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Department of
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Conservation

Croton River Hydrilla Control Project

2019 ANNUAL UPDATE

Andrew M. Cuomo, Governor | Basil Seggos, Commissioner



Division of Lands and Forests
Bureau of Invasive Species and Ecosystem Health

CROTON RIVER HYDRILLA CONTROL PROJECT
2019 ANNUAL UPDATE

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List of Abbreviations

CFS	Cubic Feet per Second (1 cfs = 1.858 million gallons per day)
DEC	New York State Department of Environmental Conservation
DOH	New York State Department of Health
EPA	United States Environmental Protection Agency
ISCS	DEC's Invasive Species Coordination Section (within the Division of Lands and Forests)
NYCDEP	New York City Department of Environmental Protection
PPB	Parts per Billion (1 ppb = 1 microgram per liter)
PRISM	Partnership for Regional Invasive Species Management
SAV	Submerged Aquatic Vegetation
USGS	United States Geological Survey

Year in Review

Through the ongoing work of the New York State Department of Environmental Conservation (DEC) and its partners, the Croton River Hydrilla Control Project successfully completed the third year (2019) of a five-year treatment project. *Hydrilla verticillata*, an aquatic plant from Asia, is one of the most difficult aquatic invasive species

to control and eradicate in the United States. Infestations can have negative impacts on recreation, tourism, and aquatic ecosystems. If the infestation of hydrilla in the Croton River is allowed to reach the Hudson River, the tide could potentially spread it along 153 miles of estuary to each connecting tributary and beyond.

2019 Highlights

- Herbicide was applied from June 10 through October 15. A total of 118.2 treatment days met the target treatment range of the project.
- By mid-growing season, hydrilla plants were found in trace amounts during snorkel surveys of the Croton River and all showed significant signs of herbicide injury and impacts to plant health (see Figure 1).
- Following the 2019 treatment season, 446 points on the Croton River were surveyed for submerged aquatic vegetation (SAV). No rooted hydrilla or fragments at any of the survey points had survived treatment (reduced from 87% in 2016, 34% in 2017, and 18% in 2018).
- Five sites were sampled (110 cores total) for hydrilla tubers following treatment. No tubers or turions were found during 2019 surveys. However, a single fragment of hydrilla with signs of bleaching was discovered in one core.
- Drinking water samples collected three times per week revealed fluridone levels ≤ 1.0 ppb throughout the entire treatment season (well within 0.0 ppb–4.0 ppb target concentration).
- 1,472 points were sampled for SAV at 29 high-priority sites along the lower Hudson River estuary and no hydrilla was present.



Figure 1: Healthy hydrilla in Croton River in 2016 (top), and damaged, bleached hydrilla mid-treatment season in 2019 (bottom)

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Introduction

About Hydrilla

Hydrilla, or “water thyme” (*Hydrilla verticillata*), is a vascular aquatic plant from Asia that is one of the most difficult invasive species to control and eradicate in the United States. Infestations can have negative impacts on recreation, tourism, and aquatic ecosystems. Hydrilla has been a popular aquarium plant for many years; however, it is now listed by the federal government as a “noxious weed.” New York State law prohibits possession of hydrilla with the intent to sell, import, purchase, transport, introduce, or propagate it under *6 New York Codes, Rules and Regulations Part 575 Prohibited and Regulated Invasive Species*.

In New York State, hydrilla is a perennial plant that emerges in late spring to early summer and grows along the bottom of wetlands, rivers, streams, lakes, and ponds. Its monoecious form (containing both male and female organs on the same plant) is capable of overwintering in New York State. Hydrilla produces dense mats of vegetation that extend from the river bottom to the surface of the water and displaces native plants that provide food and shelter for native aquatic wildlife.

To propagate, hydrilla can produce seeds, green buds called turions, and tubers. Turions are overwintering buds found where leaves attach to stems. Tubers are potato-like reproductive structures that form on the roots of the plant each fall and allow hydrilla to store energy and regenerate the following spring. New populations of hydrilla can sprout from seeds, turions, and tubers, as well as from plant fragments that easily break off the plant. These extremely effective dispersal methods make manual control of hydrilla nearly impossible.



Figure 2: *Hydrilla verticillata*

The Croton River Hydrilla Control Project

DEC has been monitoring the hydrilla infestation since its discovery in the Croton River in October 2013. Control and eradication methods in the Croton River are based on an adaptive management strategy outlined in the *Croton River Hydrilla Control Project Five-Year Management Plan*. A link to the *Five-Year Plan* can be found in Appendix A: Helpful Links. This annual update outlines the accomplishments of the treatment project in 2019 (Year 3).

2019 Permitting

The DEC Invasive Species Coordination Section (ISCS) obtained the following permits in order to operate during the 2019 treatment season:

- Article 15 Aquatic Pesticide Permit AV-3-19-767, issued 5/13/2019 (Expiration: 11/15/19)
- Article 24 Freshwater Wetlands Permit, issued 6/29/17 (Expiration: 12/31/2021)
- Special Local Needs Permit for Sonar Genesis® from New York State Department of Health (DOH), issued 04/15/2017, updated 12/14/2018 (Expiration: 12/31/2021)
- SPDES General Permit GP-0-16-005, Acknowledgement of NOI, issued 5/19/2017 (Expiration: 10/31/2021)
- Westchester County Land Use Permit, issued 5/9/2018 (Expiration: 12/31/2021)
- NYCDEP Temporary Land Use Permit, issued 6/29/2017 (Expiration: 6/28/2022)
- 6 NYCRR Part 575 Possession Permit, issued 11/15/18 (Expiration: 11/15/2023)

2019 Field Season Activities

Herbicide Treatments

The 2019 herbicide treatment involved injecting the aquatic herbicide fluridone (tradename: Sonar Genesis® [EPA Reg. No. 67690-54]) into the Croton River at a concentration of 2.0–4.0 ppb for 60–120 days. Information about the efficacy of low-dose fluridone treatments of infested flowing waters can be found in the *Croton River Hydrilla Control Project Five-Year*

Management Plan. Links to the plan and the NYS Special Local Needs Label for Sonar Genesis® can be found in Appendix A: Helpful Links. Sonar Genesis® is a liquid herbicide (active ingredient: fluridone) that was applied to the river via subsurface injection from remote-controlled (via cell phone) injection systems placed at two locations on the Croton River.



Figure 3: A fluridone injection unit (left), unit control dashboard (center), and cellular control device (right). SePRO

The first injection site was located just below the New Croton Dam and a second injection site was located approximately 1.1 miles downstream, near the concrete dam at Black Rock Park. Injection locations were selected in order to maximize treatment coverage and ensure product mixing (that the herbicide mixed with the water). Staff from SÖLitude Lake Management and SePRO Corporation installed, calibrated, and maintained the units. A licensed pesticide applicator from SÖLitude Lake Management filled and refilled the injection unit tanks. The actual dosage and duration of the application were determined daily by flow rates in the river using discharge measurements from the United States Geological Survey (USGS) Hydrologic Station 01375000 (located just below the New Croton Dam), as well as the observed efficacy and label requirements of Sonar Genesis®. Pump rates were calculated daily and controlled by accessing a dashboard using a cellular device or laptop computer. Rates were adjusted periodically in response to flow, technical issues, FasTEST monitoring results, or observed plant response, with the goal of maintaining a target dose of 2.0–4.0 ppb, and a permitted dose of 1.0–5.0 ppb throughout the entire length of the Croton River. Unit operation was conducted by SÖLitude Lake Management-licensed applicators and SePRO staff.

Prior to the beginning of treatment, permanent, weatherproof, bilingual signs with information about the fluridone treatment were installed in compliance with the Article 15 Aquatic Pesticide Permit at the following public access locations:

- Croton Gorge Park – 18 “No Public Access” posters
- Black Rock Park – 4 “No Public Access” posters and 10 “No Irrigation” posters
- Silver Lake Beach – 6 “No Irrigation” posters
- Croton Gorge Unique Area – 7 “No Irrigation” posters
- Public Park at Paradise Island – 4 “No Irrigation” posters
- Echo Boat Launch – 1 “No Irrigation” poster

Treatment began on June 10 and ended on October 15. The herbicide Sonar Genesis® was applied for a total of 118.2 days (high flow rates caused 8.47 days of shutdown). The New Croton Dam injector averaged 5.17 gallons per day (a rate of 2.5 ppb) for a total of 610.6 gallons. The Black Rock Park injector averaged 1.92 gallons per day (a rate of 1.0 ppb) for a total of 227.25 gallons (SÖLitude, 2019).

2019

Rainfall

A Pesticide Discharge Management Plan (PDMP) was developed as an operational protocol as part of the State Pollutant Discharge Elimination System (SPDES) permit. In 2019, the PDMP for this project targeted treatment in waters flowing at a rate less than 500 cubic feet per second (cfs) in an effort to ensure fluridone concentrations would remain within the target range of 2.0–4.0 ppb. Discharge (the volume of water in the Croton River) results from a combination of controlled bottom releases (using doors at the base of the New Croton Dam) and water spilling over the top

of the dam. Discharge is measured at the USGS Hydrological Station 01375000 (located along the Croton River, 1,000 feet downstream of the New Croton Dam). In total, 8.47 treatment shutdown days occurred during the 2019 treatment season due to storms. Comparatively, there were 60 shutdown days during the 2018 treatment season and 4 shutdown days during 2017. In 2019, the longest shutdown due to storms occurred during July and lasted 4.8 consecutive days. The average observed discharge during treatment was 191 cfs in 2019. Figure 4: Croton River Discharge – June–October 2019 displays the changes in flow during the treatment season.

USGS 01375000 CROTON R AT NEW CROTON DAM NR CROTON-ON-HUDSON NY

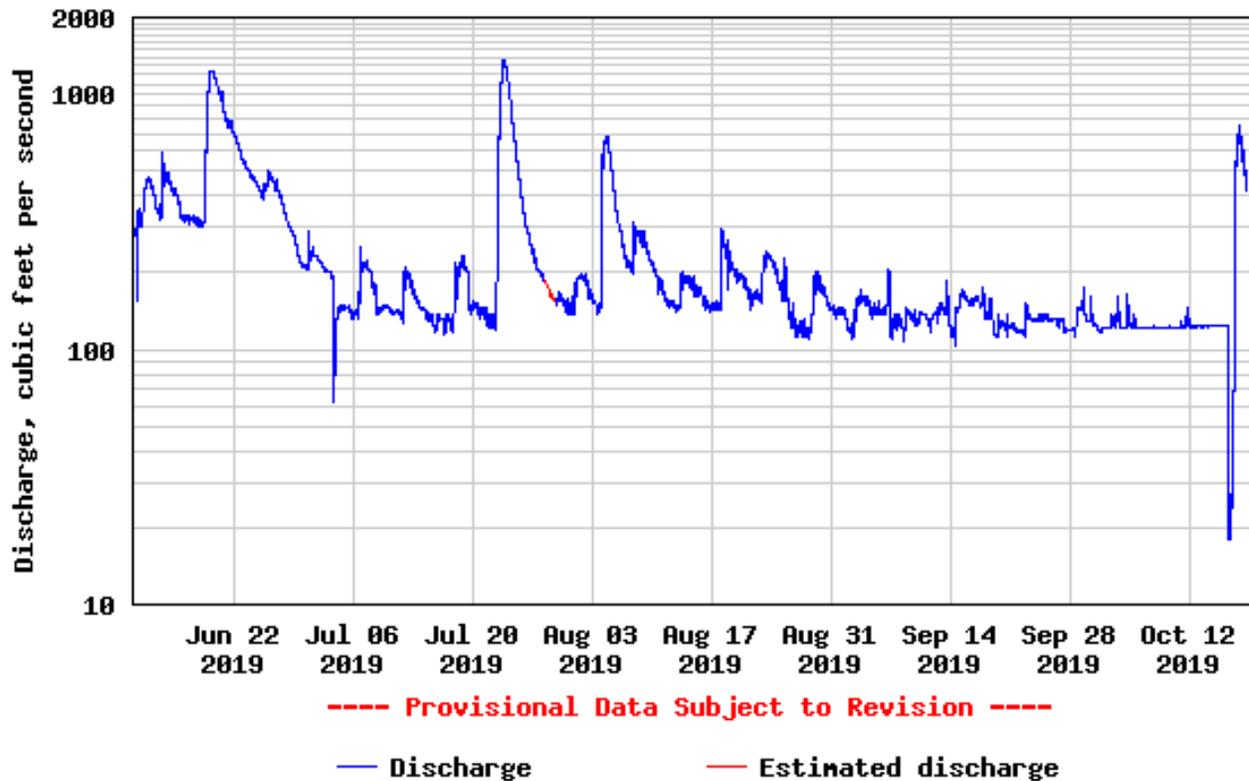


Figure 4: Croton River Discharge – June–October 2019. USGS (“R” = River, “NR” = near)

Cellular Communications

Remote control of the injection units requires communication via a cell network. A Verizon cell tower approximately three miles south-southeast from Croton Gorge Park went down for maintenance beginning in late August, causing an interruption in communications with the unit at the base of New Croton Dam. The unit at

Black Rock Park was not impacted by the outage. Cellular communication with the New Croton Dam injection unit was restored following a six-day outage by installing new antenna components at the dam site. During the dam site outage, the injection unit at Black Rock Park was adjusted from a rate of 1.0 ppb to 2.0 ppb to maintain adequate fluridone concentration in the lower portion of the Croton River.

Water Quality Sampling

Drinking water samples were collected throughout the 2019 field season by SŌLitude Lake Management and the Village of Croton-on-Hudson Water Department. Drinking water (from wells) and finished water (water that is released to the public from the Village of Croton-on-Hudson’s distribution system) were collected and analyzed. Samples were collected from three village wells (DW-1, DW-3, and DW-4), one faucet (FW-1), and two distribution sites

(Upper North Highland Pump House [UNH-1] and the Village of Croton-on Hudson Municipal Building [MB-1]). All water samples were analyzed for fluridone concentration by Phoenix Labs in Manchester, Connecticut, to a 0.29 ppb detection limit. Initially, one sample was collected from each sampling location twice a week. Every other week, two samples (A and B) were taken from each sampling location to test for variation among samples.

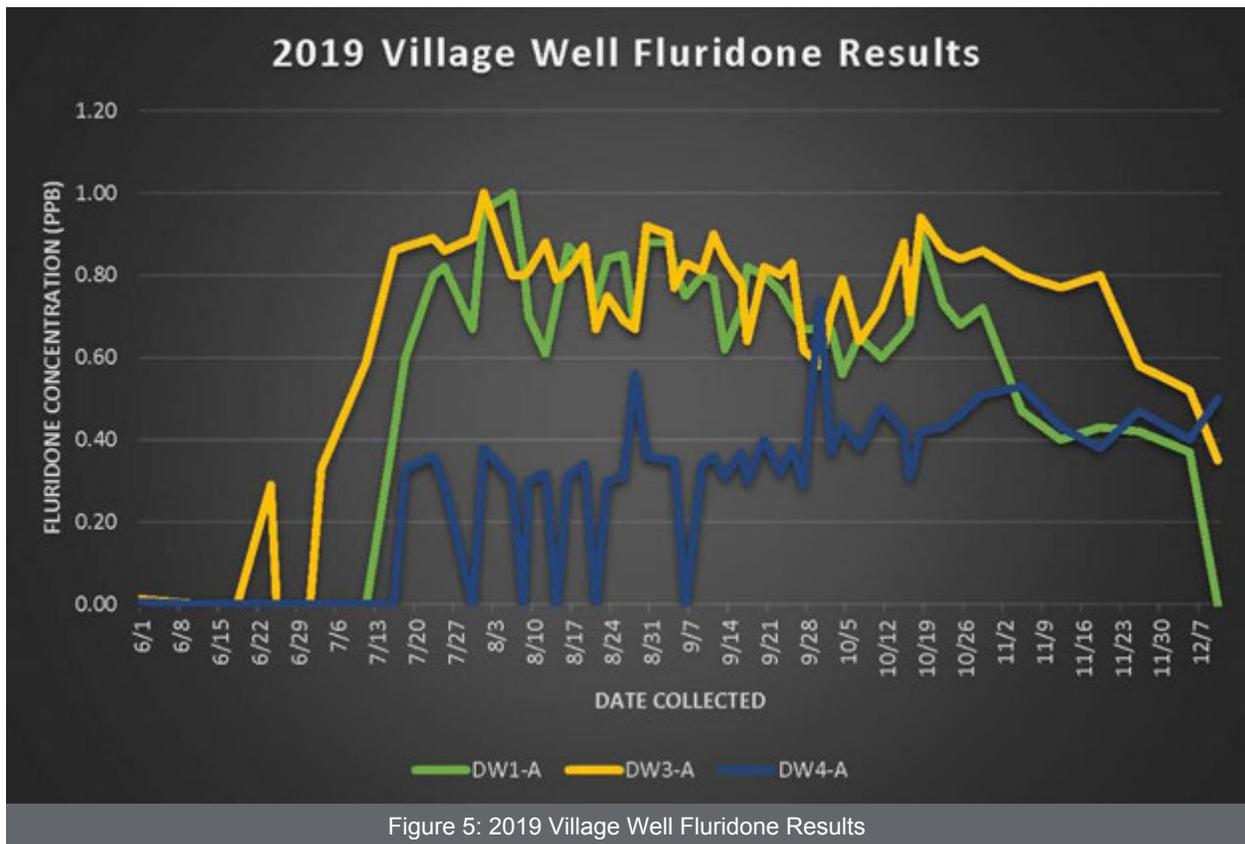


Figure 5: 2019 Village Well Floridone Results

Drinking water sampling began on June 11, and was conducted twice per week until floridone levels reached 1.0 ppb in drinking water well #3 (DW-3) on August 1. Beginning August 6, water sampling was conducted three times per week until October 22, following the end of the treatment season. Sampling was then conducted weekly until two consecutive samples with readings of “non-detect” were found at all water sampling locations. The highest floridone

concentration during the 2019 treatment season was 1.0 ppb (reached on both August 1 and August 6), well under the 4.0 ppb limit set by this project. Phoenix Lab reports containing sampling results from the finished water and drinking water were posted to the Croton River Hydrilla Project’s Water Sample Analysis Results Page on the DEC website (<http://www.dec.ny.gov/animals/110624.html>).

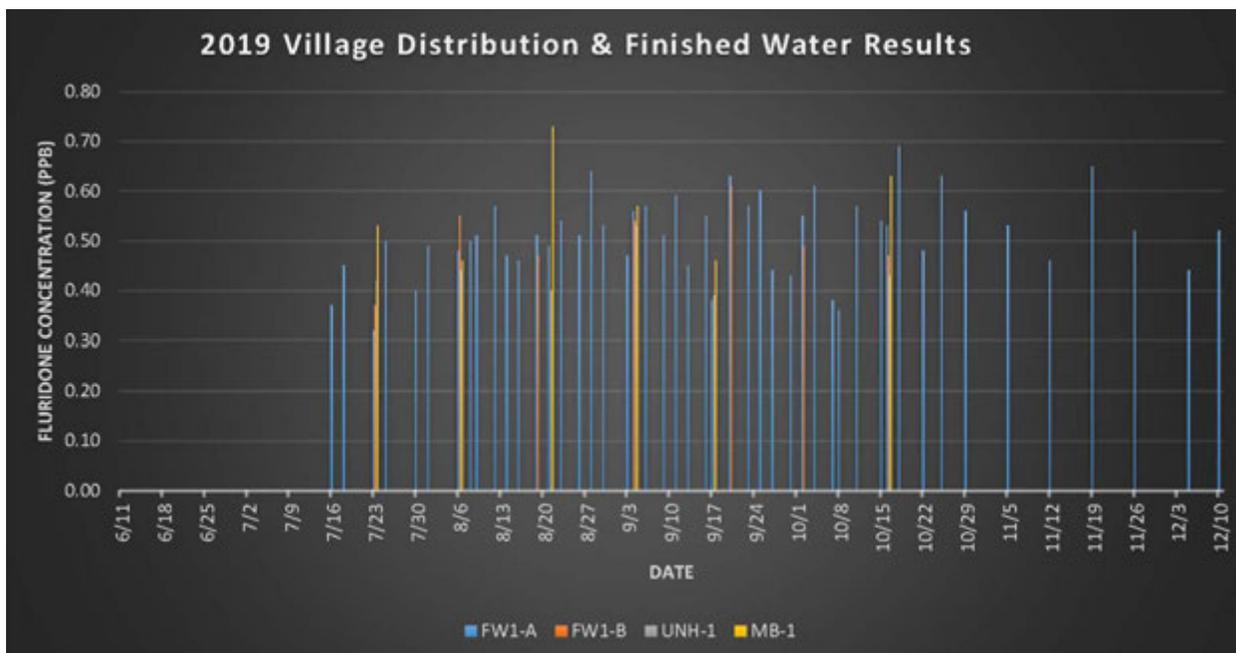


Figure 6: 2019 Village Distribution & Finished Water Results

Additionally, river water samples were collected weekly by SÖLitude Lake Management at five sites along the Croton River (CR-1, CR-1.5, CR-2, CR-3, and CR-4) and were analyzed for fluridone by SePRO Research Lab in Whitaker, North Carolina using the FasTEST method to a 1.0 ppb detection limit. FasTEST sampling concluded for the season on October 22, following the end of

treatment and all river site samples reporting non-detect for fluridone. Duplicate river samples were also sent to Phoenix Labs in Manchester, Connecticut, and tested to a 0.29 ppb detection limit for comparison. All 2019 river samples remained within the 1.0 ppb–5.0 ppb concentration range (the application range specified in the Article 15 Pesticide Permit for the project).

Submerged Aquatic Vegetation Surveys

Snorkel Surveys

Twice during the 2019 field season, snorkel surveys were conducted at CR-2 and CR-4 by DEC’s ISCS and the Lower Hudson PRISM to assess plant condition and treatment impact. The first snorkel survey was conducted on August 1 (mid-treatment), and rooted hydrilla was observed in trace amounts at both sample sites. All plants observed showed signs of significant herbicide injury, including stunted growth, loss of foliage, and bleaching of plant tissues (see Figure 8). None of the plants had formed turions or tubers. The second snorkel survey was conducted near the end of the treatment season on September 15 by ISCS. No rooted hydrilla or hydrilla fragments were observed at either of the sample sites.

Therefore, it is believed that no hydrilla survived the 2019 treatment season. A snorkel survey of Croton Bay was conducted by staff from ISCS and SePRO on August 6. Rake tosses were conducted via airboat by SÖLitude Lake Management simultaneously with the snorkel survey and no rooted hydrilla or hydrilla fragments were observed in Croton Bay.

Point-Intercept SAV Surveys

During the final weeks of the 2019 treatment, biologists with SÖLitude Lake Management conducted point-intercept (Madsen, 1999) aquatic plant surveys at the same 471 sample points utilized in the 2016, 2017, and 2018 SAV surveys within the Croton River. For ease of assessment, the Croton River is broken into six sections for the SAV surveys (Section A: Black

Rock Park, Section B: Silver Lake Beach, Section C: River Islands, Section D: Lower River, Section E: Lower Coves, and Section F: Croton Bay Wetlands). These surveys were conducted between September 27 and October 8. The 2019 results were compared to post-treatment data from 2018. Originally, the *Croton River Hydrilla Five-Year Management Plan* called for pre- and post-treatment aquatic plant surveys to be conducted by the contractor. However, because the treatment is proposed for such an early seasonal start (May), when many aquatic plants are either unidentifiable or have not yet emerged, the fall survey from each year will serve as the pre-treatment survey for the following season.

Sample points were GPS-referenced and two 10-meter weed-rake tosses were conducted at each point. Samples from each rake toss were identified to species when possible and percent cover was estimated (Doyle, 2019). A mean abundance of hydrilla was calculated for each site by assigning one of five semi-quantitative densities:

- No Plants (empty rake)
- Trace (1 or 2 stems per weed rake)
- Sparse (3 to 10 stems)
- Medium (more than 10 stems)
- Dense (entire weed rake full of stems)

2019 SAV Findings

During the 2019 SAV surveys, biologists with SŌLitude Lake Management identified all visible aquatic plants (macrophytes) to species when possible and calculated percent abundance for each of the 471 sample points. Table 1: 2019 Croton River Macrophytes contains the list of macrophytes that were identified and their status. No rooted hydrilla plants or hydrilla fragments were observed at any of the SAV sites following treatment in 2019. Table 2: Croton River Hydrilla Vegetative Biomass Reduction Survey 2016–2019 displays the total number of points that contained hydrilla (“overall” column) and their semi-quantitative densities (“trace,” “sparse,” “medium,” and “dense” columns) between 2016 and 2019.



Figure 7. A treated hydrilla plant (left) from the survey and an untreated plant (right) from the New Croton Reservoir collected on the same day

Critical SAV Communities

Hydrilla threatens to displace SAV beds, particularly those with native wild celery (*Vallisneria americana*) in both the Hudson River and tidal portions of the Croton River (Section C: River Islands, Section D: Lower River, Section E: Lower Coves, and Section F: Croton Bay Wetlands). Following the 2019 treatment season, SAV surveys revealed a decline in wild celery abundance within Section C: River Islands. Meanwhile, an increase in wild celery abundance was observed in Section D: Lower River, Section E: Lower Coves, and Section F: Croton Bay Wetlands.

DEC is working with researchers from University of Maryland Center for Environmental Sciences to determine genotypes and assess potential impacts of fluridone on different biotypes (genotypes) of wild celery growing in the Croton River. Results of genetic testing of numerous plant samples collected from the Croton River indicate very high genetic diversity at the mouth of the Croton River project site (personal communication, Katia Englehardt and Maile Neel, ND). Wild celery plants were collected in 2017 for the purpose of propagation and replanting throughout the treatment area in the future.

Table 1: 2019 Croton River Macrophytes

Common Name	Latin Name	Status
Common Watermeal	<i>Wolffia columbiana</i>	native
Common Waterweed	<i>Elodea canadensis</i>	native
Coontail	<i>Ceratophyllum demersum</i>	native
Eurasian Water Milfoil	<i>Myriophyllum spicatum</i>	aggressive, exotic, invasive
Giant Arrowhead	<i>Sagittaria montevidensis</i>	native, rare
Heart Pondweed	<i>Potamogeton perfoliatus</i>	native
Horned Pondweed	<i>Zannichellia palustris</i>	native
Leafy Pondweed	<i>Potamogeton foliosus</i>	native
Long-leaf Pondweed	<i>Potamogeton nodosus</i>	native
Muskgrass	<i>Chara sp.</i>	Native
Sago Pondweed	<i>Stuckenia pectinate</i>	native
Small Duckweed	<i>Lemna minor</i>	native
Spikerush	<i>Eleocharis sp.</i>	Native
Water Moss	<i>Fontinalis sp.</i>	Native
Water Stargrass	<i>Heteranthera dubia</i>	native
Wild Celery	<i>Vallisneria americana</i>	native

Table 2: Croton River Hydrilla Vegetative Biomass Reduction Summary 2016–2019

Year	Trace Points	Sparse Points	Moderate Points	Dense Points	Overall
2016	58 (13.00%)	56 (12.60%)	46 (10.60%)	30 (6.73%)	190 (42.60%)
2017	39 (8.74%)	21 (4.71%)	8 (1.80%)	0 (0.00%)	68 (15.25%)
2018	23 (5.16%)	6 (1.40%)	0 (0.00%)	0 (0.00%)	29 (6.56%)
2019	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Hudson River SAV Surveys

Between August 20 and October 4, biologists from SÖLitude Lake Management surveyed 29 high-priority sites along the Hudson River. Sites were deemed high-priority based on the following habitat characteristics that are suitable for hydrilla:

- bathymetry,
- suitable SAV habitat,
- prior SAV abundance, and
- proximity to the Croton River system.

Site information is organized by river mile in Table 3: 2019 Hudson River High-Priority Sites for Hydrilla Monitoring.

SÖLitude Lake Management took a total of 1,472 GPS-referenced points at a total of 29 high-priority sites and surveyed each point for SAV utilizing two 10-meter weed-rake tosses. The same point-intercept method used for SAV surveys was used for the Croton River sites. Samples from each rake toss were identified to species when possible and percent cover was estimated. No hydrilla was observed at any of the Hudson River high-priority sites during the 2019 survey.

Table 3: 2019 Hudson River High-Priority Sites for Hydrilla Monitoring

Site Name	River Mile	Size (Acres)	Points
Devries Park	25	9.0	45
Kemeys Cove	31	12	30
Croton Bay	34	639	78
Croton Landing Park	34	5.5	40
Half Moon Bay	35	76.7	66
Cedar Pond Brook	37	29.0	58
Oscawana Park	37	19.0	45
George's Island Park	39	31	60
Lents Cove	43	39	57
Dickey Brook	43	5.7	20
Annsville Creek	44	144.5	83
Iona Marsh	45	152	69
Popolopen Creek	46	13	35
Manitou Marsh South	46	47.0	31
Manitou Marsh North	47	16.0	25
Constitution Marsh	52	358	88
Foundry Cove Bay	53	6.7	12
Foundry Cove	53	41.5	64
Mayor's Park	54	8.0	34
Moodna Creek Bay	57	49	68
Fishkill Creek	59	41.7	47
Balmville Marsh	64	13.0	30
Wappingers Creek	67	94.3	50
Poughkeepsie Yacht Club	83	39	40
Black Creek Preserve	83	36	48
Mills-Norrie State Park	84	28	50
Vanderburgh Cove	87	98.6	42
Sleightsburg Park	90	224.0	100
Kingston Point Marsh	91	31	29

Plant Tissue Sampling

Each season of the project, hydrilla tissue samples have been collected from five GPS-referenced points and sent to the University of Georgia to be tested for the presence of an epiphytic blue-green algae (*Aetokthonos hydrillicola*). *A. hydrillicola*, which is linked to avian vacuolar myelinopathy (AVM), has been found to grow on the undersides of hydrilla

leaves and can move through the food chain from waterfowl to raptors. Due to no hydrilla being found in the Croton River in 2019, samples of five other submersed plant species were collected for testing. SŌLitude Lake Management collected these plant tissue samples on June 6. No *A. hydrillicola* was present in the samples collected in 2019.

Hydrilla Tuber Monitoring

Due to high flow conditions at the end of the 2018 treatment season, tuber sites were not accessible at Black Rock Park (BRP-3, BRP-4) or Silver Lake Beach (one station: SLB-1). SŌLitude biologists sampled these three remaining sites on April 1, 2019. Fifteen cores were collected at each sample location and no tubers were observed.

On October 29, SŌLitude Lake Management conducted hydrilla tuber monitoring for the 2019 treatment season. Tuber survey sites in the Croton River included Black Rock Park (BRP-3, BRP-4), Silver Lake Beach (SLB-1), and north and south of Paradise Island (CR-1, CR-2, CR-3, CR-4). Tubers were collected via airboat using a modified post-hole digger. Tuber density was calculated and expressed in tubers/m² (meters squared).

Table 4: 2016–2019 Croton River Hydrilla Tuber Monitoring Results contains a summary of tuber survey data for the entire project thus far. Data were provided by SŌLitude Lake Management. No tubers were found at any of the survey sites in 2019. The steady decrease in tuber density since the control project began is evidence that fluridone treatment has significantly reduced the fitness of hydrilla and that treated plants were not able to form tubers during the 2019 growing season. As hydrilla abundance has been reduced via treatment, monitoring efforts have increased. In 2017, 3–6 cores were collected per site. In 2018, 15 cores were collected per site and in 2019, 20–30 cores were collected per site. Hydrilla tubers can persist in the sediment and remain viable for a minimum of six years (Nawrocki, 2016). Exhausting the tuber bank in order to prevent reinfestation is a critical part of this treatment project. A single turion was observed in a single sediment core during tuber surveys in 2019.

Table 4: 2016–2019 Croton River Hydrilla Monitoring Results

Sample Section	Site	2016			2017			2018			2019		
		# Cores	Tubers (m ²)	Turions (m ²)	# Cores	Tubers (m ²)	Turions (m ²)	# Cores	Tubers (m ²)	Turions (m ²)	# Cores	Tubers (m ²)	Turions (m ²)
A (BRP)	BRP-3	3	1,637.6	35.6	6	35.6	8.9	NA	-	-	20	0.0	0.0
	BRP-4	3	498.4	0.0	3	516.2	160.2	NA	-	-	20	0.0	0.0
B (SLB)	SLB-1	3	2,082.6	53.4	3	231.4	35.6	NA	-	-	30	0.0	0.0
Croton River	CR-1	3	872.2	231.4	3	0.0	0.0	15	0.0	0.0	NA	-	-
	CR-2	4	495.8	321.6	5	96.3	21.4	15	0.0	0.0	20	0.0	0.0
	CR-3	4	174.2	321.6	3	106.8	89	15	0.0	0.0	NA	-	-
	CR-4	5	0.0	67	3	35.6	0.0	15	39.2	3.6	20	0.0	0.0

Water Sample Analysis

Water samples results were made available to the public via full lab reports posted to DEC's website (www.dec.ny.gov/animals/110624.html) and summarized in the biweekly treatment season status reports to project partners.

Outreach

Outreach plays a significant role in the project by addressing concerns about recreation, drinking water, and the spread of invasive species. A public meeting detailing plans for 2019 treatment season operations was held on May 21, at the Village of Croton-on-Hudson Municipal Building.

DEC sent status updates to key partners regularly via an email listserv, and held conference calls regularly with partners in other infested regions of New York State. Project staff presented at the North American Invasive Species Management Association (NAISMA) Conference on November 2 on the status of the Croton River Hydrilla Control Project.

Project staff participated during monthly New York State Hydrilla Task Force calls led by DEC's Bureau of Invasive Species and Ecosystem Health to share information with other New York regions and neighboring states combating hydrilla.

Hydrilla Fact Sheet and ID

DEC and its partners use DEC's hydrilla fact sheet, ID sheet, and ID card to educate the public about hydrilla in New York. These outreach materials help people learn how to identify hydrilla, tell it apart from look-alikes, and report potential locations to DEC so we can help control it. Links to these outreach documents are available on the hydrilla page of our website: www.dec.ny.gov/animals/104790.html. Paper copies can be requested by contacting DEC's Invasive Species Coordination Section at isinfo@dec.ny.gov.

Webpage

DEC's hydrilla webpage (www.dec.ny.gov/animals/104790.html) provides information on this prohibited invasive plant. It was visited 2,122 times in 2019 (an 8% decrease from 2018). A separate webpage discusses the Croton River Hydrilla Treatment Project (www.dec.ny.gov/animals/106386.html) and was visited 521 times in 2019 (a 27% decrease since 2018). Drinking water was monitored throughout the project for fluridone concentration and results were made available to the public on DEC's Water Sample Analysis webpage (www.dec.ny.gov/animals/110624.html), which was visited 131 times in 2019 (a 61% decrease since 2018). While these webpages are frequently accessed by people from New York State and around the world, a decrease in project-specific page views can be expected as many stakeholders/residents have become more familiar with the project by year three.

Partnerships

In 2019, the Croton River Hydrilla Control Project continued to rely on strong working relationships and collaborative efforts with a variety of organizations and groups. While DEC serves as the lead agency for this project, the Village of Croton-on-Hudson Water Department and the New York City Department of Environmental Protection (NYCDEP) were vital to the success of the project.

Program staff have provided partner agencies with an initial training on hydrilla identification, infestation case studies, potential control methods, and an overview of Croton River Hydrilla Control Project protocols and data collection.

In 2019, the following partner agencies conducted outreach or shared data in conjunction with the Croton River Hydrilla Control Project:

- Lower Hudson PRISM (LH PRISM)

The following partner agencies and DEC units assisted with program operation:

- Village of Croton-on-Hudson Water Department
- New York City Department of Environmental Protection (NYCDEP)
- DEC Region 3 Fisheries Unit
- DEC Region 3 Department of Materials Management

Watercraft Inspections

LH PRISM participated in the Watercraft Inspection Steward Program (WISP) in 2018 and 2019. WISP is a statewide effort to prevent the spread of aquatic invasive species. Trained staff inspected recreational boats and equipment as watercraft were launched and removed from the Croton River at Echo Boat Launch. Data were collected during each inspection and were uploaded using the Watercraft Inspection Steward Program App (WISPA). A statewide database from WISPA is managed by the New York Natural Heritage Program and

contains all watercraft inspection data provided by various PRISMs and other local private and public entities. The watercraft inspection stewards at Echo Boat Launch conducted 662 recreational boat inspections in 2018 and 584 in 2019. No hydrilla fragments were observed on boats or equipment during those inspections. Information on how to properly clean, drain, and dry watercraft to prevent the spread of invasive species was disseminated during inspections. For more information on WISPA, please visit <https://www.nyimainvasives.org/wispa>.

New Croton Reservoir Hydrilla Infestation

During the majority of the 2019 treatment season, there was minimal surface water spill entering the Croton River from the New Croton Reservoir. NYCDEP assisted in maintaining flow rates within the Croton River via strategic measured releases from the bottom of the New Croton Dam. Without spill from the reservoir, the hydrilla populations in these connected systems remain relatively separate. While no plants were found to have survived the 2019 fluridone treatment within the Croton River, a storm event occurred on October 15 that caused extensive surface water spill from New Croton Reservoir.

Following that storm event, healthy hydrilla fragments (Figure 8) were found floating throughout the Croton River. Visual surveys for hydrilla fragments were conducted on October 21 and October 23 by ISCS, SÖLitude Lake Management, and SePRO staff. These fragments pose an enormous risk of reinfestation within the Croton River as well as a significant threat of invasion within the lower Hudson River Estuary. It is critical that a full-scale reservoir treatment take place as soon as possible in order to reduce these significant risks to water quality and ecosystem health.



Figure 8: Healthy hydrilla fragments found at CR-2 during a visual survey in October

Conclusion

Fluridone treatment continues to decrease the abundance and fitness of hydrilla plants in the Croton River. No hydrilla was observed during 2019 SAV surveys. The few plants that were found during mid-treatment snorkel surveys showed significant signs of herbicide injury and did not survive the treatment season. No tubers or turions were observed during any 2019 surveys. A single plant fragment was observed in a sediment core during tuber surveys in 2019. As hydrilla biomass decreases, rooted plants, fragments, and tubers will become more difficult to find. The Croton River is a high-flowing

system and environmental conditions can change rapidly throughout the year. High-flow conditions may cause sediment to be transported within the river. Therefore, monitoring efforts may expand to additional SAV or tuber survey sites. Additionally, snorkel survey efforts are likely to increase in 2020 and 2021, in an effort to locate any remaining plant biomass. We will continue to rely on adaptive management strategies and close cooperation with our partners managing the New Croton Reservoir infestation in order to reduce the threats that hydrilla poses to the Hudson River watershed.

Looking Forward

Treatment of hydrilla in the Croton River was highly successful in 2019 (year three of five). The *Croton River Hydrilla Control Project Five-Year Management Plan* continues to provide the framework for decision-making and adaptive management strategies. We will continue to

build upon past experience with each year of treatment and communicate regularly with the New York City Department of Environmental Protection (NYCDEP) regarding the necessary treatment of the source of the hydrilla infestation in the New Croton Reservoir.

Sources

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Nawrocki, J. L., R. Richardson, and S. T. Hoyle. 2016. "Monoecious Hydrilla Tuber Dynamics following Various Management Regimes on Four North Carolina Reservoirs." *Journal of Aquatic Plant Management*, 54, 12–19.

SOLitude Lake Management. 2017. "Croton River 2017 Treatment Final Report." Unpublished data.

Appendix A: Helpful Links

- DEC Hydrilla Webpage
<https://www.dec.ny.gov/animals/104790.html>
- DEC Croton River Hydrilla Control Project Webpage and Five-Year Management Plan
<https://www.dec.ny.gov/animals/106386.html>
- DEC Croton River Hydrilla Control Project's Water Sample Analysis Results Webpage
<https://www.dec.ny.gov/animals/106386.html>
- Sonar® Genesis NYS Label
https://www.dec.ny.gov/docs/lands_forests_pdf/sonarlabel2017.pdf



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