Post-Treatment Assessment for Aquatic Plant Control ERDC Demonstration Project Wells College Bay, Cayuga Lake 2019

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List of Abbreviations and Acronyms

APCRP	Aquatic Plant Control Research Program
CSI	Community Science Institute
DOH	(Cayuga County) Department of Health
E & E	Ecology and Environment, Inc., member of WSP
ERDC	Engineer Research and Development Center
GPS	Global Positioning System
HPLC	high-performance liquid chromatography
Hydrilla	*Hydrilla verticillata*
µg/L	micrograms per liter
mL	milliliter
NYSDEC	New York State Department of Environmental Conservation
ppb	parts per billion
ppm	parts per million
Project	Wells College Bay, Cayuga Lake Hydrilla Demonstration Project
SePRO	SePRO Corporation
SLM	SOLitude Lake Management, LLC
SOW	scope of work
TAT	turnaround time
USACE	United States Army Corps of Engineers (Buffalo District)

1 Introduction

The Wells College Bay, 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 3 post-treatment monitoring and assessment of herbicide efficacy on Hydrilla by summarizing field conditions during the treatment; summarizing herbicide treatment methodology and contact time; and identifying lessons learned to benefit future work.

1.1 Background

Hydrilla is a very aggressive, submerged aquatic plant. The Cayuga Lake Floating Classroom first discovered this invasive plant in the Wells College Bay of Cayuga Lake in September 2016. The only other Hydrilla infestation documented in Cayuga Lake was discovered in late summer 2011 near Ithaca, New York. The majority of the Hydrilla treated as a part of the first year of the Project was identified within a 30-acre portion of Wells College Bay with several small patches found in the adjacent 29-plus acres. The monitoring area for the second year of this Project was extended from 59 acres to 120 acres to monitor for the spread of small patches of Hydrilla in areas adjacent to the areas treated during the first year at water depths ranging from 0 to 18 feet. For the third year, the 30-acre treatment area remained largely the same, and 120 total acres were monitored.

Given the ease with which this plant spreads by fragments, proximity to the Erie Canal, and 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 implementation of the Project.

During the third year of treatment to control and eradicate Hydrilla, treatment occurred within two general areas in the Town of Aurora, totaling approximately 120 acres that focused on application of two aquatic herbicides: fluridone (Sonar® H4C), and copper ethylene diamine complex (copper; Harpoon® Granular). The treatment plan for 2019 activities originally called for the use of Komeen® Crystal, but due to a defective batch of the product used on

Tonawanda Creek earlier in the treatment season, which resulted in a significant portion of the product floating instead of immediately sinking into the water, a switch was made to Harpoon® Granular. [Note: For future treatments, Komeen® Crystal is preferable to Harpoon® Granular due to the much lower quantity required for application.]

The following two areas were treated during the 2019 season (see Figure 1-1):

- **Fluridone treatment area**: an approximately 30-acre area in Wells College Bay along approximately 5,000 linear feet of Cayuga Lake's shoreline between Wells Road to the north and just south of the outlet of Paines Creek at the southern extent. The water depths in this treatment area range from approximately 0 to 18+ feet with an average depth of 8 to 10 feet depending on location. This approximately 30-acre block was treated over a total of 10 treatments. Two applications at 20 parts per billion (ppb) occurred over the first two treatments, and eight applications at 13.75 ppb occurred over treatments 3 through 10. Any Hydrilla beds that persisted later in the season (i.e., August) and appeared unresponsive to the fluridone application were treated with copper at a target concentration of 1 part per million (ppm) or 1,000 ppb. Any copper used in this treatment area was deducted from the annual limit of 30 acres of chelated copper for the two spot-treatment zones.
- **Potential copper spot treatment blocks**: two areas north and south of the lake treatment block that total approximately 90 acres. These blocks were monitored for Hydrilla throughout the Project. The depth in these areas ranges from 0 to 18+ feet with an assumed average depth of 10 feet. Within the 90-acre area, a total of 9 acres were ultimately delineated for spot treatment.

These treatment blocks were delineated by the USACE to provide detailed maps for targeting Hydrilla beds in these blocks.

Between 2018 and 2019, the 30-acre fluridone treatment area and copper spot treatment areas did not remain constant, but were revised to reflect actual hydrilla locations.

Additionally, an approximately 1-acre area near Don's Marina in the town of Genoa, New York, just over 9 miles south of Aurora, New York, was identified in August 2019 for treatment with endothall (Aquathol® Super K) (see Figure 1-2).

Implementation of the Project was a collaborative effort between the Engineer Research and Development Center (ERDC); USACE; Ecology and Environment, Inc., member of WSP (E & E); New York State Department of Environmental Conservation (NYSDEC); the Village of Aurora; the Cayuga County Department of Health (DOH); the Wells College water treatment plant; Finger Lakes Partnership for Regional Invasive Species Management; Cayuga Lake Watershed Network; and the applicator, 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 this Project, reasonable 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 (APCRP) 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 line of research has been ongoing since 2010. This method and the underlying concepts are being tested against monoecious Hydrilla at the Tonawanda Creek/Erie Canal demonstration project in Western New York as well as this Project.

The findings in this program will provide valuable information for developing future guidance on how to manage this invasive aquatic plant that is expanding in high water exchange systems throughout the northeastern United States. The sprouting dynamics of Hydrilla tubers and condition of plants were monitored by the USACE prior to and several weeks post-treatment to determine optimal timing of treatment, length of exposure, and concentration of herbicide required for effective control of Hydrilla.

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, conclusions are provided, in the form of lessons learned, to help shape future treatment projects.

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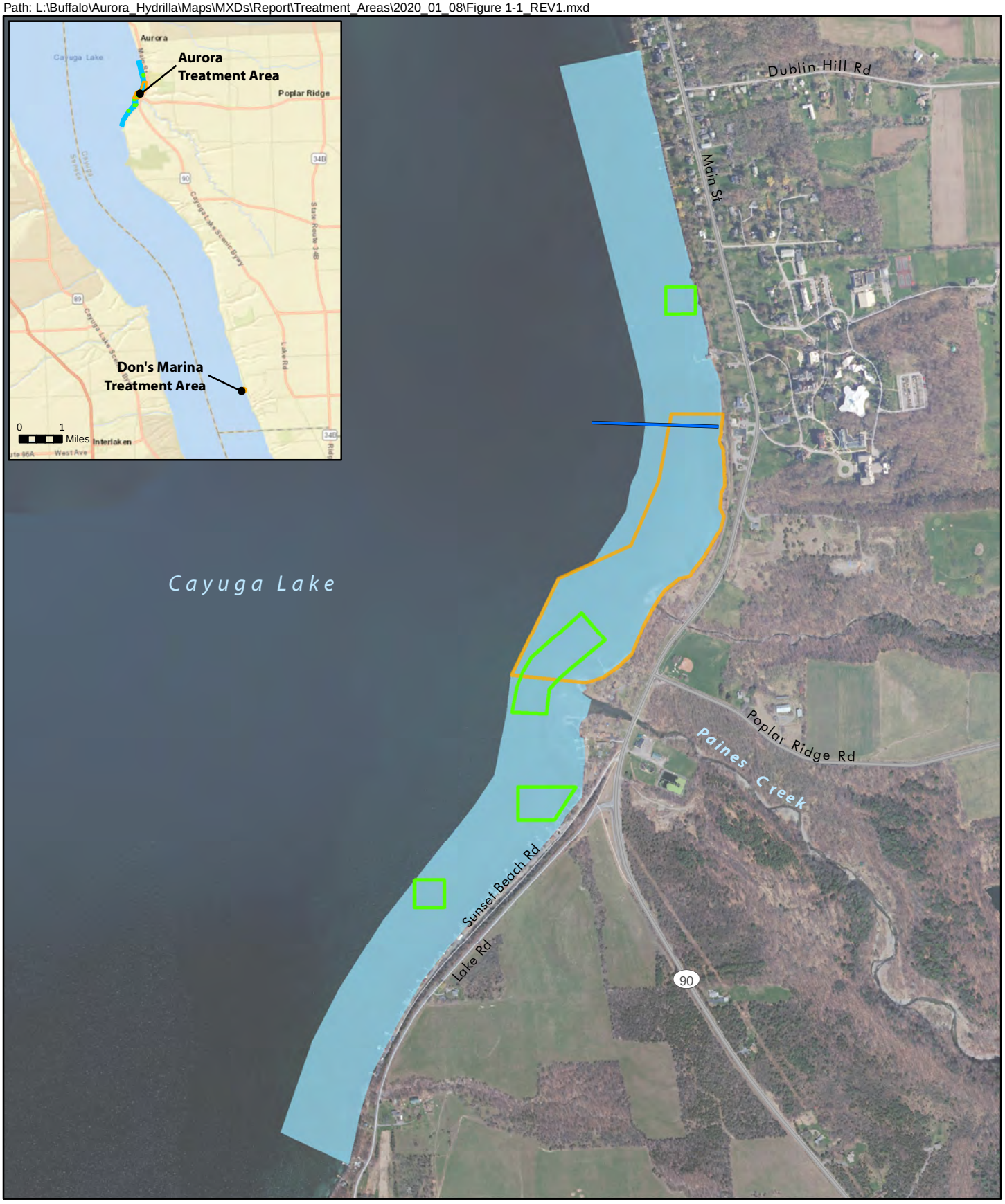

Potable Water Intake
Hydrilla Monitoring Area
Fluridone Treatment
Copper Spot Treatment Blocks

Figure 1-1
Aurora Hydrilla Treatment Areas - Summer 2019
Wells College Bay
Cayuga Lake Hydrilla Demonstration Project
Cayuga County, New York

0 200 400 600 800 1,000 Feet

Source: ESRI 2012; NYS Office of Information Technology Services, GIS Program Office, 2018.

Path: L:\Buffalo\Aurora_Hydrilla\Maps\MXDs\Report\Treatment_Areas\2019_11_21\Figure 1-2.mxd

Don's Marina Hydrilla Treatment Area

0 50 100 150 200 250 Feet

Figure 1-2
Don's Marina Hydrilla Treatment Areas - Summer 2019
Wells College Bay
Cayuga Lake Hydrilla Demonstration Project
Cayuga County, New York

Source: ESRI 2012; NYS Office of Information Technology Services, GIS Program Office, 2018.

2 Overview of Herbicide Treatment and Monitoring

Treatment of Hydrilla for this Project focused on the application of the aquatic herbicides fluridone (Sonar® 4HC) and copper (Harpoon®) within Wells College Bay, and endothall (Aquathol® Super K) within Cayuga Lake near Don's Marina. Endothall was selected for use near Don's Marina due to the discovery of Hydrilla later in the season, which precluded the use of a systemic, slow-acting herbicide like fluridone. Therefore, a contact herbicide was necessary, and endothall, specifically Aquathol Super K, was selected in part because it releases over a period of hours, which may be beneficial in shallow waters like those near the marina.

The following sections outline the public notification that preceded treatment; field conditions before, during, and after treatment; herbicide treatment methodology; and quantity of herbicide used.

2.1 Public Notification

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

- Dates for the initial treatments were provided to NYSDEC, the Cayuga County DOH, the Village of Aurora, and the Wells College water treatment plant and email reminder notifications were sent out 24 hours prior to each treatment;
- Written notifications were sent certified mail approximately 18 days prior to the first fluridone treatment to all riparian owners/users within the half-mile buffer (north and south) of the treatment area and all municipal water supply customers including those that receive water delivery by truck;
- Agency notification letters were distributed approximately eight 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 and until the times listed were reached, or until testing determined that the threshold concentration had been met. Additionally, warning signs were placed for the copper spot treatment; and

- The Cayuga County DOH prepared a Hydrilla – Harpoon Granular FAQ factsheet and posted it on their website for the copper spot treatment.

E & E 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 10 treatments. As for the first and second years of the project, NYSDEC did not require any newspaper notifications of the treatment activities.

E & E also conducted public notification efforts for the treatment near Don's Marina. Written notifications were sent out certified mail which included a factsheet developed by the Cayuga County DOH entitled "Hydrilla – Frequently Asked Questions Regarding Endothall."

2.2 Herbicide Treatment Methodology

The aquatic herbicide fluridone was applied in designated sections of Wells College Bay during 10 treatment events that occurred between July and September 2019 (see Table 2-1). Copper was applied during one of the 10 events, on August 29, 2019. The herbicide applications were completed by SLM in accordance with the *Architect-Engineer Scope of Work (SOW) Aquatic Plant Control ERDC Demonstration Project Wells College Bay, Cayuga Lake, Aurora, NY,* dated May 22, 2019, and subsequently amended (USACE 2019).

2.2.1 Herbicide Transfer

An in-line herbicide injection system and an SR 430 Stihl backpack blower were used for the fluridone treatments. An SR 430 Stihl backpack blower or an Agri-Fab granular spreader was used for the copper treatments. The boats used for the treatments were either a 20-foot skiff or a jon boat. Each boat was outfitted with a polyethylene tank, venturi adaptation, and granular spreaders. Herbicide transfer occurred at the Long Point State Park Boat Launch, where the chemical delivery truck was able to park so that other users maintained access to the boat launch during the herbicide transfer process. The fluridone was delivered in 44-pound buckets and the copper was delivered in 20-pound bags. The empty buckets and bags were triple rinsed and recycled at the Montgomery-Otsego-Schoharie Counties' Solid Waste Management Authority Oneonta Transfer Station. Personal protective equipment was worn by SLM staff during the transfer from the truck to the treatment system.

2.2.2 Herbicide Application

Aurora

The work skiff and jon boat were outfitted with 2-inch gasoline-powered water pumps. The tanks and lines were fitted with ball valves used to meter the rate of flow. The fluridone herbicide was mixed with water from the lake and then distributed into the lake subsurface through hoses located at the stern of the skiff or jon boat. The injection rate was approximately 10 pounds per minute. The copper herbicide was poured into the granular spreader and evenly distributed over the surface at the bow of the boats. The boats had a Global Positioning System (GPS) navigation system with all of 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 product was applied to each section before moving to the next adjacent section.

SLM staff arrived at the Long Park State Park Boat Launch between at 8:00 AM and 9:00 AM on each scheduled treatment day, launched the 20-foot skiff or jon boat, and began assembling treatment systems. After the staff had their on-site meetings, the herbicide transfer began. The treatment crew on the boats consisted of a lead applicator and an assistant/technician. Treatment started between 9:00 AM and 10:00 AM and, aside from brief breaks when the boats stopped to re-load herbicide, the treatments continued uninterrupted until the lake treatment areas were completed at approximately 12:30 PM. There were no deviations from treatment schedule due to weather conditions or other factors.

Don's Marina, Town of Genoa

For the endothall application, the boat was launched in Aurora and traveled to Don's Marina after finishing the Aurora application. The endothall was applied using a Vortex blower. The boat had a GPS navigation system with the treatment area preloaded. The quantity of herbicide was determined by the USACE. The day following treatment, remnants of the gel-like carrier of the endothall formation were found washed up on the shore near the marina (see Photo 2-1). This was attributed to the storms that occurred overnight following the treatment. The product manufacturer indicated that the herbicide releases from the gel carrier in 3-4 hours, but the biodegradable carrier can persist for longer periods. SLM personnel came back to the site and cleaned up the area.

Photo 2-1 Gel-like endothall carrier, washed up on shore.

Due to a scheduling error, the treatment area near Don's Marina was treated one week early, on August 15 instead of August 22, 2019. Every effort was made by E & E and SLM to notify all affected stakeholders of the error and E & E worked with Cayuga County DOH to call those residents who had reached out with questions or concerns in response to the riparian notification of the treatment. Cayuga County DOH staff went door to door to hand-deliver notices of the treatment error. E & E provided bottled water for the Atwater Association, which draws their water directly from Cayuga Lake. The use of bottled water would have occurred regardless of the scheduling error.

2.3 Quantity of Herbicide Used and Total Area Treated

Aurora

Ten fluridone treatments were scheduled in the 30-acre treatment area during the summer of 2019. The treatment plan specified that the first two treatments would consist of application of fluridone to achieve a target concentration of 20 ppb, and the third through tenth treatments would achieve a target concentration of 13.75 ppb (see Table 2-1). Treatments occurred approximately seven days apart.

Table 2-1 In-lake Fluridone Herbicide Application Summary by Treatment Date for Aurora

Date	Target Concentration (ppb)	Total Pounds of Sonar H4C
7/3/2019	20	438
7/11/2019	20	438
7/18/2019	13.75	298
7/25/2019	13.75	298
8/1/2019	13.75	298
8/8/2019	13.75	298
8/15/2019	13.75	298
8/22/2019	13.75	298
8/29/2019	13.75	298
9/5/2019	13.75	298
	Total Pounds	**3,260**

Key:
ppb = parts per billion

In-lake copper spot treatment application occurred along with one of the fluridone treatment events, on August 29, 2019, at concentrations not to exceed 1,000 ppb (1 ppm) (see Table 2-2). Spot treatment areas consisted of four individual, predetermined treatment areas and totaled 9 acres (see Figure 1-1).

Table 2-2 In-lake Copper Herbicide Application Summary for Aurora

Date	Acres	Target Concentration (ppb)	Total Pounds of Harpoon
8/29/2019	9	1,000	4,950.55

Key:
ppb = parts per billion

Don's Marina, Town of Genoa

One spot treatment of endothall (Aquathol® Super K) was conducted on August 15, 2019, near Don's Marina. A total of 88 pounds of endothall were used to achieve an application target rate of 5 ppm (5,000 ppb).

2.4 Water Quality Sampling

For Aurora, fluridone was applied during 10 treatment events, between July 3, 2019, and September 5, 2019. E & E performed in-lake water quality sampling to determine the fluridone concentrations and dispersion of herbicide between July 8, 2019, and September 9, 2019. Refer to Appendix A for analytical results of the sampling. The USACE also performed water quality sampling at nine sites on four dates during the season. Additionally, the Cayuga County DOH performed drinking water and beach sampling between July 8, 2019, and September 9, 2019, for the Aurora fluridone treatments.

Water sampling was also conducted following treatment at Don's Marina. E & E conducted sampling on two days immediately following treatment (August 16 and August 17, 2019); this consisted of in-lake and raw water sampling. The Cayuga County DOH conducted water sampling on August 23, 2019.

2.4.1 Aurora In-Lake Sampling

2.4.1.1 E & E Sampling

E & E collected four in-lake water samples following each of the 10 treatment events (see Figure 2-1 and Table 2-3 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 (i.e., there was a 48-hour turnaround time [TAT] for sample analyses that factored into planning each sampling event). Weekly sampling events occurred approximately four days following each application.

**Table 2-3 In-Lake Water Sample Collection Sites
Wells College Bay, Cayuga Lake Hydrilla
Demonstration Project**

Sample Collection Site	Latitude[a]	Longitude[a]
TreatN	42.742864	-76.701202
LakeN	42.751160	-76.703304
LakeS	42.732135	-76.709815
TreatS	42.739172	-76.704476

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

The samples were collected with a stainless-steel Kemmerer bottle sampler. The four in-lake sampling locations consisted of the following (see Figure 2-1):

- Two sample locations in the lake treatment block (TreatN and TreatS);
- One sample approximately a half mile north of the lake treatment block (LakeN); and
- One sample approximately a half mile south of the lake treatment block (LakeS).

Samples from each sample location listed above 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.

Prior to sample collection, 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 brown high-density polyethylene 30 milliliter (mL) sample bottles provided by the laboratory. Samples were stored protected from light and shipped in coolers to SePRO Corporation (SePRO) in Whitakers, North Carolina, for analysis.

In-lake 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 part per billion (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%.

Samples collected a half mile to the north and south of the lake treatment block were not significantly different from samples collected within the lake treatment

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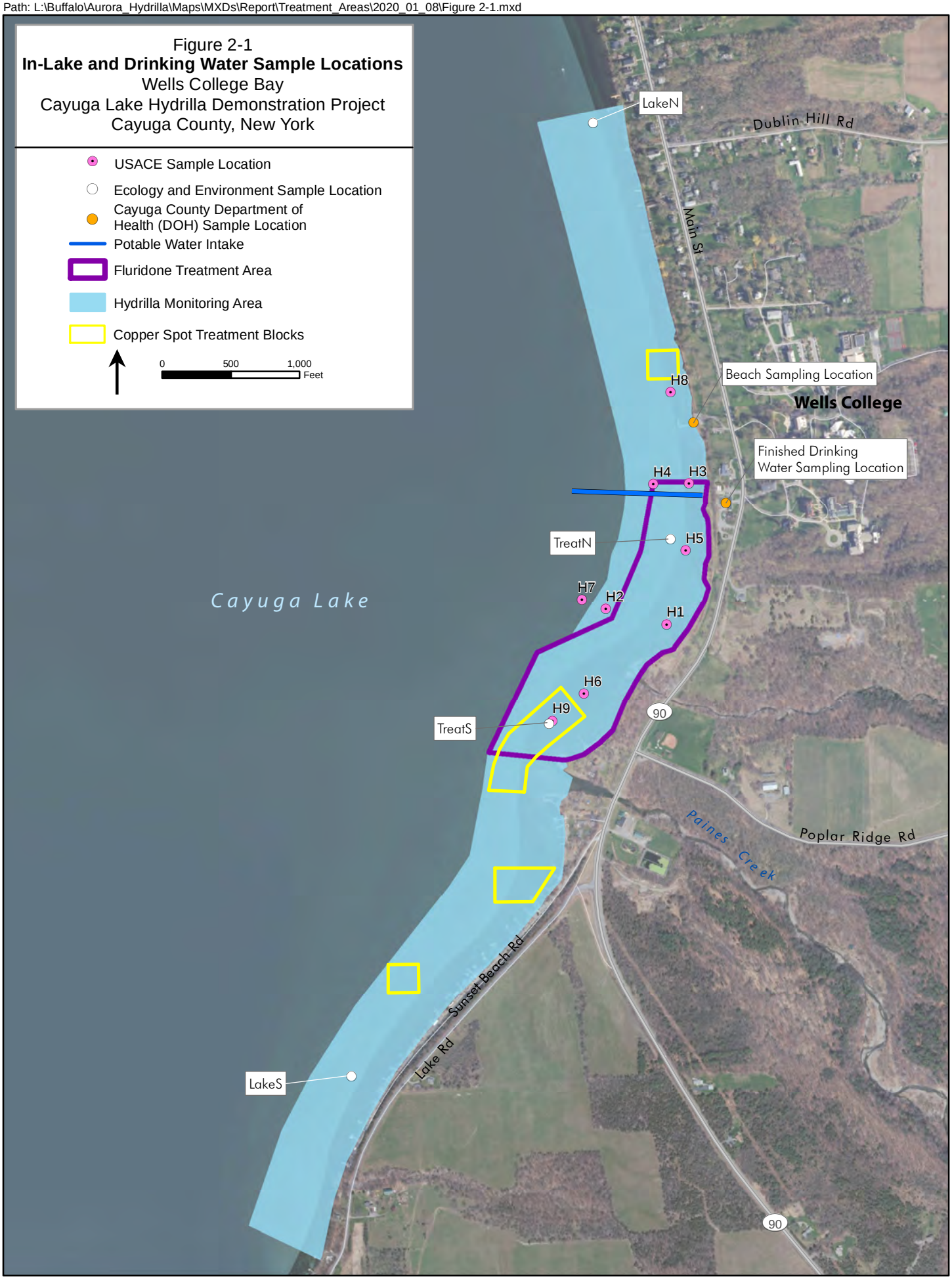


Source: ESRI 2018; Cayuga County, 2015

block (see Table 2-4). This indicated that the fluridone did not remain concentrated at the application site at the end of a week.

Table 2-4 E & E In-Lake Water Sampling Results for Fluridone (ppb)

Date	Sample Location	Time	Sample Depth	Fluridone Concentration (ppb)[a]
7/8/2019	TreatN	1745	6'5"	<1
7/8/2019	LakeN	1800	12'8"	<1
7/8/2019	LakeS	1730	8'5"	<1
7/8/2019	TreatS	1810	6'8"	**1.5**
7/15/2019	TreatN	1440	8'4"	<1
7/15/2019	LakeN	1444	12'8"	<1
7/15/2019	LakeS	1420	5'8"	<1
7/15/2019	TreatS	1430	2'	<1
7/22/2019	TreatN	1407	6'4"	<1
7/22/2019	LakeN	1416	11'	<1
7/22/2019	LakeS	1354	5'7"	<1
7/22/2019	TreatS	1401	5'8"	<1
7/30/2019[b]	TreatN	1505	7'2"	<1
7/30/2019[b]	LakeN	1455	10'8"	<1
7/30/2019 [b]	LakeS	1525	7'4"	<1
7/30/2019[b]	TreatS	1515	6'6"	1
8/5/2019	TreatN	1242	9'	1
8/5/2019	LakeN	1252	12'5"	1
8/5/2019	LakeS	1225	6'7"	<1
8/5/2019	TreatS	1234	6'5"	**1.9**
8/12/2019	TreatN	1420	8'	<1
8/12/2019	LakeN	1428	12'2"	<1
8/12/2019	LakeS	1408	7'2"	<1
8/12/2019	TreatS	1415	7'6"	<1
8/19/2019	TreatN	1225	9'6"	<1
8/19/2019	LakeN	1233	13'3"	<1
8/19/2019	LakeS	1211	7'5"	<1
8/19/2019	TreatS	1220	9'3"	<1
8/26/2019	TreatN	1444	9'4"	<1
8/26/2019	LakeN	1450	11'5"	<1
8/26/2019	LakeS	1430	7'9"	<1/<1
8/26/2019	TreatS	1438	6'9"	<1
9/3/2019	TreatN	1505	9'1"	<1
9/3/2019	LakeN	1516	10'6"	<1
9/3/2019	LakeS	1453	8'7"	<1/<1
9/3/2019	TreatS	1500	6'1"	<1
9/9/2019	TreatN	1438	6'4"	<1
9/9/2019	LakeN	1444	9'4"	<1

Table 2-4 E & E In-Lake Water Sampling Results for Fluridone (ppb)

Date	Sample Location	Time	Sample Depth	Fluridone Concentration (ppb)[a]
9/9/2019	LakeS	1425	5'2"	<1
9/9/2019	TreatS	1432	3'2"	<1

Notes:
[a] Two reported results in a single cell indicate an instance where a field duplicate sample was collected.
[b] Sampling was delayed by one day and occurred on 7/30/2019.

Bold values denote positive detections.

Key:
ft = feet
in = inches
ppb = parts per billion

2.4.1.2 USACE Sampling

The USACE collected two samples at nine sampling locations on four dates following the fluridone treatments (see Figure 2-1 and Table 2-5). One sample was collected in the middle of the water column, and one was collected at the lake bottom to address dilution and spread of herbicide. Due to the granular nature of fluridone, sampling in the middle of the water column is more likely to pick up herbicide residues than sampling at the water's surface. Samples were analyzed using the RaPID assay (enzyme-linked immunosorbent assay) method (RaPID Assay Fluridone Test Kit).

Table 2-5 USACE In-Lake Water Sampling Results for Fluridone (ppb)

Sampling Location	Fluridone Concentration (ppb)			
	7/16/19	8/6/2019	8/26/19	9/16/2019
H1 MID	ND	1.24	0.39	1.19
H1 BOT	0.04	0.45	0.84	0.22
H2 MID	0.42	15.11	2.58	0.59
H2 BOT	1.27	7.66	0.15	0.52
H3 MID	0.25	0.19	0.06	0.63
H3 BOT	1.80	0.45	0.30	0.45
H4 MID	0.14	0.31	3.00	8.87
H4 BOT	1.57	0.11	4.85	0.22
H5 MID	0.58	0.54	0.95	0.99
H5 BOT	1.27	0.36	0.80	0.42
H6 MID	0.30	nd	1.56	1.00
H6 BOT	0.52	1.66	0.15	0.04
H7 MID	0.65	0.04	0.66	ND
H7 BOT	3.57	0.04	0.06	ND
H8 MID	----[a]	0.54	0.24	ND
H8 BOT	----[a]	0.19	0.27	0.08

Table 2-5 USACE In-Lake Water Sampling Results for Fluridone (ppb)

Sampling Location	Fluridone Concentration (ppb)			
	7/16/19	8/6/2019	8/26/19	9/16/2019
H9 MID	0.12	0.11	8.42	0.24
H9 BOT	0.17	0.23	0.59	ND

Notes:
Bold denotes sample location within application area.
[a] Water samples not taken at this location.

Key:
BOT = bottom of water column
MID = middle of water column
ND = Non-detect

As indicated in Table 2-5, variation in herbicide residues was detected within the water column.

Sampling results from September 16, 2019, one week after the final treatment, which occurred on September 9, 2019, indicate that concentrations were 1.00 ppb or below at all locations but one.

2.4.2 Aurora Cayuga County DOH Finished Drinking Water and Beach Sampling

The Wells College water treatment plant shut down operations during each treatment application until each application was complete. The Cayuga County DOH collected finished drinking water samples at the Wells College treatment plant, as well as lake water at the Wells College dock at the bathing beach (see Figure 2-1). The Cayuga County DOH collected finished drinking water samples four days after each treatment to determine if the treatment had an impact on drinking water (see Table 2-6). With respect to the bathing beach samples, they were taken four days following the first seven herbicide applications, and no samples were taken after the eighth, ninth, and tenth treatments due to the closure of the beach for the season.

Table 2-6 Drinking Water/Beach Sampling Results for Fluridone (ppb)

Date	Sample Site	Fluridone Concentration (ppb)	
		DOH	E & E
7/8/2019	AUD2	<0.5	NS
7/8/2019	AUB	<0.5	NS
7/15/2019	AUD2	<0.5	NS
7/15/2019	AUB	<0.5	NS
7/22/2019	AUD2	0.6	NS
7/22/2019	AUB	<0.5	NS
7/29/2019	AUD2	<0.5	NS
7/29/2019	AUB	<0.5	NS
8/5/2019	AUD2	<0.5	<0.5

Table 2-6 Drinking Water/Beach Sampling Results for Fluridone (ppb)

Date	Sample Site	Fluridone Concentration (ppb)	
		DOH	E & E
8/5/2019	AUB	**1.14**	NS
8/12/2019	AUD2	<0.5	NS
8/12/2019	AUB	<0.5	NS
8/19/2019	AUD2	<0.5	NS
8/19/2019	AUB	<0.5	NS
8/26/2019	AUD2	<0.5	NS
8/26/2019	AUB	NS	NS
9/3/2019	AUD2	<0.5	NS
9/3/2019	AUB	NS	NS
9/9/2019	AUD2	<0.5	NS
9/9/2019	AUB	NS	NS

Note:
Bold values denote positive detections.

Key:

AUD2 = Wells College Maintenance Building Finished Drinking Water
AUB = Wells College dock at the bathing beach
DOH = Cayuga County Department of Health
E & E = Ecology and Environment, Inc., member of WSP
µg/L = micrograms per liter
NS = Not Sampled

As indicated in Table 2-6, there was one elevated value – 1.14 ppb on August 5, 2019 – recorded at the Wells College dock at the bathing beach.

Based on recommendations included in the 2018 post-treatment assessment report, the Cayuga County DOH eliminated the raw water samples collected at the Wells College treatment facility because monitoring did not indicate any difference in fluridone results between the raw and finished water.

Finished drinking water samples were collected from a sink tap within the Wells College maintenance building by a Cayuga County DOH staff member. The staff member collected the sample by filling a clean high-density polyethylene container with the tap water, then the tap water was transferred into separate brown high-density polyethylene 30-mL sample bottles (including split samples). The Cayuga County DOH hand delivered their sample to the Community Science Institute (CSI) in Ithaca, New York, for fluridone analysis using the RaPID assay (enzyme-linked immunosorbent assay) method (RaPID Assay Fluridone Test Kit). The laboratory reported results for fluridone to a lower reporting limit of 0.5 part per billion (µg/L) and an upper reporting limit of 10.0 ppb (µg/L). E & E collected finished drinking water split samples of the Cayuga County DOH samples at a rate of 10% (i.e., one sample). The split sample was stored, protected from light, and shipped via FedEx Priority Overnight in coolers to SePRO for analysis. SePRO utilized a propriety HPLC to determine fluridone

concentrations to a method detection limit of 1 µg/L. The purpose of the split sample was to compare the fluridone concentrations in samples collected using the two different test methods (the RaPID Assay method, and the SePRO proprietary HPLC method). The RaPID assay is considered a screening method whereas the HPLC method is considered a definitive method. Any significant detection by RaPID assay would require confirmation by HPLC. There were no significant differences in detections between the Cayuga County DOH finished drinking water sample and the E & E split sample (see Table 2-6).

2.4.3 Don's Marina In-Lake and Drinking Water Sampling

E & E conducted water sampling at two locations within the approximately 1-acre treatment area at Don's Marina, as well as one location 0.25 mile north and one location 0.25 south of the treatment area. Additionally, one raw water sample was taken at the pumphouse for the Atwater Association Public Water System (see Table 2-7 and Figure 2-2). Samples were sent to the University of Florida Center for Aquatic Invasive Plants for analysis.

Table 2-7 E & E Endothall Sampling Results for Don's Marina

Date	Sample Location	Results (ppb)
8/16/19	TreatW	ND
8/16/19	TreatE	515.55
8/16/19	OutN	ND/ND[a]
8/16/19	OutS	ND
8/16/19	Raw	ND
8/17/19	TreatW	10.8
8/17/19	TreatE	48.45
8/17/19	OutN	ND
8/17/19	OutS	ND
8/17/19	Raw	ND

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

Key:
ND = non-detect

As indicated in Table 2-7, one sample within the treatment area was above the limits of detection on August 16, 2019, and two samples were above the limits of detection on August 17, 2019.

In addition to the E & E sampling, the Cayuga County DOH performed their own sampling on August 23, 2019, and took one raw water sample at the Atwater Association Public Water System. The sample was analyzed by Pace Analytical and results indicated less than 9.0 ppb. The New York State Department of Health drinking water standard, or Maximum Contaminant Level, for endothall for public water systems is 50 ppb.

2.5 Vegetative Monitoring (2016 through 2019)

The USACE conducted point intercept surveys on four dates throughout the growing season to determine hydrilla distribution and relative frequency. Hydrilla distribution was concentrated within the central portion of the overall monitoring area for 2019, and its relative frequency ranged from sparse to moderate (see Figure 2-3).

Based on the point intercept surveys conducted over the last four years during the growing season, Hydrilla relative frequency has significantly decreased from 57% in September 2016 to 0.5% in September 2019 (see Table 2-8). Additionally, Figure 2-4 provides a visual comparison of Hydrilla distribution between 2017-2019.

Table 2-8 Hydrilla Relative Frequency, 2016-2019

Hydrilla Frequency	Year
57%	September 2016
2.4%	September 2017
1.3%	September 2018
0.5%	September 2019

2.6 Tuber Monitoring (2017-2019)

USACE monitored tubers at four sites on Cayuga Lake at Aurora, New York, from 2017 through 2019 for tuber densities pre- and post-treatment and to determine tuber sprouting dynamics (see Figure 2-5). Sample sites were established in areas where dense beds of Hydrilla were delineated in 2016. Based on sampling, tubers begin sprouting in late May to early June and most sprouting occurs by the end of June to early July depending on water temperature. These sprouting rates are comparable to what has been documented on the Erie Canal/Tonawanda Creek in Western New York (see Table 2-9). In 2017, the majority of tubers that sprouted had produced shoots above the sediment surface by late June, whereas in 2018 this did not occur until the second week of July. This was likely due to warmer water temperatures in 2017. The water temperatures in mid- to late June 2017 were approximately 4°C (39.2°F) warmer than in June 2018 and 2019.

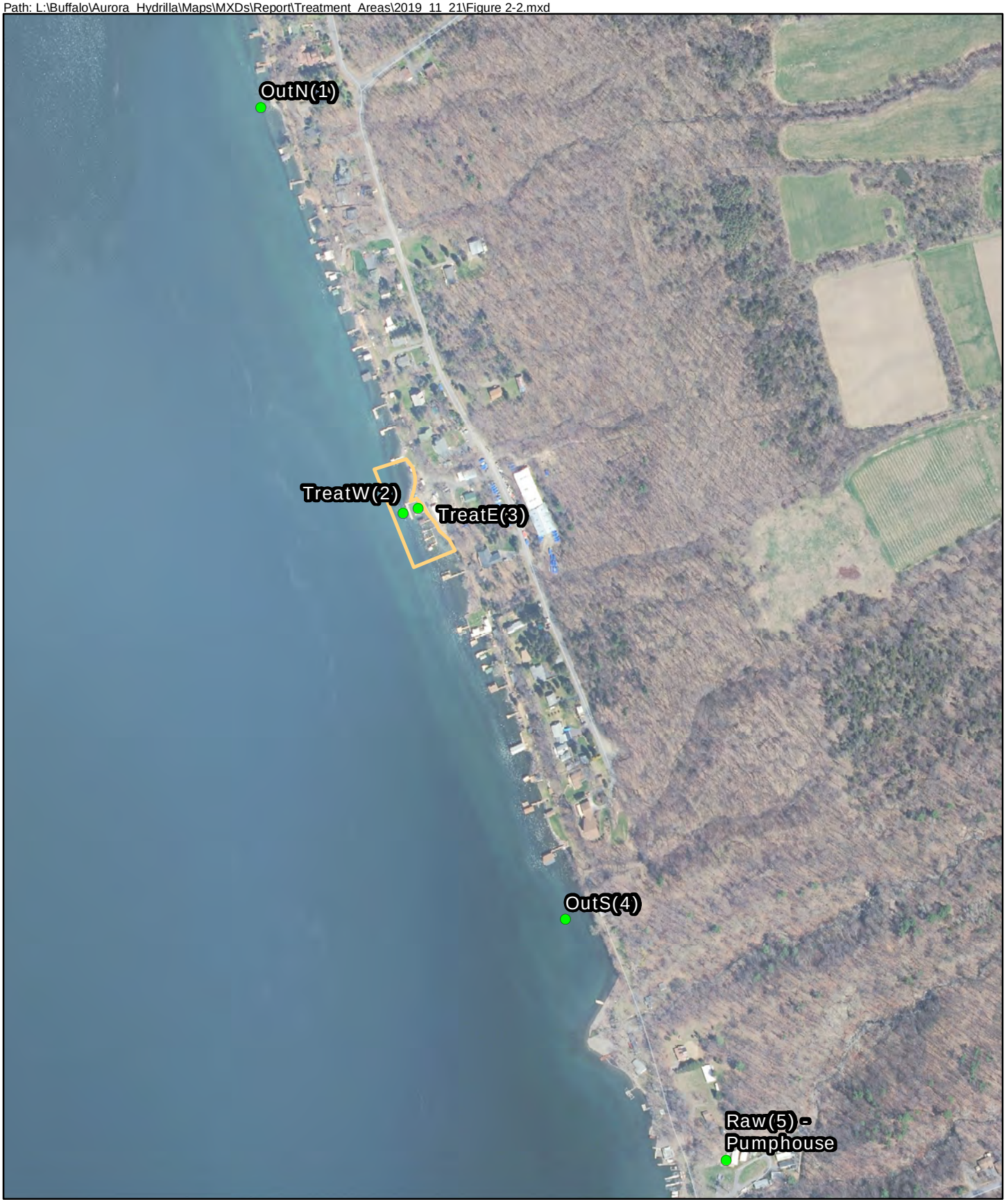
A total of 1,360 sediment cores were collected in summer and fall of 2017 and summer of 2018. Tuber samples were not collected in the fall of 2018 due to high wave conditions during scheduled sampling events in September and October. A tuber attrition rate of approximately 88% (due to synchronous sprouting) was calculated following the 2017 treatment; the USACE considers this rate to be very encouraging. Tuber samples collected in June 2019 demonstrated that tuber densities were reduced an additional ~93% due to a second year of treatment. Thus, overall tuber densities have been reduced by >99% of their pre-treatment numbers in 2017. It is anticipated that they have been reduced further due to a third year of treatments conducted during the summer of 2019.

Table 2-9 Combined Tuber Data from Four Sites on Cayuga Lake at Aurora (May 2017 through June 2019)

Four Sites at Aurora[1]	Temperature (°C)	Total Tubers	No. of Sproutings	% Sprouting	No. of Tubers/ Core
5/24/17	13.2	97	8	8.1	0.99
6/8/17	12.6	120	16	13.3	0.75
6/28/17	22.2	319	264	82.8	1.99
8/8/17	23.2	30	14	46.7	0.19
9/18/17	21.5	22	14	63.6	0.14
10/12/17	18.3	34	18	52.9	0.21
6/6/18	13.1	15	2	13.3	0.09
6/27/18	18.7	7	4	57.1	0.04
7/10/18	23.6	41	38	92.7	0.26
6/25/19	18.9	3	2	66.7	0.02

Note:
[1] 20 cores per site were collected on May 24, 2017; 40 cores per site were collected for the rest of 2017, 2018, and 2019.

Path: L:\Buffalo\Aurora_Hydrilla\Maps\MXDs\Report\Treatment_Areas\2019_11_21\Figure 2-2.mxd



Don's Marina Hydrilla

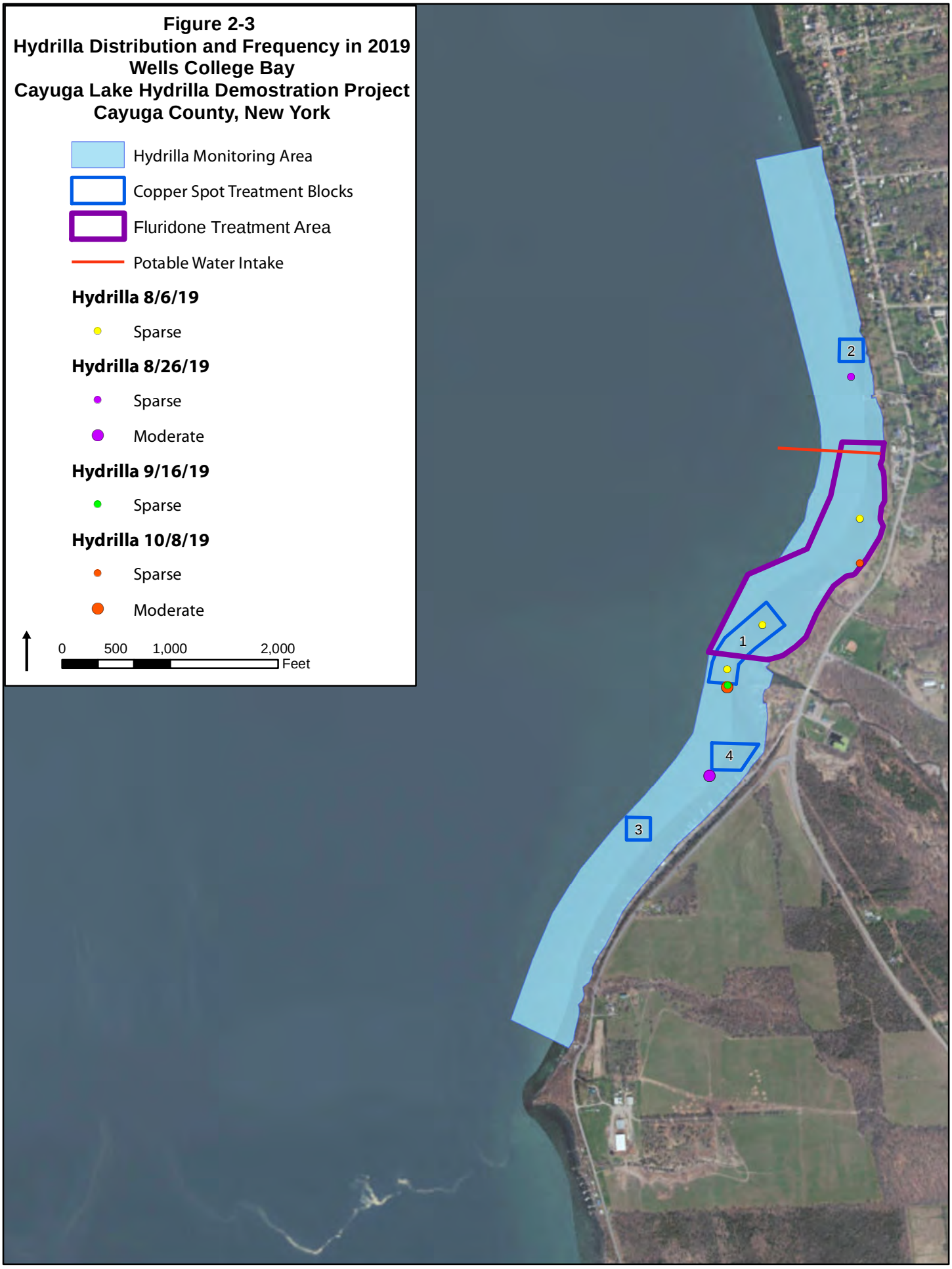
Water Sample

Figure 2-2
Don's Marina Sampling Locations
Wells College Bay
Cayuga Lake Hydrilla Demonstration Project
Cayuga County, New York

0 100 200 300 400 500 Feet

Source: ESRI 2012; NYS Office of Information Technology Services, GIS Program Office, 2018.

Figure 2-3
Hydrilla Distribution and Frequency in 2019
Wells College Bay
Cayuga Lake Hydrilla Demostration Project
Cayuga County, New York



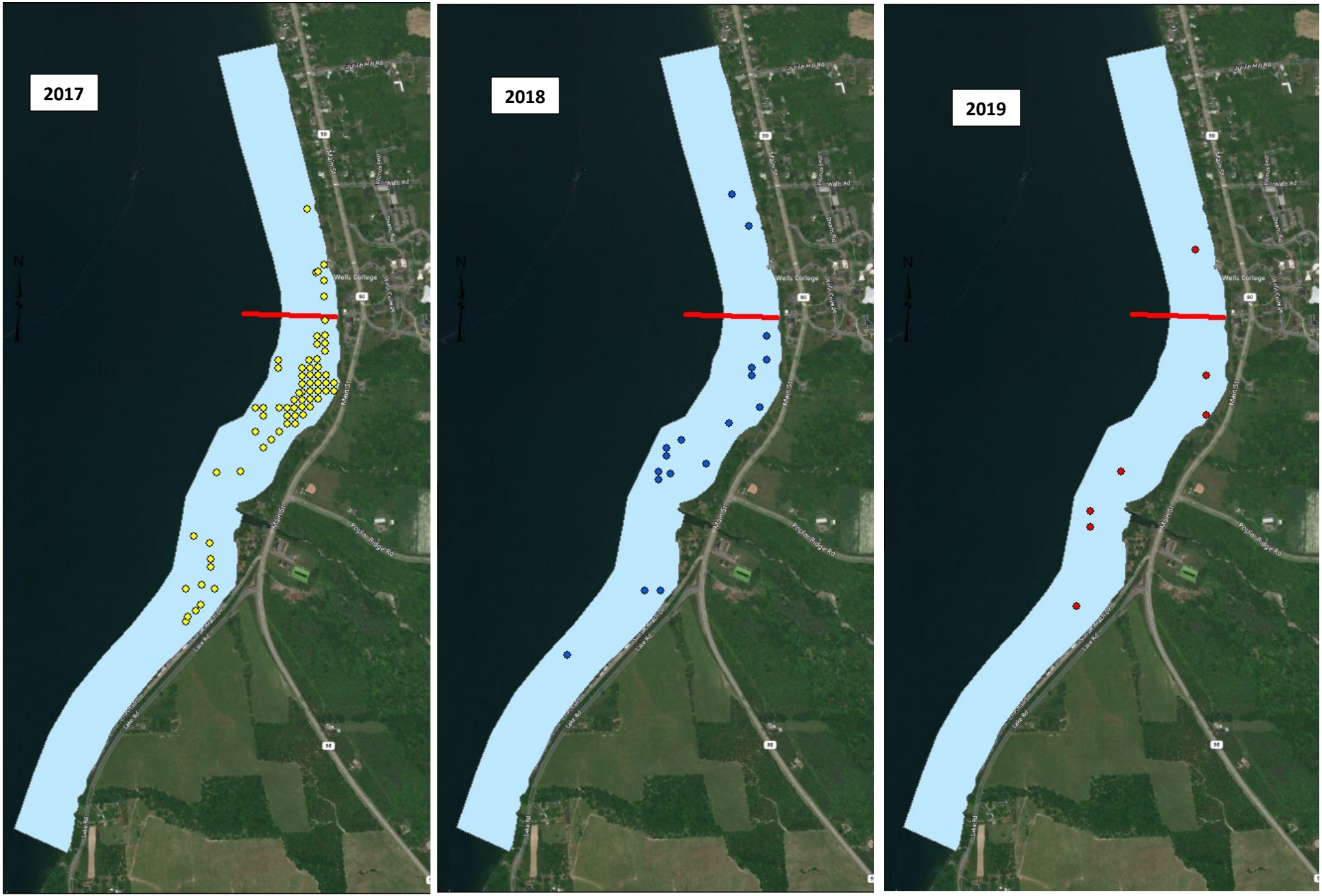


Figure 2-4 Hydrilla Locations in Cayuga Lake at Aurora, NY from 2017 through 2019

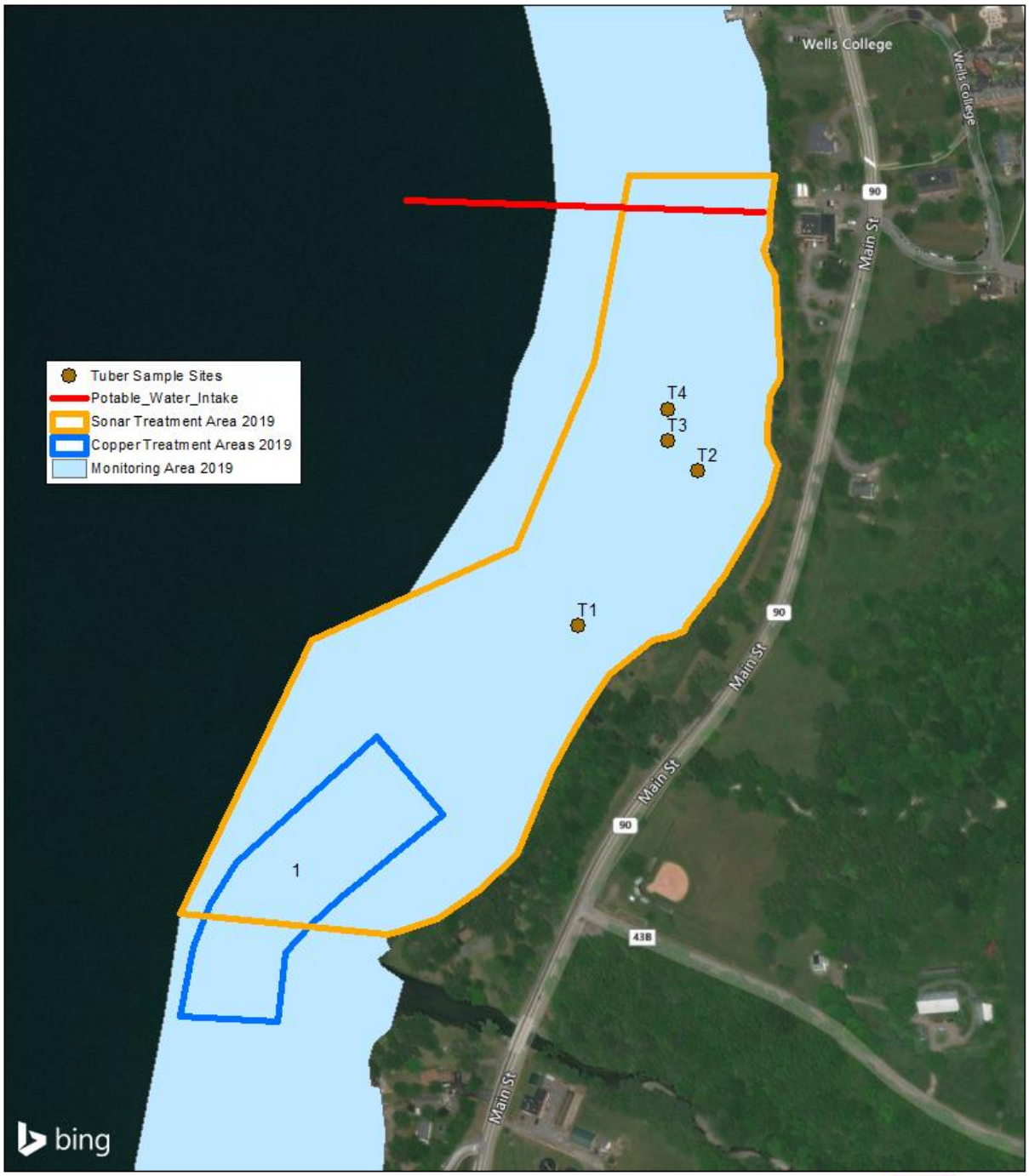


Figure 2-5
Hydrilla Tuber Monitoring Areas

N

0 240 480 960 Feet

US Army Corps of Engineers
Buffalo District
BUILDING STRONG

3 Recommended Study Improvements

The study improvements, summarized in this section, were based on lessons learned from the third year of herbicide application effort, coordination with the study partners work plan development, and activities conducted during the 2019 herbicide application.

3.1 Herbicide Application and Analysis

Herbicide Application

Transfer of the herbicide from the shore-based areas to the skiff and airboat and application of the herbicide in 2019 was smooth and efficient. The staging areas in Aurora and near Don's Marina adequately supported operations for the in-lake treatments. Public access to the boat ramps during use by the applicators was uninterrupted. Although inclement weather can significantly affect the application and subsequent in-lake sampling schedule, weather delayed application by one day for only one event. The Project team needs to continue to look at long-range weather forecasts when planning future applications/sampling and build in schedule flexibility for each event.

Analysis

As with 2017 and 2018 efforts, two different types of analytical tests were performed to determine fluridone concentrations during the study. SePRO's proprietary HPLC method was used for analysis of fluridone in the in-lake samples and the finished drinking water split samples, and CSI analyzed the finished drinking water samples using the RaPID assay to determine fluridone concentrations. The RaPID assay is considered a screening method whereas the HPLC method is considered a definitive method. The split sample did not show any discernible differences between the results; therefore, both methods met the goal of quantifying fluridone concentrations. For future work, either method could be employed; however, elevated detections using the RaPID assay would require confirmation via a definitive method.

3.2 2019 Lessons Learned

Treatment Areas

Due to the consistency with scheduling and the fluridone treatment, the application operations proceeded smoothly. When working on waterbodies of this scale, it is critical for the broader Project Team (referring to those entities defined in Section 1.2) to continue to maintain proper contact through E & E or the USACE to communicate needs, especially concerning the water intake facility adjacent to the treatment area.

Herbicide Application and Volumes

To improve the efficacy of the treatments, isolation techniques such as limnocorrals and bubble curtains may be employed at the smaller treatment zones as a possible method to extend exposure times. The efficacy of bubble curtains is still being evaluated by the USACE; however, they may allow for longer residence time in the area, regardless of some of the weather conditions on the lake. It is also recommended to mark the Hydrilla plants in the treatment zones nearest Wells College with a small buoy or similar. SLM was able to see some of the plants from the surface; however, markers would not only increase plant visibility but would also allow other boaters that come into the area to avoid the areas containing Hydrilla.

As future years of the program will include more reactive smaller-scale spot-treatments, the applicator will need to have greater flexibility to accommodate last minute changes to the SOW. The applicator will need to have enough herbicide on hand to be able to target all areas that require treatment, but have the flexibility to return unused product to inventory. Improvements with preliminary estimates of the anticipated and potential maximum quantities of herbicide to be applied will be needed, to arrange for product delivery.

Communication

Twenty-four-hour email notification of herbicide treatments, including changes in treatment schedule was effective and no issues were raised by Cayuga County DOH or Wells College. This type of communication needs to continue in future treatment programs.

Drinking Water/Beach Sampling

Frequency of Drinking Water/Beach Sampling and Logistics. For a third year, the Cayuga County DOH performed finished drinking water sampling at Wells College to ensure the treatments did not have an impact on drinking water; drinking water samples were taken once following each fluridone application. Additionally, the Cayuga County DOH performed sampling at the Wells College dock at the bathing beach once following fluridone treatments 1 through 7.

Looking forward to Year 4, the Cayuga County DOH plans to continue the same sampling protocol followed in Year 3 (2019).

Analytical Turnaround Times. Samples were analyzed with a 24-hour TAT. Similar to 2018 findings and suggestions in the post-treatment assessment report, since it was determined that the treatments did not have an impact on drinking water quality, the TAT is not as critical as it was prior to the commencement of this Project. If all parties agree that the TAT is not critical, then drinking water samples could be sent to SePRO along with the in-lake samples. SePRO can analyze the samples at a much reduced cost (approximately 32% with a 48-hour TAT) than CSI.

In-Lake Sampling

Frequency of In-Lake Sampling and Logistics. Samples should continue to be collected between day four and day seven of each application so that results can be obtained before the next treatment (assuming a 48-hour TAT). During the 2019 treatments, back-calculating the dosage was not performed as it was in 2017 to maintain the target fluridone concentration. However, to ensure that target concentrations are achieved and not exceeded, in-lake sampling should continue to be performed between days 4 and 7 following fluridone application.

Analytical Turnaround Times. Samples are analyzed on a 48-hour 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.

4 References

United States Army Corps of Engineers (USACE). 2019. *Architect-Engineer Scope of Work Aquatic Plant Control ERDC Demonstration Project Wells College Bay, Cayuga Lake, Aurora, NY*. May 2019.

A Analytical Data

Community Science Institute, Inc.
NYSDOH ELAP #11790 www.communityscience.org EPA Lab Code NY01518

Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 7/8/19 Test Date: 7/10/19

Report ID: Aurora 071019 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	7/10/19
AUB	Beach	<0.5	7/10/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 7/10/19
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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 7/15/19 Test Date: 7/17/19

Report ID: Aurora 071519 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	7/17/19
AUB	Beach	<0.5	7/17/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 7/17/19
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NYSDOH ELAP #11790 www.communityscience.org EPA Lab Code NY01518

Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 7/22/19 Test Date: 7/24/19

Report ID: Aurora 071519 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	0.6	7/24/19
AUB	Beach	<0.5	7/24/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 7/24/19
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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 7/29/19 Test Date: 7/31/19

Report ID: Aurora 072919 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	7/31/19
AUB	Beach	<0.5	7/31/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 7/31/19
Stephen M. Penningroth, Technical Director

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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 8/5/19 Test Date: 8/6/19

Report ID: Aurora 080519 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	8/6/19
AUB	Beach	1.14	8/6/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 8/6/19
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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 8/12/19 Test Date: 8/13/19

Report ID: Aurora 081319 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	8/13/19
AUB	Beach	<0.5	8/13/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 8/13/19
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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 8/19/19 Test Date: 8/21/19

Report ID: Aurora 082119 Number of Samples: 2
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	8/21/19
AUB	Beach	<0.5	8/21/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 8/21/19
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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 8/26/19 Test Date: 8/28/19

Report ID: Aurora 082119 Number of Samples: 1
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	8/28/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 8/28/19
Stephen M. Penningroth, Technical Director

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Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 9/03/19 Test Date: 9/04/19

Report ID: Aurora 082119 Number of Samples: 1
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	9/04/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth, Technical Director Date: 9/04/19

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NYSDOH ELAP #11790 www.communityscience.org EPA Lab Code NY01518

Cayuga Inlet and Fall Creek Fluridone Monitoring Report

Client: Cayuga County Health Department 8 Dill St. Auburn, NY 13021	Sampling Date: 9/09/19 Test Date: 9/11/19

Report ID: Aurora 090919 Number of Samples: 1
Test Methods: Modern Water, RaPID Assay® Fluridone Test Kit A00250 (ELISA)

Site	Location	Fluridone, ppb	Test Date
AUD2	Finished drinking water-Wells College Maintenance Building-Break	<0.5	9/11/19

Results apply only to samples listed above and not to any other samples.
Samples were not acidified unless otherwise stated.
The analytical method is based on ELISA technology and is not certifiable by NYSDOH.

Report prepared by: Stephen M. Penningroth Date: 9/12/19
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SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC5483 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM16849-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	07/08/2019
CTM16850-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	07/08/2019
CTM16851-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	07/08/2019
CTM16852-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	1.5	07/08/2019
CTM16853-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	07/08/2019
CTM16854-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	07/08/2019
CTM16855-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	1.4	07/08/2019
CTM16856-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	1.5	07/08/2019
CTM16857-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	1.5	07/08/2019
CTM16858-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	3.2	07/08/2019
CTM16859-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	1.5	07/08/2019
CTM16860-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	3.5	07/08/2019

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: 07/10/19 11:00 AM
Date Results Sent: Thursday, July 11, 2019

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: COC5562 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM17135-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17136-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17137-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17138-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	4.5	07/15/2019
CTM17139-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	2.2	07/15/2019
CTM17140-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	3.0	07/15/2019
CTM17141-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	2.3	07/15/2019
CTM17142-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	2.8	07/15/2019
CTM17143-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17144-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17145-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019
CTM17146-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	07/15/2019

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: 07/17/19 11:00 AM
Date Results Sent: Thursday, July 18, 2019

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: COC5626 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM17547-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17548-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17549-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17550-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	4.7	07/22/2019
CTM17551-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	1.5	07/22/2019
CTM17552-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	3.9	07/22/2019
CTM17553-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17554-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	2.9	07/22/2019
CTM17555-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17556-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17557-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019
CTM17558-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	<1	07/22/2019

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: 07/23/19 11:00 AM
Date Results Sent: Wednesday, July 24, 2019

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: COC5721 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM17851-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17852-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17853-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17854-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17855-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17856-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	1.3	07/30/2019
CTM17857-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17858-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	1.5	07/30/2019
CTM17859-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17860-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17861-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	07/30/2019
CTM17862-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	1.0	07/30/2019

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: 07/31/19 11:00 AM
Date Results Sent: Wednesday, July 31, 2019

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: COC5784 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18048-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	08/05/2019
CTM18049-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	1.0	08/05/2019
CTM18050-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	08/05/2019
CTM18051-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	1.9	08/05/2019
CTM18052-1	DWSS	Sonar/fluridone (ug/L)	FAST 10	<1	08/05/2019
CTM18053-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	08/05/2019
CTM18054-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	08/05/2019
CTM18055-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	3.4	08/05/2019
CTM18056-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	6.2	08/05/2019
CTM18057-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	4.0	08/05/2019
CTM18058-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	5.1	08/05/2019
CTM18059-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	1.5	08/05/2019
CTM18060-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	3.1	08/05/2019

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: 08/06/19 11:00 AM
Date Results Sent: Wednesday, August 7, 2019

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: COC5839 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18216-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18217-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18218-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	3.2	08/12/2019
CTM18219-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	2.8	08/12/2019
CTM18220-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	2.4	08/12/2019
CTM18221-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	2.3	08/12/2019
CTM18222-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18223-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	1.2	08/12/2019
CTM18224-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18225-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18226-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019
CTM18227-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	<1	08/12/2019

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: 08/13/19 11:00 AM
Date Results Sent: Thursday, August 15, 2019

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: COC5908 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18415-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	08/19/2019
CTM18416-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	08/19/2019
CTM18417-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	08/19/2019
CTM18418-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	<1	08/19/2019

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: 08/20/19 11:00 AM
Date Results Sent: Wednesday, August 21, 2019

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: COC5980 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18647-1	Out N	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18648-1	Out W	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18649-1	Treat 1	Sonar/fluridone (ug/L)	FAST 10	3.6	08/26/2019
CTM18650-1	Treat 2	Sonar/fluridone (ug/L)	FAST 10	5.1	08/26/2019
CTM18651-1	Treat 3	Sonar/fluridone (ug/L)	FAST 10	1.4	08/26/2019
CTM18652-1	Treat 4	Sonar/fluridone (ug/L)	FAST 10	2.1	08/26/2019
CTM18653-1	Treat 5	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18654-1	Treat 6	Sonar/fluridone (ug/L)	FAST 10	1.3	08/26/2019
CTM18655-1	Lake N	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18656-1	Lake S	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18657-1	Treat N	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18658-1	Treat S	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18659-1	Out W-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019

CTM18660-1	Treat 5-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019
CTM18661-1	Lake S-Q	Sonar/fluridone (ug/L)	FAST 10	<1	08/26/2019

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: 08/27/19 11:00 AM
Date Results Sent: Wednesday, August 28, 2019

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: COC6055 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18833-1	LAKE S	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18834-1	LAKE S-Q	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18835-1	TREAT S	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18836-1	TREAT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18837-1	LAKE N	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18838-1	OUT W	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18839-1	OUT W-Q	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18840-1	OUT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18841-1	TREAT 1	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18842-1	TREAT 2	Sonar/fluridone (ug/L)	FAST 10	2.4	09/03/2019
CTM18843-1	TREAT 3	Sonar/fluridone (ug/L)	FAST 10	2.1	09/03/2019
CTM18844-1	TREAT 4	Sonar/fluridone (ug/L)	FAST 10	3.4	09/03/2019
CTM18845-1	TREAT 5	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019

CTM18846-1	TREAT 6	Sonar/fluridone (ug/L)	FAST 10	2.0	09/03/2019
CTM18847-1	SC OUT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019
CTM18848-1	SC TREAT 1	Sonar/fluridone (ug/L)	FAST 10	<1	09/03/2019

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: 09/04/19 12:00 PM
Date Results Sent: Thursday, September 5, 2019

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: COC6112 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name Ecology and Enviornment Inc	Contact Person: Katie Evans
Address: 368 Pleasant View Dr. Lancaster NY 14086	E-mail Address: Kevans@ene.com
	Phone: 716-684-8060

Waterbody Information

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

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM18991-1	OUT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019
CTM18992-1	OUT W	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019
CTM18993-1	TREAT 1	Sonar/fluridone (ug/L)	FAST 10	1.7	09/09/2019
CTM18994-1	TREAT 2	Sonar/fluridone (ug/L)	FAST 10	6.0	09/09/2019
CTM18995-1	TREAT 3	Sonar/fluridone (ug/L)	FAST 10	2.6	09/09/2019
CTM18996-1	TREAT 4	Sonar/fluridone (ug/L)	FAST 10	5.2	09/09/2019
CTM18997-1	TREAT 5	Sonar/fluridone (ug/L)	FAST 10	3.7	09/09/2019
CTM18998-1	TREAT 6	Sonar/fluridone (ug/L)	FAST 10	6.9	09/09/2019
CTM18999-1	SC OUT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019
CTM19000-1	SC TREAT 1	Sonar/fluridone (ug/L)	FAST 10	2.1	09/09/2019
CTM19001-1	LAKE N	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019
CTM19002-1	LAKE S	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019
CTM19003-1	TREAT N	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019

CTM19004-1	TREAT S	Sonar/fluridone (ug/L)	FAST 10	<1	09/09/2019

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: 09/10/19 12:00 PM
Date Results Sent: Wednesday, September 11, 2019

This entire report was reviewed and approved for release.

Reviewed By: Laboratory Supervisor

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

August 29, 2019

Kathleen Evans
Ecology & Environment
368 Pleasant View Drive
Lancaster, NY 14086

RE: Project: ENDOTHALL 8/23
Pace Project No.: 70102598

Dear Kathleen Evans:
Enclosed are the analytical results for sample(s) received by the laboratory on August 24, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

John D. Stanton
john.stanton@pacelabs.com
(631)694-3040
Project Manager

Enclosures

cc: Marcia Galloway, Ecology & Environment
Eridania Marte, Ecology & Environment

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

CERTIFICATIONS

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

Long Island Certification IDs

575 Broad Hollow Rd, Melville, NY 11747
New York Certification #: 10478 Primary Accrediting Body
New Jersey Certification #: NY158
Pennsylvania Certification #: 68-00350
Connecticut Certification #: PH-0435
Maryland Certification #: 208
Rhode Island Certification #: LAO00340
Massachusetts Certification #: M-NY026
New Hampshire Certification #: 2987

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

Method: **EPA 548.1**
Description: 548.1 MSSV Endothall
Client: Ecology & Environment
Date: August 29, 2019

General Information:
1 sample was analyzed for EPA 548.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 548.1 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

Sample: ENDOTHALL **Lab ID: 70102598001** Collected: 08/23/19 09:45 Received: 08/24/19 10:30 Matrix: Drinking Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
548.1 MSSV Endothall	Analytical Method: EPA 548.1 Preparation Method: EPA 548.1							
Endothall	**<9.0**	ug/L	9.0	1	08/26/19 11:02	08/27/19 15:55		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

QC Batch: 127430 Analysis Method: EPA 548.1
QC Batch Method: EPA 548.1 Analysis Description: 548 MSSV Endothall
Associated Lab Samples: 70102598001

METHOD BLANK: 608688 Matrix: Water
Associated Lab Samples: 70102598001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Endothall	ug/L	<9.0	9.0	08/27/19 12:03	

LABORATORY CONTROL SAMPLE: 608689

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endothall	ug/L	50	43.4	87	80-120	

MATRIX SPIKE SAMPLE: 608690

Parameter	Units	70102216001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Endothall	ug/L	<9.0	50	43.8	88	80-120	

SAMPLE DUPLICATE: 608691

Parameter	Units	70102189001 Result	Dup Result	RPD	Qualifiers
Endothall	ug/L	<9.0	<9.0		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: ENDOTHALL 8/23
Pace Project No.: 70102598

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
70102598001	**ENDOTHALL**	EPA 548.1	127430	EPA 548.1	127656

REPORT OF LABORATORY ANALYSIS

WO#:70102598

70102598

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

Section A Required Client Information:

Company:	Cayuga Co Health Dept
Address:	8 Dill St. Auburn, NY 13021
Email To:	eoconnor@cayugacounty.us
Phone:	(315) 253-1405
Fax:	(315) 253-1478
Requested Due Date/TAT:	

Section B Required Project Information:

Report To:	
Copy To:	
Purchase Order No.:	
Project Name:	
Project Number:	

Section C Invoice Information:

Attention:	
Company Name:	Army Corp of Engineers
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ____

Site Location STATE: ____

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	Requested Analysis Filtered (Y/N): endothall	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	endothall	DW	G			8/23/19	945		2						X						
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Lisa M Jones	8/23/19	10:07	[signature] PACE	8/23/19	10:07				
	[signature] PACE	8/23/19	17:20	[signature] PACE	8/24/19	10:30	1.6	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Lisa M. Jones

SIGNATURE of SAMPLER: Lisa M. Jones DATE Signed (MM/DD/YY): 08/23/19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical

Sample Condition Upon Receipt

WO#: 70102598
PM: JDS Due Date: 09/03/19
CLIENT: ENE

Client Name: ENE

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

Tracking #: 7760 6594 8217

Custody Seal on Cooler/Box Present: ☐ Yes ☐ No Seals intact: ☒ Yes ☐ No

Temperature Blank Present: ☐ Yes ☒ No

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ Ziploc ☐ None ☐ Other

Type of Ice: (Wet) Blue None

Thermometer Used: TH091 Correction Factor: +0.2

☐ Samples on ice, cooling process has begun

Cooler Temperature (°C): 1.4 Cooler Temperature Corrected (°C): 1.6

Date/Time 5035A kits placed in freezer

Temp should be above freezing to 6.0°C

USDA Regulated Soil (☐ N/A, water sample) Date and Initials of person examining contents: SK 8/24/19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check map)? ☐ YES ☐ NO

Did samples orignate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-LI-C-010) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present:	☒Yes	☐No		1.
Chain of Custody Filled Out:	☒Yes	☐No		2.
Chain of Custody Relinquished:	☒Yes	☐No		3.
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No		5.
Short Hold Time Analysis (<72hr):	☐Yes	☒No		6.
Rush Turn Around Time Requested:	☐Yes	☒No		7.
Sufficient Volume: (Triple volume provided for MS/MSD)	☒Yes	☐No		8.
Correct Containers Used:	☒Yes	☐No		9.
-Pace Containers Used:	☒Yes	☐No		
Containers Intact:	☒Yes	☐No		10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A	11. Note if sediment is visible in the dissolved container.
Sample Labels match COC:	☒Yes	☐No		12.
-Includes date/time/ID/Analysis Matrix SL WT OIL				
All containers needing preservation have been checked	☐Yes	☐No	☒N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
pH paper Lot #				Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl, NaOH>9 Sulfide, NAOH>12 Cyanide) Exceptions: VOA, Coliform, TOC/DOC, Oil and Grease, DRO/8015 (water). Per Method, VOA pH is checked after analysis	☐Yes	☐No	☒N/A	Initial when completed: / Lot # of added preservative: / Date/Time preservative added:
Samples checked for dechlorination:	☐Yes	☐No	☒N/A	14.
KI starch test strips Lot #				Positive for Res. Chlorine? Y N
Residual chlorine strips Lot #				
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☒N/A	15.
Trip Blank Present:	☐Yes	☐No	☒N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (if applicable):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

* PM (Project Manager) review is documented electronically in LIMS.