results of vegetation monitoring did not detect any Hydrilla left within Fall Creek this fall (see Section 2.6). Thus, it appears there was still an effective treatment in this area.

Table 2-10 Fall Creek - USACE Water Sampling Results for Fluridone (ppb)

	Fluridone Concentration (ppb)		
Sample Location	**7/15/2021**	**8/10/2021**	**9/8/2021**
IFS1 MID	<1	**1.1**	<1
IFS1 BOT	<1	<1	**1.1**
IFS 1A[a]	<1	**4.8**	**1.0**
IFS 1B[a]	<1	<1	<1

Notes:
[a] Due to shallow depth, only one sample taken at elbow depth.
Bold denotes sample location within application area as well as positive sample detections.
Key:
BOT = bottom of water column
MID = middle of water column
ppb = parts per billion

2.5.2. Cayuga Lake East In-Lake Sampling

JV Sampling

Fluridone concentrations at the sample location (OutN) outside the treatment area remained below detection limits for the duration of the monitoring period between June 28 and September 7, 2021 (see Table 2-11). The fluridone concentrations at location SP4 were consistently higher than the other sample locations within the treatment area for the majority of the treatment period, with the exception of July 6 and August 16, 2021, when SP1 had a higher concentration, which was likely due to the application of Sonar Genesis in Fall Creek. Fall Creek flows directly into the area where SP1 is located. The higher concentrations at SP4 may have been influenced by the general flow and wave action in this area, which concentrated fluridone in this corner of the treatment area from the adjacent areas. The highest fluridone concentration during the monitoring period was observed on July 19, 2021, at SP4 at 7.0 ppb. Overall, good retention of fluridone concentrations at the target concentration of 1 to 3 ppb was evident throughout much of the application period despite lowering the application rate to 9 ppb this year for the last eight weekly treatments. This was substantiated by the point intercept sampling, which had no detections of Hydrilla in this entire area this fall (see Section 2.6).

Table 2-11 Cayuga Lake East — JV Water Sampling Results for Fluridone (ppb)

Sample Location	Date Fluridone Concentration (ppb)										
	6/28/2021	7/6/2021	7/12/2021	7/19/2021	7/26/2021[b]	8/2/2021	8/9/2021	8/16/2021	8/23/2021	8/30-8/31/2021	9/7/2021
OutN	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
SP1	NS	**3.1/2.9**[a]	<1	<1	<1	<1/**1.0**[a]	<1	**4**	<1	<1	<1
SP2	NS	**2.4**	<1	**1.0**	**1.2**	**1.6**	<1	**1.2**	<1	<1	<1
SP3	NS	**1.8**	**1.5**	**3.5/4**[a]	**1.8**	**2.5**	<1	**2.1**	<1	**1.1**	<1
SP4	NS	**1.5**	**3.4**	**7**	**2.4**	**2.7**	**<1**	**1.2**	**1.4**	**1.0**	**<1**
CS1	NS	**1.2**	**2.3**	**1.8**	**1.2**	**2.0**	<1	**1.3**	**1.1**	<1	<1
CS2	NS	<1	**1.5**	<1	**1.6**	**1.7**	<1	<1	**1.2**	<1	<1

Notes:

[a] Two reported results in a single cell indicate an instance where a field duplicate sample was collected.

[b] The 7/22 treatment was delayed one day due to weather/lake conditions; it occurred on 7/23.

Bold denotes positive sample detections.

Key:

ppb = parts per billion

NS = No sample collected

USACE Sampling

Slight variations in fluridone concentrations between samples taken at the bottom versus samples taken in the middle of the water column were not observed for the second sampling event; however, for sampling events one and three, variation was observed at three of the 11 sampled locations and at five of the sampling locations, respectively (see Table 2-12). In general, samples taken within the treatment area evidenced higher concentrations than samples taken outside, as expected. Concentrations on July 15, 2021, were highest in the easternmost portion of the Stewart Park 2 and southern half of the Cornell Community Sailing Center treatment areas, demonstrating that flows in this area appear to concentrate in the southwest corner of the treatment area (see Figure 1-1). Sampling results from September 8, 2021, six days after the final treatment, which occurred on September 2, 2021, indicate that concentrations were 1.7 ppb or below at all locations.

Table 2-12 Cayuga Lake East — USACE Water Sampling Results for Fluridone (ppb)

Sample Location	Fluridone Concentration (ppb)		
	7/15/2021	8/10/2021	9/8/2021
IFS2 MID	<1	<1	<1
IFS2 BOT	<1	<1	<1
IFS3 MID	<1	<1	<1
IFS3 BOT	<1	<1	<1
IFS4 MID	<1	<1	<1
IFS4 BOT	<1	<1	<1
IFS5 MID	**2.3**	<1	**1.0**
IFS5 BOT	**2.7**	<1	<1
IFS6 MID	**1.9**	<1	**1.1**
IFS6 BOT	**2.2**	<1	<1
IFS7 MID	<1	<1	<1
IFS7 BOT	<1	<1	<1
IFS8 MID	<1	<1	<1
IFS8 BOT	<1	<1	**1.1**
IFS9 MID	<1	<1	<1
IFS9 BOT	<1	<1	**1.2**
IFS10 MID	<1	<1	<1
IFS10 BOT	<1	<1	**1.7**
IFS11 MID	**1.9**	<1	<1
IFS11 BOT	**1.5**	<1	<1
IFS12 MID	<1	<1	<1
IFS12 BOT	<1	<1	<1

Notes:
Bold denotes sample location within application area as well as positive sample detections.
Key:
BOT = bottom of water column
MID = middle of water column

Consistency between the JV and USACE sampling efforts was not always evident in the sampling results. For example, sampling conducted by the JV on August 9 and sampling conducted by the USACE on August 10, 2021, both indicated concentrations below the detection limit across all sites. However, sampling conducted by the JV on September 7 indicated concentrations below the detection limit across all sites, but the USACE sampling indicated fluridone concentrations above the detection limit at five locations. Two (IFS5 and IFS6) of the five sampling locations overlapped with the JV sampling locations. This may be explained by a difference in sampling methodologies, with the USACE using a water pump placed closer to the bottom for the bottom sample and the mid-water sample being generally farther off the bottom than the 1-foot sample depth with a Kimmerer bottle used by JV. Despite most locations showing less than the ideal concentrations needed for effective control, results of vegetation monitoring indicated effective control was achieved (see Section 2.6).

2.5.3. Cayuga Lake West Sampling

JV Sampling

Fluridone concentrations at the sampling location 1/2 mile north of the treatment area (OutW) were below detection limits for the duration of the monitoring period between period between June 28 and September 7, 2021 (see Table 2-13). Fluridone concentrations in the treatment area remained near or below detection limits, with the exception of one sample on July 26 and one on August 31, 2021, when fluridone concentrations were 4.3 ppb and 4.6 ppb, respectively.

USACE Sampling

Variations in fluridone concentrations within the water column were not observed during the second sampling event; however, for sampling events one and three, variation was observed at three of the five sampled locations for both sampling events (see Table 2-14). Sampling results from September 8, 2021, six days after the final treatment, which occurred on September 2, 2021, indicate that concentrations were 1.6 ppb or below at all locations. These results differ slightly from the JV sampling conducted on September 7, which indicated that concentrations were below detection limits at all locations, two of which—IFS13 and IFS16—directly overlapped with USACE sampling locations (see Figure 2-1). As mentioned in the previous section, these differences may be explained by differences in sampling methodology. Despite most locations showing concentrations less than those needed for effective control, results of vegetation monitoring indicated that effective control was achieved (see Section 2.6).

Table 2-13 Cayuga Lake West — JV Water Sampling Results for Fluridone (ppb)

Sample Location	Date Fluridone Concentration (ppb)										
	6/28/2021	7/6/2021	7/12/2021	7/19/2021	7/26/2021	8/2/2021	8/9/2021	8/16/2021	8/23/2021	8/30-8/31/2021	9/7/2021
OutW	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TSMP1	NS	<1/<1[a]	<1	**1.2**	**4.3**	<1	<1/<1[a]	<1	<1	**1.8**	<1
TSMP2	NS	<1	<1	<1	<1/<1[a]	<1	**1.1**	<1	<1	<1	<1

Notes:
[a] Two reported results in a single cell indicate an instance where a field duplicate sample was collected.
Bold values denote positive detections.
Key:
ppb = parts per billion

Table 2-14 Cayuga Lake West - USACE In-Lake Water Sampling Results for Fluridone (ppb)

Sample Code	Fluridone Concentration (ppb)		
	7/15/2021	8/10/2021	9/8/2021
IFS13 MID	<1	<1	**1.5**
IFS13 BOT	**1.8**	<1	<1
IFS14 MID	<1	<1	<1
IFS14 BOT	**1.3**	<1	<1
IFS15 MID	<1	<1	**1.6**
IFS15 BOT	<1	<1	<1
IFS16 MID	<1	<1	<1
IFS16 BOT	**2.9**	<1	<1
IFS17 MID	<1	<1	**1.5**
IFS17 BOT	<1	<1	<1

Notes:
Bold denotes sample location within application area as well as positive sample detections.
Key:
BOT = bottom of water column
MID = middle of water column
ppb = parts per billion

2.5.4 Cayuga Inlet Sampling

JV Sampling

Fluridone concentrations at the sample location (OutS) outside the treatment area remained near or below detection limits for the duration of the monitoring period between June 28 and September 7, 2021 (see Table 2-15). A majority of the fluridone concentrations in samples throughout the monitoring period were near or below detection limits. The highest fluridone concentration during the monitoring period was observed on August 16, 2021, at CCB at 1.5 ppb.

USACE Sampling

Water samples were not collected on July 15, 2021, in this treatment area. Fluridone concentrations were measured at or near the reporting limit for all samples taken for the Cayuga Inlet treatment area on August 10, 2021 (see Table 2-16). Two samples collected on September 8, 2021, were greater than 1.0 ppb at IFS19 (mid) and IFS20 (bot), at 2.0 ppb and 1.3 ppb, respectively. These results differ slightly from the JV sampling conducted on September 7, which indicated that concentrations were below detection limits at all locations, four of which—IFS19, IFS21, IFS23, and IFS24—directly overlapped with USACE sampling locations (see Figure 2-1). Despite most locations showing concentrations less than the ideal concentrations needed for effective control, results of vegetation monitoring only detected on Hydrilla points within these areas this fall (see Section 2.6). Thus, it appears there was still an effective treatment in this area.

Table 2-15 Cayuga Lake Inlet — JV In-Lake Water Sampling Results for Fluridone (ppb)

Sample Location	Date Fluridone Concentration (ppb)										
	6/28/2021	7/6/2021	7/12/2021	7/19/2021	7/26/2021[b]	8/2/2021	8/9/2021	8/16/2021	8/23/2021	8/30-8/31/2021	9/7/2021
OutS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1.1**
TSMPL	NS	<1	<1	<1	<1/<1[a]	<1	<1	<1	<1	<1	<1
CP	NS	<1	<1	<1/<1[a]	<1	<1	<1	**1.1**	<1	<1	<1
CC	NS	<1	<1	<1	<1	<1<1[a]	<1/<1[a]	**1.3**	<1	**1.0**	<1
CCB	NS	<1	<1	<1	**1.1**	<1	<1	**1.5**	<1	**1.0**	<1

Notes:

[a] Two reported results in a single cell indicate an instance where a field duplicate sample was collected.

[b] The 7/22 treatment was delayed one day due to weather/lake conditions; it occurred on 7/23.

Bold values denote positive detections.

Key:

ppb = parts per billion

NS= No sample collected

Table 2-16 Cayuga Lake Inlet - USACE Water Sampling Results for Fluridone (ppb)

Sample Code	Fluridone Concentration (ppb)		
	7/15/2021	8/10/2021	9/8/2021
IFS18 MID	NS	<1	<1
IFS18 BOT	NS	<1	<1
IFS19 MID	NS	<1	**2.0**
IFS19 BOT	NS	<1	<1
IFS20 MID	NS	<1	<1
IFS20 BOT	NS	<1	**1.3**
IFS21 MID	NS	<1	<1
IFS21 BOT	NS	<1	<1
IFS22 MID	NS	<1	<1
IFS22 BOT	NS	<1	<1
IFS23 MID	NS	<1	<1
IFS23 BOT	NS	**1.0**	<1
IFS24 MID	NS	<1	<1
IFS24 BOT	NS	<1	<1
IFS25 MID	NS	<1	<1
IFS25 BOT	NS	<1	<1

Notes:
Bold denotes sample location within application area as well as positive sample detections.
Key:
BOT = bottom of water column
MID = middle of water column
NS= No sample collected
ppb = parts per billion

2.6. Vegetative Monitoring and Treatment Summary

The USACE conducted point intercept surveys (PIS) at all fluridone treatment locations on five dates (June 14 [pre-treatment], July 14 and August 9 [during treatment], and September 8 and October 6, 2021 [post-treatment]) throughout the growing season to determine Hydrilla distribution (Figures 2-2 through 2-5). Hydrilla was detected at 12 separate locations during the first three PISs. Eleven of the Hydrilla patches detected in the PISs were located within the fluridone and/or chelated copper treatment areas (see Figures 2-2 and 2-3). Comparing pre- and post-treatment PIS surveys demonstrates that the treatment was largely successful at eliminating known patches of Hydrilla within targeted treatment areas (see Figures 2-4 to 2-5). The only area where hydrilla was still found in the October post-treatment surveys was in the outlet of Cascadilla Creek (see Figures 2-4 to 2-5). Despite the high flows observed in Fall Creek and the intermittent treatment of Sonar® Genesis in the main stem of the creek, no Hydrilla plants were observed in the sampling in 2021. The high flows and increased turbidity in this area may have contributed to a suppression of Hydrilla.

In addition, there was an observed drop in abundance of plants within all treatment areas again this year, but diversity of native plants was maintained and improved over the previous year with six of the eight dominant species in the PISs being native plants and the two invasive plants (starry stonewort [*Nitellopsis*

obtuse] and eurasian watermilfoil [*Myriophyllum spicatum*]) evidenced decrease in percent occurrence for 2021 (see Table 2-17).

Table 2-17 Summary of Dominant Species Percent Occurrence in Point Intercept Surveys

Species	Native/Invasive	Percent Occurrence
Starry stonewort (*Nitellopsis obtuse)*	Invasive	17.3
Coontail (*Ceratophyllum demersum)*	Native	27.0
Sago pondweed (*Vallisneria americana*)	Native	26.8
Eelgrass (*Zostera*)	Native	10.1
Muskgrass (*Chara vulagaris*)	Native	12.0
Eurasian waterfmilfoil (*Myriophyllum spicatum)*	Invasive	5.9
Elodea (*Elodea* sp.)	Native	20.8
Water stargrass (*Heteranthera demersum*)	Native	8.1

Figure 2-2 Hydrilla Locations from Point Intercept Surveys, June through August 2021
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

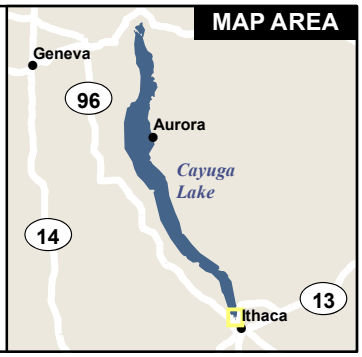
- Cayuga Inlet
- Cayuga Lake East
- Cayuga Lake West
- Fall Creek

Point Intercept Surveys

- 6/14/21
- 7/14/21
- 8/9/21

N

0 1,000 Feet



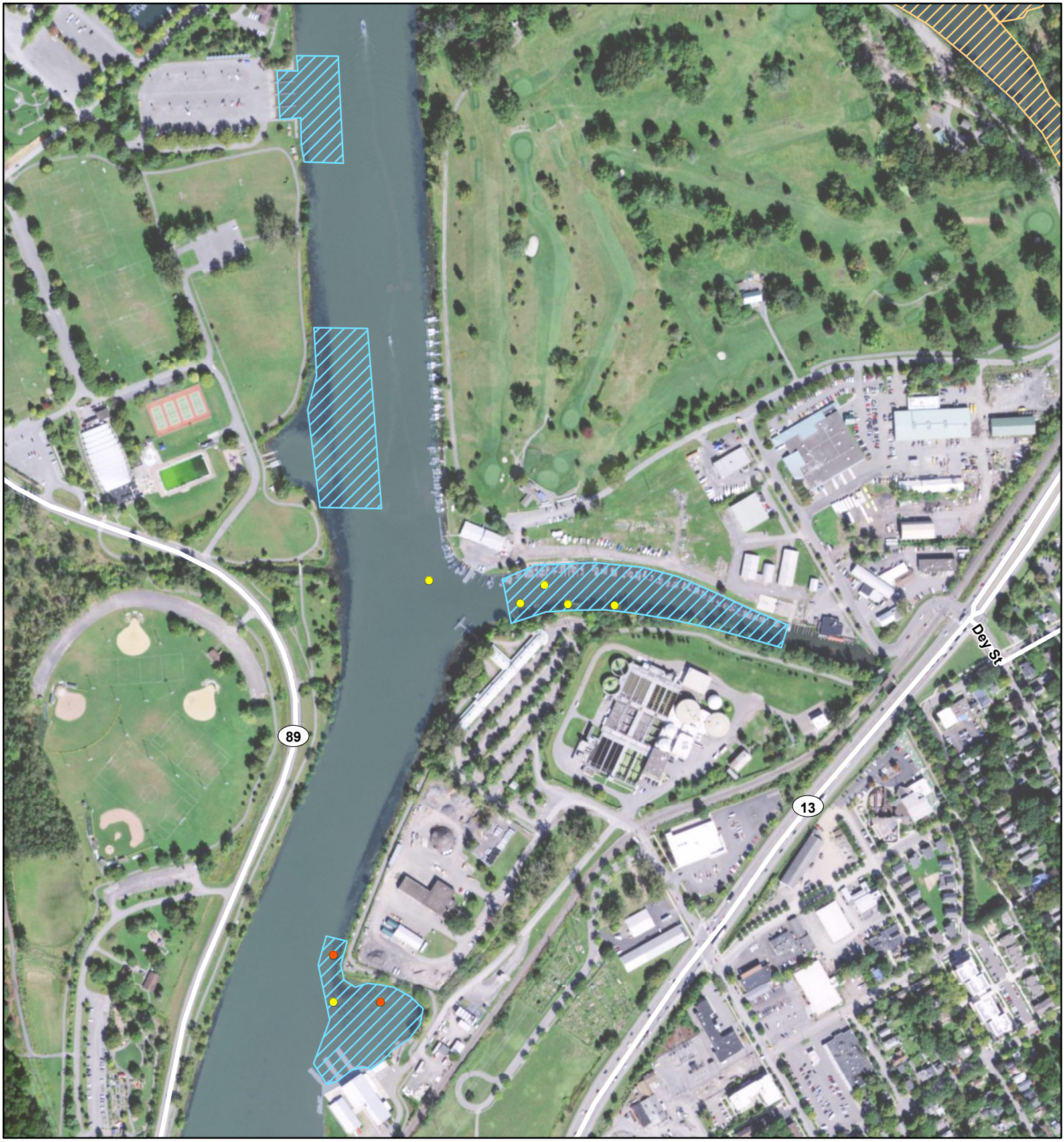


Figure 2-3 Hydrilla Locations from Point Intercept Surveys, June through August 2021, Cayuga Inlet Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

- Cayuga Inlet
- Fall Creek

Point Intercept Surveys

- 7/14/21
- 8/9/21

N

0 500 Feet

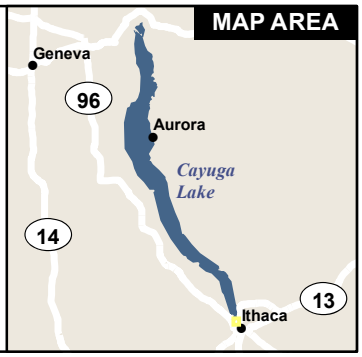


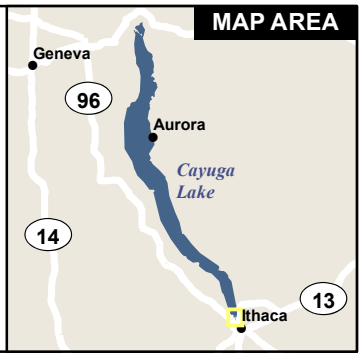
Figure 2-4 Hydrilla Locations from Point Intercept Surveys, September through October 2021
Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas
- Cayuga Inlet
- Cayuga Lake East
- Cayuga Lake West
- Fall Creek

Point Intercept Surveys
- 9/8/21
- 10/6/21

N

0 1,000 Feet



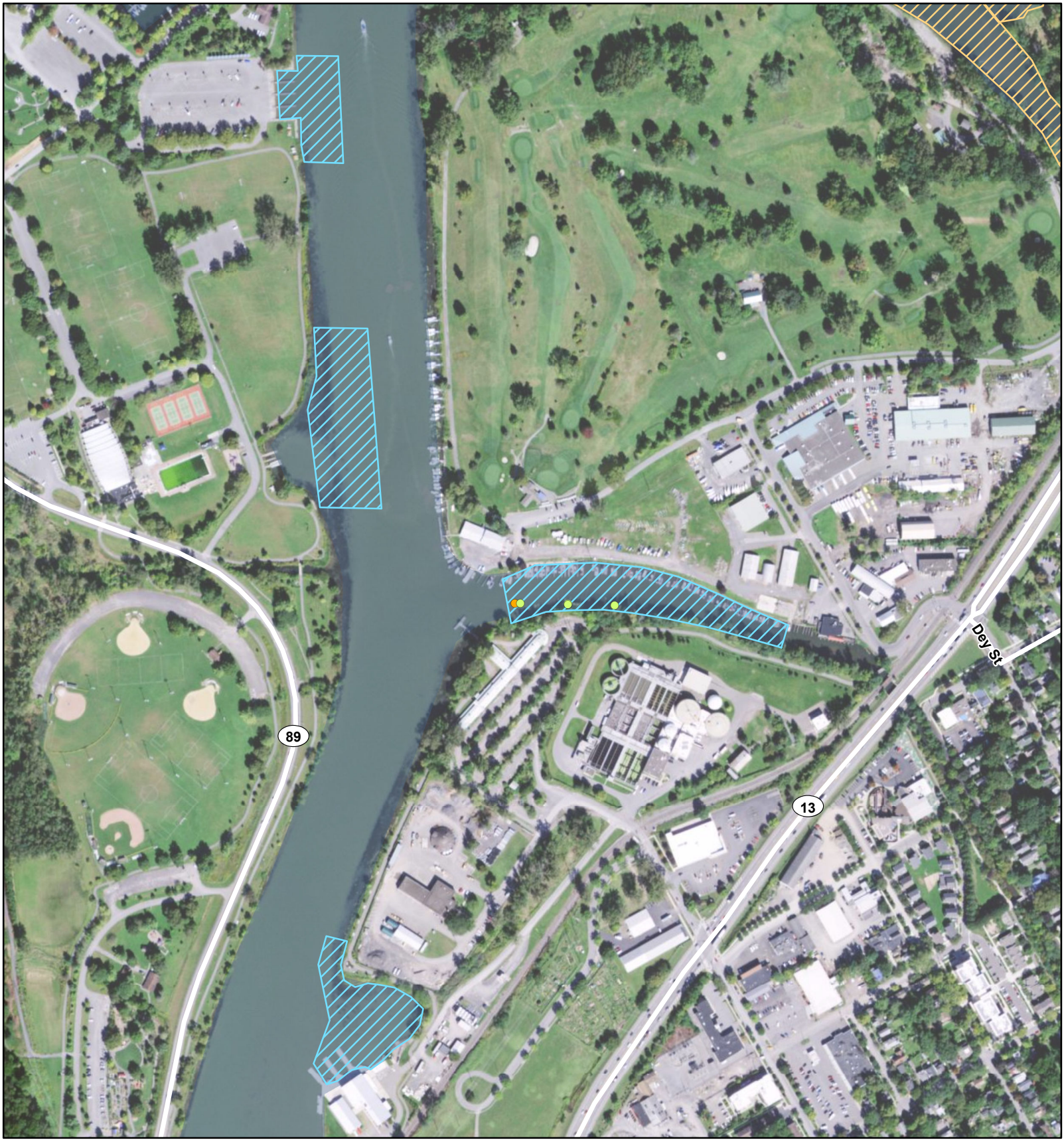


Figure 2-5 Hydrilla Locations from Point Intercept Surveys, September through October 2021, Cayuga Inlet Cayuga Lake, Tompkins County, New York

2021 Hydrilla Treatment Areas

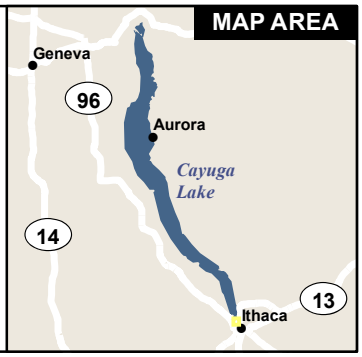
- Cayuga Inlet
- Fall Creek

Point Intercept Surveys

- 9/8/21
- 10/6/21

N

0 500 Feet



3. STUDY IMPROVEMENTS

The study improvements summarized in this section are based on lessons learned from the third year of the herbicide application effort, coordination with the study partners on work plan development, and activities conducted during the 2021 herbicide application.

3.1. Herbicide Application and Analysis

Herbicide Application

Transfer of the herbicide from the shore-based areas to the jon boat and airboat, and application of the herbicide in 2021 was smooth and efficient. The staging area at the Allen H. Treman State Park launch adequately supported operations for the in-lake treatments. Public access to the boat ramps during use by the applicators was uninterrupted. To avoid sailing activities, the treatments usually started at the Cornell Community Sailing Center first thing in the morning, followed by the other sites. The Project team needs to continue to consider long-range weather forecasts when planning future applications/sampling and build in schedule flexibility for each event.

Analysis

SePRO's proprietary HPLC method was used for analysis of fluridone in the samples that were taken by both the USACE and the JV. This allowed for a consistent assessment of both sets of results with a low detection limit (1 ppb) to understand herbicide contact time and efficacy.

3.2. 2021 Lessons Learned

Herbicide Application

Budgeting for the operation of the Sonar® Genesis injection system for 90 days with a limit of 80 cfs was insufficient given the rainfall experienced in 2021. The ability of Fall Creek flow rate to rise rapidly and significantly makes the site more conducive to a short-term herbicide injection program. Two or three 24-hour Aquathol® K injection treatments over the growing season may result in greater and more reliable Hydrilla control in this waterbody.

For 2022, the use of a new model of spreaders instead of the Vortex granular spreader should be considered, as it would provide additional accuracy in spreading the herbicide and can be adjusted to spread much slower or faster depending on size of the treatment zone. This functionality would be especially helpful in the Stewart Park 1 treatment area, which has been the most difficult area to treat due to the shallow water depths and hidden tree trunks and debris. The large size of the zone requires that application proceed at a slower speed, and the new model of spreader would facilitate more effective application.

Communication

Twenty-four-hour email notification prior to herbicide treatments, including changes in treatment schedule, was effective, and no issues were raised by the Tompkins County Health Department or other stakeholders. This type of communication needs to continue in future treatment programs.

Due to unpredictable weather conditions and the open nature of the lake, inclement weather can arise on short notice and cause delays or cancellations in applications or sampling events. There was one such delay during the 2021 season.

Sampling and Monitoring

Frequency of In-Lake Sampling and Logistics. In-lake samples should continue to be collected between day four and day seven after each fluridone application so that results can be obtained before the next treatment (assuming a 48-hour TAT). That way, the results can be used to ensure that target concentrations are achieved and not exceeded.

Analytical Turnaround Times. Samples are analyzed on a 48-hour turnaround time (TAT). There are no apparent needs to change this TAT at this time. If weather significantly affects sampling, it may be necessary to implement a 24-hour TAT, if deemed necessary.

Point Intercept Surveys. The USACE employs the PIS method to monitor the presence, absence, relative abundance, and condition of Hydrilla in treatment plots and immediately adjacent to treatment plots. This is an efficient way to monitor for Hydrilla and can help inform the potential need for changes to treatments if Hydrilla plants are observed to be in "healthy" condition and should be continued.

4. REFERENCES

United States Army Corps of Engineers (USACE). 2021. *Architect-Engineer Scope of Work Aquatic Plant Control ERDC Demonstration Project Stewart Park, Cayuga Lake, Ithaca, NY*. April 2021.

United States Geological Survey (USGS). 2021. Fall Creek Near Ithaca water discharge data. Available at: https://waterdata.usgs.gov/monitoring-location/04234000/#parameterCode=00060&startDT=2020-06-01&endDT=2021-10-30; accessed on November 16, 2021.

A. ANALYTICAL DATA

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10088 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM28388-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	06/28/2021
CTM28389-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	06/28/2021
CTM28390-1	Out S	Sonar/fluridone (ug/L)	FAST 10	<1	06/28/2021
CTM28391-1	FC	Sonar/fluridone (ug/L)	FAST 10	<1	06/28/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 06/29/21 11:30 AM
Date Results Sent: Wednesday, June 30, 2021

Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10179 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
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	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM28575-1	Out N-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28576-1	Out W-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28577-1	Out S-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28578-1	FC-07062021	Sonar/fluridone (ug/L)	FAST 10	3.8	07/06/2021
CTM28579-1	CC-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28580-1	CCB-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28581-1	CS1-07062021	Sonar/fluridone (ug/L)	FAST 10	1.2	07/06/2021
CTM28582-1	CS2-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28583-1	SP1-07062021	Sonar/fluridone (ug/L)	FAST 10	3.1	07/06/2021
CTM28584-1	SP2-07062021	Sonar/fluridone (ug/L)	FAST 10	2.4	07/06/2021
CTM28585-1	SP3-07062021	Sonar/fluridone (ug/L)	FAST 10	1.8	07/06/2021
CTM28586-1	SP4-07062021	Sonar/fluridone (ug/L)	FAST 10	1.5	07/06/2021
CTM28587-1	CP-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021

CTM28588-1	TSMPL-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28589-1	TSMP1-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28590-1	TSMP2-07062021	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021
CTM28591-1	SP1-07062021-Q	Sonar/fluridone (ug/L)	FAST 10	2.9	07/06/2021
CTM28592-1	TSMP1-07062021-Q	Sonar/fluridone (ug/L)	FAST 10	<1	07/06/2021

ANALYSIS STATEMENTS:
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COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 07/07/21 12:30 PM
Date Results Sent: Wednesday, July 7, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10282 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM28874-1	OUTN-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28875-1	OUTS-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28876-1	OUTW-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28877-1	FC-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28878-1	CC-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28879-1	CCB-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28880-1	CS1-071221	Sonar/fluridone (ug/L)	FAST 10	2.3	07/12/2021
CTM28881-1	CS2-071221	Sonar/fluridone (ug/L)	FAST 10	1.5	07/12/2021
CTM28882-1	SP1-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28883-1	SP2-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28884-1	SP3-071221	Sonar/fluridone (ug/L)	FAST 10	1.5	07/12/2021
CTM28885-1	SP4-071221	Sonar/fluridone (ug/L)	FAST 10	3.4	07/12/2021
CTM28886-1	CP-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021

CTM28887-1	TSMPL-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28888-1	TSMP1-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28889-1	TSMP2-071221	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021
CTM28890-1	TSMP1-071221-Q	Sonar/fluridone (ug/L)	FAST 10	<1	07/12/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 07/13/21 12:00 PM
Date Results Sent: Wednesday, July 14, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10349 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM29033-1	Out N- 071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29034-1	Out W -071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29035-1	Out S-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29036-1	SP1-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29037-1	SP2-071921	Sonar/fluridone (ug/L)	FAST 10	1.0	07/19/2021
CTM29038-1	SP3-071921	Sonar/fluridone (ug/L)	FAST 10	3.5	07/19/2021
CTM29039-1	SP4-071921	Sonar/fluridone (ug/L)	FAST 10	7.0	07/19/2021
CTM29040-1	CS1-071921	Sonar/fluridone (ug/L)	FAST 10	1.8	07/19/2021
CTM29041-1	CS2-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29042-1	SP3-071921-Q	Sonar/fluridone (ug/L)	FAST 10	4.0	07/19/2021
CTM29043-1	TSMP1-071921	Sonar/fluridone (ug/L)	FAST 10	1.2	07/19/2021
CTM29044-1	TSMP2-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29045-1	TSMPL-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021

CTM29046-1	CP-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29047-1	CP-071921-Q	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29048-1	CC-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29049-1	CCB-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021
CTM29050-1	FC-071921	Sonar/fluridone (ug/L)	FAST 10	<1	07/19/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 07/20/21 11:30 AM
Date Results Sent: Wednesday, July 21, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10471 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake-Ithaca - NY
Waterbody size:	42956
Depth Average:	

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM29441-1	Out N - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29442-1	Out W - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29443-1	Out S - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29444-1	SP 1 - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29445-1	SP 2 - 072621	Sonar/fluridone (ug/L)	FAST 10	1.2	07/26/2021
CTM29446-1	SP 3 - 072621	Sonar/fluridone (ug/L)	FAST 10	1.8	07/26/2021
CTM29447-1	SP 4 - 072621	Sonar/fluridone (ug/L)	FAST 10	2.4	07/26/2021
CTM29448-1	CS 1 - 072621	Sonar/fluridone (ug/L)	FAST 10	1.2	07/26/2021
CTM29449-1	CS 2 - 072621	Sonar/fluridone (ug/L)	FAST 10	1.6	07/26/2021
CTM29450-1	TSMP 1 - 072621	Sonar/fluridone (ug/L)	FAST 10	4.3	07/26/2021
CTM29451-1	TSMP 2 - 072621-Q	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29452-1	TSMP 2 - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29453-1	TSMP L - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021

CTM29454-1	TSMP L - 072621-Q	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29455-1	CP - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29456-1	CC - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021
CTM29457-1	CCB - 072621	Sonar/fluridone (ug/L)	FAST 10	1.1	07/26/2021
CTM29458-1	FC - 072621	Sonar/fluridone (ug/L)	FAST 10	<1	07/26/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 07/27/21 10:30 AM
Date Results Sent: Wednesday, July 28, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10561 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM29666-1	Out-N	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29667-1	Out-W	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29668-1	Out-S	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29669-1	SP1	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29670-1	SP1-Q	Sonar/fluridone (ug/L)	FAST 10	1.0	08/02/2021
CTM29671-1	SP2	Sonar/fluridone (ug/L)	FAST 10	1.6	08/02/2021
CTM29672-1	SP3	Sonar/fluridone (ug/L)	FAST 10	2.5	08/02/2021
CTM29673-1	SP4	Sonar/fluridone (ug/L)	FAST 10	2.7	08/02/2021
CTM29674-1	CS1	Sonar/fluridone (ug/L)	FAST 10	2.0	08/02/2021
CTM29675-1	CS2	Sonar/fluridone (ug/L)	FAST 10	1.7	08/02/2021
CTM29676-1	TSMP1	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29677-1	TSMP2	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29678-1	TSMPL	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021

CTM29679-1	CP	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29680-1	CC	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29681-1	CCB	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29682-1	CC-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021
CTM29683-1	FC	Sonar/fluridone (ug/L)	FAST 10	<1	08/02/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/03/21 11:30 AM
Date Results Sent: Wednesday, August 4, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10651 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake-Ithaca - NY
Waterbody size:	42956
Depth Average:	

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM29856-1	TSMPL-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29857-1	CP-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29858-1	CC-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29859-1	CC-080921-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29860-1	CCB-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29861-1	FC-080921	Sonar/fluridone (ug/L)	FAST 10	1.0	08/09/2021
CTM29862-1	Out N-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29863-1	Out W-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29864-1	Out S-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29865-1	SP1-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29866-1	SP2-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29867-1	SP3-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29868-1	SP4-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021

CTM29869-1	CS1--080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29870-1	CS2-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29871-1	TSMP1-080921	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29872-1	TSMP1-080921-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/09/2021
CTM29873-1	TSMP2-080921	Sonar/fluridone (ug/L)	FAST 10	1.1	08/09/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/10/21 11:40 AM
Date Results Sent: Wednesday, August 11, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10748 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM30219-1	OutS-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30220-1	CCB-081621	Sonar/fluridone (ug/L)	FAST 10	1.5	08/16/2021
CTM30221-1	CC-081621	Sonar/fluridone (ug/L)	FAST 10	1.3	08/16/2021
CTM30222-1	CP-081621	Sonar/fluridone (ug/L)	FAST 10	1.1	08/16/2021
CTM30223-1	TSMPL-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30224-1	OutW-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30225-1	TSMP1-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30226-1	TSMP2-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30227-1	FC-081621	Sonar/fluridone (ug/L)	FAST 10	3.8	08/16/2021
CTM30228-1	SP1-081621	Sonar/fluridone (ug/L)	FAST 10	4.0	08/16/2021
CTM30229-1	SP2-081621	Sonar/fluridone (ug/L)	FAST 10	1.2	08/16/2021
CTM30230-1	SP3-081621	Sonar/fluridone (ug/L)	FAST 10	2.1	08/16/2021
CTM30231-1	SP4-081621	Sonar/fluridone (ug/L)	FAST 10	1.2	08/16/2021

CTM30232-1	CS1-081621	Sonar/fluridone (ug/L)	FAST 10	1.3	08/16/2021
CTM30233-1	CS2-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021
CTM30234-1	OutN-081621	Sonar/fluridone (ug/L)	FAST 10	<1	08/16/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/17/21 11:30 AM
Date Results Sent: Wednesday, August 18, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10805 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM30585-1	OutS-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30586-1	CCB-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30587-1	CC-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30588-1	CP-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30589-1	TSMPL-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30590-1	OutW-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30591-1	TSMP1-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30592-1	TSMP2-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30593-1	FC-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30594-1	SP1-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30595-1	SP2-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30596-1	SP3-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021
CTM30597-1	SP4-08232021	Sonar/fluridone (ug/L)	FAST 10	1.5	08/23/2021

CTM30598-1	CS1-08232021	Sonar/fluridone (ug/L)	FAST 10	1.1	08/23/2021
CTM30599-1	CS2-08232021	Sonar/fluridone (ug/L)	FAST 10	1.2	08/23/2021
CTM30600-1	OutN-08232021	Sonar/fluridone (ug/L)	FAST 10	<1	08/23/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/24/21 11:45 AM
Date Results Sent: Wednesday, August 25, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10896 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM30867-1	OutS-083021	Sonar/fluridone (ug/L)	FAST 10	<1	08/30/2021
CTM30868-1	CCB-083021	Sonar/fluridone (ug/L)	FAST 10	1.0	08/30/2021
CTM30869-1	CC-083021	Sonar/fluridone (ug/L)	FAST 10	1.0	08/30/2021
CTM30870-1	CP-083021	Sonar/fluridone (ug/L)	FAST 10	<1	08/30/2021
CTM30871-1	TSMPL-083021	Sonar/fluridone (ug/L)	FAST 10	<1	08/30/2021
CTM30872-1	TSMP2-083021	Sonar/fluridone (ug/L)	FAST 10	<1	08/30/2021
CTM30873-1	TSMP1-083121	Sonar/fluridone (ug/L)	FAST 10	1.8	08/31/2021
CTM30874-1	OutW-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021
CTM30875-1	SP1-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021
CTM30876-1	SP2-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021
CTM30877-1	SP3-083121	Sonar/fluridone (ug/L)	FAST 10	1.1	08/31/2021
CTM30878-1	SP4-083121	Sonar/fluridone (ug/L)	FAST 10	1.0	08/31/2021
CTM30879-1	FC-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021

CTM30880-1	CS1-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021
CTM30881-1	CS2-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021
CTM30882-1	OutN-083121	Sonar/fluridone (ug/L)	FAST 10	<1	08/31/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 09/01/21 01:30 PM
Date Results Sent: Wednesday, September 1, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10960 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name WSP USA	Contact Person: Katie Evans
Address: 50 Lakefront Blvd. Ste. 111 Buffalo, NY 14202	E-mail Address: katie.evans@wsp.com
	Phone: 440-823-1677

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM31054-1	OutN-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31055-1	OutW-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31056-1	OutS-090721	Sonar/fluridone (ug/L)	FAST 10	1.1	09/07/2021
CTM31057-1	SP1-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31058-1	SP2-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31059-1	SP3-090721	Sonar/fluridone (ug/L)	FAST 10	1.0	09/07/2021
CTM31060-1	SP4-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31061-1	CS1-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31062-1	CS2-090721	Sonar/fluridone (ug/L)	FAST 10	1.6	09/07/2021
CTM31063-1	TSMP1-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31064-1	TSMP2-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31065-1	TSMPL-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31066-1	CP-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021

CTM31067-1	CC-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31068-1	CCB-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021
CTM31069-1	FC-090721	Sonar/fluridone (ug/L)	FAST 10	<1	09/07/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 09/08/21 12:00 PM
Date Results Sent: Thursday, September 9, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10454 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name US Army Corps of Engineers	Contact Person: Richard Ruby
Address: 1105 North HWY T15 Knoxville, IA 50138	E-mail Address: richard.j.ruby@usace.army.mil
	Phone: 641-828-7522

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM29369-1	IFS1 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29370-1	IFS1 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29371-1	IFS2 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29372-1	IFS2 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29373-1	IFS3 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29374-1	IFS3 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29375-1	IFS4 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29376-1	IFS4 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29377-1	IFS5 Bottom	Sonar/fluridone (ug/L)	FAST 10	2.7	07/15/2021
CTM29378-1	IFS5 Mid	Sonar/fluridone (ug/L)	FAST 10	2.3	07/15/2021
CTM29379-1	IFS6 Bottom	Sonar/fluridone (ug/L)	FAST 10	2.2	07/15/2021
CTM29380-1	IFS6 Mid	Sonar/fluridone (ug/L)	FAST 10	1.9	07/15/2021
CTM29381-1	IFS7 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021

CTM29382-1	IFS7 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29383-1	IFS8 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29384-1	IFS8 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29385-1	IFS9 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29386-1	IFS9 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29387-1	IFS10 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29388-1	IFS10 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29389-1	IFS11 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.5	07/15/2021
CTM29390-1	IFS11 Mid	Sonar/fluridone (ug/L)	FAST 10	1.9	07/15/2021
CTM29391-1	IFS12 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29392-1	IFS12 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29393-1	IFS13 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.8	07/15/2021
CTM29394-1	IFS13 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29395-1	IFS14 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.3	07/15/2021
CTM29396-1	IFS14 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29397-1	IFS15 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29398-1	IFS15 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29399-1	IFS16 Bottom	Sonar/fluridone (ug/L)	FAST 10	2.9	07/15/2021
CTM29400-1	IFS16 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29401-1	IFS17 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29402-1	IFS17 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29403-1	IFS 1A	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021
CTM29404-1	IFS 1B	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.

QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 07/26/21 10:00 AM
Date Results Sent: Tuesday, July 27, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC10721 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name US Army Corps of Engineers	Contact Person: Richard Ruby
Address: 1105 North HWY T15 Knoxville, IA 50138	E-mail Address: richard.j.ruby@usace.army.mil
	Phone: 641-828-7522

Waterbody Information

Waterbody:	Cayuga Lake - NY
Waterbody size:	42956
Depth Average:	0

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM30025-1	IFS Bottom 1	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30026-1	IFS Mid 1	Sonar/fluridone (ug/L)	FAST 10	1.1	08/10/2021
CTM30027-1	IFS 1A	Sonar/fluridone (ug/L)	FAST 10	4.8	08/10/2021
CTM30028-1	IFS 1B	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30029-1	IFS Bottom 2	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30030-1	IFS Mid 2	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30031-1	IFS Bottom 3	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30032-1	IFS Mid 3	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30033-1	IFS Bottom 4	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30034-1	IFS Mid 4	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30035-1	IFS Bottom 5	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30036-1	IFS Mid 5	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30037-1	IFS Bottom 6	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021

CTM30038-1	IFS Mid 6	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30039-1	IFS Bottom 7	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30040-1	IFS Mid 7	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30041-1	IFS Bottom 8	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30042-1	IFS Mid 8	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30043-1	IFS Bottom 9	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30044-1	IFS Mid 9	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30045-1	IFS Bottom 10	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30046-1	IFS Mid 10	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30047-1	IFS Bottom 11	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30048-1	IFS Mid 11	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30049-1	IFS Bottom 12	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30050-1	IFS Mid 12	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30051-1	IFS Bottom 13	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30052-1	IFS Mid 13	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30053-1	IFS Bottom 14	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30054-1	IFS Mid 14	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30055-1	IFS Bottom 15	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30056-1	IFS Mid 15	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30057-1	IFS Bottom 16	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30058-1	IFS Mid 16	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30059-1	IFS Bottom 17	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30060-1	IFS Mid 17	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30061-1	IFS Bottom 18	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30062-1	IFS Mid 18	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30063-1	IFS Bottom 19	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30064-1	IFS Mid 19	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021

CTM30065-1	IFS Bottom 20	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30066-1	IFS Mid 20	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30067-1	IFS Bottom 21	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30068-1	IFS Mid 21	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30069-1	IFS Bottom 22	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30070-1	IFS Mid 22	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30071-1	IFS Bottom 23	Sonar/fluridone (ug/L)	FAST 10	1.0	08/10/2021
CTM30072-1	IFS Mid 23	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30073-1	IFS Bottom 24	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30074-1	IFS Mid 24	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30075-1	IFS Bottom 25	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021
CTM30076-1	IFS Mid 25	Sonar/fluridone (ug/L)	FAST 10	<1	08/10/2021

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/13/21 10:45 AM
Date Results Sent: Monday, August 16, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC11018 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name US Army Corps of Engineers	Contact Person: Richard Ruby
Address: 1105 North HWY T15 Knoxville, IA 50138	E-mail Address: richard.j.ruby@usace.army.mil
	Phone: 641-828-7522

Waterbody Information

Waterbody:	Cayuga Lake-Ithaca - NY
Waterbody size:	42956
Depth Average:	

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM31228-1	IFS1 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.1	09/08/2021
CTM31229-1	IFS1 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31230-1	IFS 1A	Sonar/fluridone (ug/L)	FAST 10	1.0	09/08/2021
CTM31231-1	IFS 1B	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31232-1	IFS2 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31233-1	IFS2 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31234-1	IFS3 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31235-1	IFS3 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31236-1	IFS4 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31237-1	IFS4 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31238-1	IFS5 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31239-1	IFS5 Mid	Sonar/fluridone (ug/L)	FAST 10	1.0	09/08/2021
CTM31240-1	IFS6 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021

CTM31241-1	IFS6 Mid	Sonar/fluridone (ug/L)	FAST 10	1.1	09/08/2021
CTM31242-1	IFS7 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31243-1	IFS7 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31244-1	IFS8 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.1	09/08/2021
CTM31245-1	IFS8 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31246-1	IFS9 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.2	09/08/2021
CTM31247-1	IFS9 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31248-1	IFS10 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.7	09/08/2021
CTM31249-1	IFS10 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31250-1	IFS11 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31251-1	IFS11 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31252-1	IFS12 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31253-1	IFS12 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31254-1	IFS13 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31255-1	IFS13 Mid	Sonar/fluridone (ug/L)	FAST 10	1.5	09/08/2021
CTM31256-1	IFS14 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31257-1	IFS14 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31258-1	IFS15 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31259-1	IFS15 Mid	Sonar/fluridone (ug/L)	FAST 10	1.6	09/08/2021
CTM31260-1	IFS16 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31261-1	IFS16 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31262-1	IFS17 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31263-1	IFS17 Mid	Sonar/fluridone (ug/L)	FAST 10	1.5	09/08/2021
CTM31264-1	IFS18 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31265-1	IFS18 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31266-1	IFS19 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31267-1	IFS19 Mid	Sonar/fluridone (ug/L)	FAST 10	2.0	09/08/2021

CTM31268-1	IFS20 Bottom	Sonar/fluridone (ug/L)	FAST 10	1.3	09/08/2021
CTM31269-1	IFS20 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31270-1	IFS21 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31271-1	IFS21 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31272-1	IFS22 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31273-1	IFS22 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31274-1	IFS23 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31275-1	IFS23 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31276-1	IFS24 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31277-1	IFS24 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31278-1	IFS25 Bottom	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021
CTM31279-1	IFS25 Mid	Sonar/fluridone (ug/L)	FAST 10	<1	09/08/2021

ANALYSIS STATEMENTS:
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in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 09/13/21 10:00 AM
Date Results Sent: Tuesday, September 14, 2021

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor