Delaware and Raritan Canal

2017 Submersed Aquatic Vegetation (SAV) Monitoring in the Delaware and Raritan Canal

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2017 *Submersed Aquatic Vegetation (SAV) Monitoring in the Delaware & Raritan Canal Report*

New Jersey Water Supply Authority (NJWSA)
Clinton, New Jersey

Introduction

The Delaware & Raritan (D&R) Canal was constructed in the 1830's to serve as a transport waterway for coal and other goods. The 58 mile canal originates on the Delaware River near Raven Rock and terminates at the Raritan River near New Brunswick. The New Jersey Water Supply Authority (NJWSA, or the Authority) operates and maintains the canal. The canal system supplies water to over 15 water customers in central New Jersey, utilizing approximately 100 million gallons of water per day for drinking water and irrigation. The canal is contained within a linear park managed by the New Jersey Division of Parks and Forestry.

In late July 2016, an aquatic consultant conducting hydro-raking activities on the canal discovered hydrilla (*Hydrilla verticillata*). Hydrilla is a highly invasive submersed aquatic plant that can result in significant negative ecological (such as crowding out desirable native aquatic plants, impairing water quality, and reducing dissolved oxygen), recreational and economical impacts. The Authority's primary function is the delivery of raw water, and dense beds of invasive submersed aquatic plants (SAV) reduce water flow through the canal system.

In September 2016, SOLitude Lake Management was awarded the project to conduct the initial delineation of the hydrilla infestation in select sections of the canal, focusing on high use areas, and documented hydrilla infestations. In addition, establishing hydrilla tuber monitoring stations and collecting baseline tuber data was part of this project.

In 2017, a comprehensive Hydrilla and Other Submersed Aquatic Plant (SAV) Management Plan was drafted for a three year control program of the SAV in the canal, specifically targeting hydrilla. Part of that plan was extensive aquatic plant monitoring, which includes four tasks. Task 1 (2017, 2018 and 2019) includes re-mapping the same sections mapped in 2016. Since the 2016 monitoring effort defined the apparent upper and lower extent of the hydrilla in the Canal, the 2016 sections (#1-6) are now considered the treatment area. This data (along with Tasks 3 and 4) will be used to track the efficacy of the selected control program. Task 2 (2017 only) includes mapping the remaining 40 miles of the Canal to confirm there is no additional infestations of hydrilla or other aggressive invasive species. Task 3 (2017 only) includes supplemental weed rake surveys conducted at selected locations at the request of the herbicide manufacturer to track in-season aquatic plant response to herbicides. Task 4 (2017, 2018, and 2019) includes hydrilla tuber monitoring at the five sites established in 2016.

Procedures

Tasks 1, 2 and 3: Point Intercept Submersed Aquatic Plant Mapping: Treatment Area, 40-miles of the D&R Canal, and Supplemental Aquatic Vegetation Surveys

The Point Intercept Method (PIM) of sampling aquatic macrophytes is generally accepted by lake managers as a suitable procedure to map submersed aquatic macrophytes in a lake. By applying a few modifications, this method can be employed on river systems (such as the Cayuga River Inlet and the Croton River, both located in New York, or the D&R Canal in New Jersey). The PIM is designed to be utilized by volunteer and citizen science groups, and is the method often preferred by state regulators, since it's repeatable. For hydrilla delineation projects, the *2013 Monitoring Report of the Cayuga Inlet and Southern Cayuga Lake Monoecious Hydrilla Eradication Project* (Johnson, 2014) was reviewed to develop similar surveying protocols for this project.

The total number of sample locations is typically based on the total acreage of the lake. As a rule of thumb, one sample location per acre (minimum 50 sample locations) is surveyed at a given site. In a river system, or a canal system (such as the D&R Canal) sample locations are not placed on a grid, but instead are situated 50 meters apart. A total of 597 sites were sampled along 18.31 miles of the canal for Treatment Area of this project (Task 1). This area was mapped in 2016, and was used to determine the extent of the rooted hydrilla in the canal at that time. Table 1, below is a summary of the six sections re-mapped in 2017. Using a Trimble Geo XH handheld GPS unit (or a 2017 series unit), survey crews piloted back to the stations established in 2016 for this portion of the survey.

Table 1 2017 Treatment Area Section Summary: D&R Canal

Section	Description	Date	Length (miles)	# Sites Surveyed
1/1.5	Rte. 179 to Titusville Bridge	9/1/17 & 9/5/17	5.23	165
2	Titusville Bridge to Washington's Crossing	9/5/17	1.74	57
3	Washington's Crossing to Lower Ferry Rd.	9/5/17 & 9/6/17	4.50	149
4	Lower Ferry Rd. to Hermitage Ave.	9/6/17	2.12	69
5	Canal Support Structure to Carnegie Rd.	9/8/17	1.97	65
6	Provinceline Road to Alexander Road	9/7/17	2.75	92

A total of 1,216 stations were surveyed in 2017 for the remaining 40 miles of the canal not surveyed in 2016 (Task 2). These areas were dived into six logical sections based on location and assigned a corresponding section number for consistency. A summary of these stations is included in Table, 2, below.

Table 2: 2017 Summary of the Remainder of the D&R Canal

Section	Description	Date	Length (miles)	# Sites Surveyed
0.5	Mouth of the Canal to Rte 179 Bridge	8/9-11/17 & 8/14/17	7.34	235
4.5	Hermitage Ave to Canal Support Structures (Downtown Trenton)	9/15/17	2.2	73
5.5	Carnegie Road to Provinceline Road	8/15/17	2.71	84
7	Alexander Road to Griggstown Causeway	8/16-17/17 & 8/21-22/17	8.73	285
8	Griggstown Causeway to 10 Mile Lock	8/18/17, 8/23/17, 8/24/17, 8/25/17, 8/31/17	8.76	286
9	10 Mile Lock to Canal End	8/16/17, 8/22/17, 8/24/17, 8/28/17	7.93	253

Before the survey began, random sample locations were plotted on an overlay map of the target sections of the canal, 50 meters apart. At GPS-referenced sites, using the overlay grid loaded onto the GPS unit, the canoe was paddled to the first sample location. On arrival, the GPS coordinates of the sample location was recorded **in the center of the canal** using a Trimble GeoXH 2008 series (or 2017 series) handheld GPS unit with sub-meter accuracy. Any other pertinent field notes (such as floating fragments of hydrilla or established SAV beds not sampled) regarding the sample location were also recorded on a field log.

The exception was section 4.5 (Hermitage Ave to the Canal Support Structures). Most of this section was in urban Trenton, with numerous low bridges and very restricted access. In most areas, the banks of the canal were a concrete wall three to four feet high, and typically a fence was located between the water and the parkland. See the picture to the left. For this section, we conducted the survey on foot. At each sample station, we logged a GPS point on the shoreline, and we conducted visual inspections as long as the water clarity was suitable to see the canal bottom. If necessary, we tossed weed rakes (one in each direction for the A and B sub-samples) to confirm the identification or abundance of aquatic plants observed. Due to the lack of littoral zone (from the concrete walls) and the higher flow, aquatic plant abundance was reduced in many of these areas.

Next, a weed rake attached to a 10 meter-long piece of rope is tossed from a random side of the canoe toward or along one of the shorelines. It is important to toss the weed rake the full

10 meters (a loop at the end of the rope is attached to the boat to prevent losing the rake). The weed rake is slowly retrieved along the bottom, and carefully hoisted into the boat. To determine the overall submersed vegetation amount, the weed mass is assigned one of five densities, based on semi-quantitative metrics developed by Cornell University (Lord, et al, 2005). These densities are: **No Plants** (empty anchor), **Trace** (one or two stems per anchor, or the amount that can be held between two fingers), **Sparse** (three to 10 stems, but lightly covering the anchor, or about a handful), **Medium** (more than 10 stems, and covering all the tines of the anchor), or **Dense** (entire anchor full of stems, and one has trouble getting the mass into the boat). See the Appendix of this report for pictures of these representative densities. These densities are abbreviated in the field notes as 0, T, S, M, and D. Next, the submersed weed mass is sorted by genus (or species if possible) and one of the five densities (as described above) is assigned to each genus and/or species. This procedure is then repeated for the remaining sample points.

Following methods established at Cayuga Lake Inlet for the monitoring of hydrilla, we utilized two rake tosses per site. The toss labeled “A” was always conducted along the west shore of the canal, while the “B” toss was always conducted on the east shore of the canal. The different shores often supported different SAV abundance and community structure. The data for both of these tosses are included on Table #2, in the Appendix. Each density was assigned a numeric value: 0 for no plants, 1 for trace, 2 for sparse, 3 for medium, and 4 for dense plants. The mean of these three values for both tosses (rounded up) are also displayed on Table #2. These mean values were used to assign overall densities, as depicted on the distribution maps in the Appendix. For example, if toss A was dense density (4), and toss B was sparse density (2) for the same macrophyte, the mean density would be medium (4+2=6/2=3). Although using two tosses is ideal for detecting the presence of target species (and species occurring infrequently), these procedures and associated calculations tend to decrease the overall abundance per site. However, our primary goal was to delineate hydrilla, so two tosses per site (and both shorelines) should result in a greater frequency of occurrence for target species. Visual assessments were also used during the data collection. Although not included in this report, since the different tosses were conducted on opposite shorelines, the west versus east shoreline SAV data could be teased out of our overall data.

A sample of each different macrophyte is collected and placed in a bottle or Ziploc-type bag with a letter or number code (A, B, 1, 2, etc.). If possible, these samples included both submersed and floating leaves (if any), seeds, and flowers (if present), to facilitate identification. These bottles are placed in a cooler stocked with blue-ice packs or ice, and returned to SOLitude Lake Management’s lab for positive identification and photographing. Regionally appropriate taxonomic keys are used to identify the aquatic macrophytes (a list of references is included in the appendix) to the lowest practical taxa, typically to species.

The weed rake used for aquatic macrophyte surveys has a specific design. It is constructed with two 13.5-inch wide metal garden rakes attached back to back with several hose clamps. The wooden handles are removed and a 10 meter-long nylon rope is attached to the rake heads.

In addition to these surveys, the Authority conducted visual aquatic vegetation surveys at several locations along the feeder side of the canal, weekly or bi-weekly during the entire 120 day treatment period. Aquatic plants collected were digitally photographed. At the request of the herbicide manufacturer, monthly weed rake toss surveys were also conducted at select sections on four dates throughout the treatment period (Task 3). Table 3, below, is a summary of these surveys. At each station, two weed rake tosses were conducted from the shoreline in opposite directions. LFR refers to Lower Ferry Road, SCF refers to Scudder's Fall's, while RR refers to River Drive. WHR refers to Whitehead Road, while KN refers to Kingston locations.

Table 3: 2017 Supplemental Aquatic Vegetation Survey Summary

Date	Description (# stations)
6/29/17	LFR (3), SCF (3), RR (3)
7/28/17	LFR (3), SCF (3), RR (3), WHR (2)
9/5-6/17	LFR (3), SCF (3), RR (3)
9/28/17	LFR (3), SCF (3), RR (3), KN (2)

Task 4: Hydrilla Tuber Monitoring

For the tuber monitoring at the D&R Canal in 2017, we employed methods established by Johnson (2013), utilizing the same sampling stations used to establish baseline hydrilla tuber densities in 2016. We used a Trimble Series 2017 handheld GPS unit to return to the 2016 sampling stations. We used a post hole digger with modified handles (to sample deeper water sites) for all sediment core samples. The corer removes a consistent plug of sediment with a surface area of 187 cm^2 to a depth of 20 cm. Although slightly larger than the corer utilized by Johnson (173 cm^2), we can compensate for the larger surface area while calculating our final tuber density, expressed in tubers/m^2. All collected cores were placed into a 5 gallon bucket and composited into a single sample and processed at the canal shore.

Processing the sediment samples is conducted with a custom-designed sieve with a 0.16 inch (0.4 cm) metal mesh. The sediment and sieve is placed in the water and gently shaken to remove sediment particles. The remaining larger sediment and plant material is examined for tubers and turions. Any hydrilla tubers or turions are collected and placed in a Ziploc-type bag, labeled with the sample location, site number and date. Any remaining organic and inorganic material is discarded. This process is repeated until the entire composited sediment sample has been passed through the sieve. Back at the laboratory, the tubers and turions at each site are counted, photographed, and tuber density per m^2 is calculated depending on the number of cores (and the surface area per core).

In 2017, we conducted between 10 and 14 cores per site. Since active herbicide injection is occurring in the treatment area where the tuber monitoring stations are located, the Management Plan takes into account additional effort during the latter years of this project. It is likely that 20 to 22 cores per site (as per Johnson, 2013) will be required in 2018 and 2019 as we observe a continued decline in hydrilla biomass and tuber production over time.

Macrophyte Summary

The following aquatic macrophytes were collected in Tasks 1, 2 and 3 in the D&R Canal in 2017. The respective macrophyte percent abundance data are summarized in Table #1 in the Appendix, organized by overall distribution and by distribution per Task. Below is a short description of each macrophyte and a picture. Twenty nine aquatic macrophytes (plus benthic filamentous algae and two macro-algae) were collected during the 2017 survey. Please note that individual maps of each species are not included in the Appendix of this report, which is routine. It is difficult to display the aquatic plant abundances on the linear 60 miles of canal surveyed this year. Instead, shapefiles and GIS data were turned over to the Authority in November to create maps suitable for display.

The brief summaries that follow are organized alphabetically. When possible, pictures of aquatic macrophytes represent the actual plants located at the D&R Canal, either taken in the field, or from samples returned to SOLitude Lake Management's laboratory. All other photos are from the archives at SOLitude Lake Management, unless noted differently.

Arrowhead (Submersed Rosette) (*Sagittaria* sp. Common Name: Arrowhead. **Native.**): This plant is the submersed rosette of a species of arrowhead. The submersed rosette lacks both flowers and seeds, so further identification is not possible. Arrowhead has emergent leaves, and usually inhabits shallow waters at pond or lake edges, or along sluggish streams. It can tolerate a wide variety of sediment types and pH ranges. Arrowhead is very suitable for constructed wetland development due to its tolerance of habitats, and ability to act as a nutrient sink for phosphorous. Typical arrowhead reproduction is via rhizomes and tubers although seed production is possible if conditions are ideal. Arrowhead has high wildlife value, providing high-energy food sources for waterfowl, muskrats and beavers. Arrowhead beds provide suitable shelter and forage opportunities for juvenile fish as well.

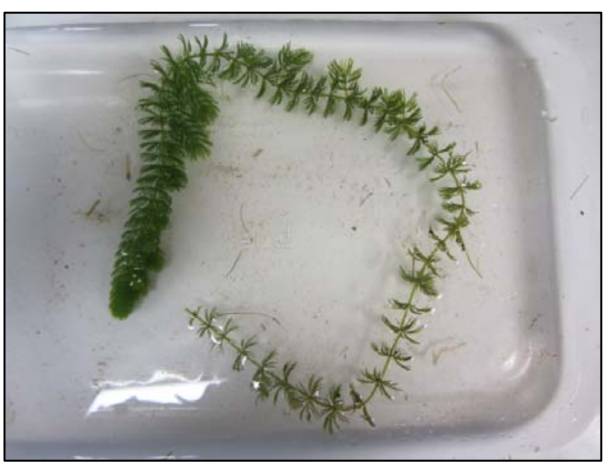
Benthic/Floating Filamentous Algae: Filamentous algae is a chain or series of similar algae cells arranged in an end to end manner. Benthic filamentous algae is attached to a hard substrate, such as logs, rocks, a lake bottom, or even other aquatic plants. When growing in heavy densities, benthic filamentous algae can appear as brown or green mats of vegetation that can reach the surface. When large pieces break off the bottom substrate they become floating filamentous algae patches. Benthic filamentous algae can comprise an entire range of morphologies, but flagellated taxa are far less common.

Brittle Naiad (*Najas minor*. Common Names: brittle water nymph, European naiad. **Exotic, Invasive.**): Brittle naiad is a submersed annual that flowers in August to October. It resembles other naiads, except its leaves are highly toothed with 6-15 spinules on each side of the leaf, visible without the aid of magnification. The leaves are opposite, simple, thread-like, and usually lime-green in color, often with a "brittle" feel to them. Brittle naiad fruit are narrow, slightly curved, and marked with 10-18 longitudinal ribs, resembling a ladder. Brittle Naiad has been introduced from Europe in the early 1900's, and can be found in most of the northeastern states. Brittle naiad prefers sandy and gravel substrates, but can tolerate a wide range of bottom types. It's tolerant of turbid and eutrophic conditions. Waterfowl graze on the fruit.

Common Bladderwort (*Utricularia vulgaris*: Common Names: common bladderwort, great bladderwort. **Native.**): Common bladderwort is a free-floating plant that can reach 2-3 meters in length. Since they are free-floating, they can grow in areas with very loose sediment. Along its stem are finely divided leaf-like branches, forked 3-7 times. Scattered about the branches are numerous bladders, used to capture prey ranging from the size of unicellular protozoans (such as Euglena), to mosquito larvae. Prey is slowly digested inside the bladders by enzymes. Common bladderwort produces small yellow flowers that protrude above the water. Stems of common bladderwort provide food and cover for fish.

Common Watermeal (*Wolffia columbiana*. Common Names: common watermeal. **Native.**): Common watermeal appears as pale green globes of vegetative matter without roots, stems or true leaves. It's one of the world's smallest flowering plants, but flowers are rarely observed and require magnification to see. Watermeal usually reproduces by budding. Watermeal is typically found on the surface, intermingled with duckweeds. It drifts with the water's current or wind, and therefore it grows independent of water depth, clarity or sediment type. It often accumulates on the stems of floating-leaf aquatic plants (such as lilies) or among submersed plants at the surface. In the fall it produces winter buds that sink to the bottom. In the spring, the buds become buoyant and float to the surface. Waterfowl, fish, and muskrats all include watermeal in their diets.

Common Waterweed (*Elodea canadensis*: Common Names: elodea, common waterweed. **Native.**): Common waterweed has slender stems that can reach a meter in length, and a shallow root system. The stem is adorned with lance-like leaves that are attached directly to the stalk that tend to congregate near the stem tip. The leaves are populated by a variety of aquatic invertebrates. Male and female flowers occur on separate plants, but it can also reproduce via stem fragmentation. Since common waterweed is disease resistant, and tolerant to low-light conditions, it can reach nuisance levels, creating dense mats that can obstruct fish movement, and the operation of boat motors.



Coontail (*Ceratophyllum demersum*. Common Names: coontail, hornwort. **Native**.): Coontail has long trailing stems that lack true roots, although it can become loosely anchored to sediment by modified leaves. The leaves are stiff, and arranged in whorls of 5-12 at each node. Each leaf is forked once or twice (only), and has teeth along the margins. The whorls of leaves are spaced closer at the end of the stem, creating a raccoon tail appearance. Coontail is tolerant of low light conditions, and since it is not rooted, it can drift into different depth zones. Coontail can also tolerate cool water and can over winter as a green plant under the ice. Typically, it reproduces via fragmentation. Bushy stems of coontail provide valuable habitat for invertebrates and fish (especially during winter), and the leaves are grazed on by waterfowl.

Curly-leaf Pondweed (*Potamogeton crispus*. Common Name: curly-leaf pondweed. **Invasive, aggressive.**): Curly-leaf pondweed has spaghetti-like stems that often reach the surface by mid-June. Its submersed leaves are oblong, and attached directly to the stem in an alternate pattern. The margins of the leaves are wavy and finely serrated, hence its name. No floating leaves are produced. Curly-leaf pondweed can tolerate turbid water conditions better than most other macrophytes. In late summer, Curly-leaf pondweed enters its summer dormancy stage. It naturally dies off (often creating a sudden loss of habitat and releasing nutrients into the water to fuel algae growth) and produces vegetative buds called turions. These turions germinate when the water gets cooler in the autumn and give way to a winter growth form that allows it to thrive under ice and snow cover, providing habitat for fish and invertebrates.

Eurasian Water Milfoil (*Myriophyllum spicatum*. Common Names: Asian Water milfoil. **Aggressive, Exotic, Invasive**.): Eurasian water milfoil has long (2 meters or more) spaghetti-like stems that grow from submerged rhizomes. The stems often branch repeatedly at the water's surface creating a canopy that can crowd out other vegetation, and obstruct recreation and navigation. The leaves are arranged in whorls of 4 to 5, and spread out along the stem. The leaves are divided like a feather, resembling the bones on a fish spine. Eurasian water milfoil is an exotic originating in Europe and Asia, but its range now includes most of the United States. Its ability to grow in cool water and at low light conditions gives it an early season advantage over most other native submersed plants. Although it can reproduce via fruit production, it typically also reproduces via fragmentation.

Fanwort (*Cabomba caroliniana*. Common Name: fanwort. **Exotic, aggressive, Invasive.**)**:** Fanwort is a submerged rooted herb, native to Southeastern United States, from Virginia to South Florida. A popular aquarium plant, fanwort has since spread to much of the Northeast, and even parts of the Northwest, and is considered a non-native invasive species in these regions. Fanwort prefers sluggish streams, or acidic ponds and lakes. It can reach six feet long, and can colonize water up to ten feet deep. Fanwort has slender stems covered with a thin gelatinous slime, and two types of leaves. Submerged leaves are green and situated in a whorl pattern, similar to a fan. The floating leaves are alternate and linear, about one half to one inch in diameter. Fanwort blooms in the fall, producing small white flowers with a slight pinkish tint. Although it can reproduce via seed germination, it can also reproduce by fragmentation. In late summer, the stems become brittle, and break easily. The loose fragments can then rapidly move throughout the aquatic system due to natural flow patterns. Unattached plants can even continue to grow, indicating it removes most of its nutrients directly from the water column instead of the sediment. Due to its rapid spreading, it can occur in dense stands, clogging streams or canals, and impairing aquatic systems. Fanwort provides suitable habitat for aquatic invertebrates and fish.

Flat-leaf bladderwort (*Utricularia intermedia*). Common names: Flat-leaf bladderwort, intermediate bladderwort, northern bladderwort. **Native.**) Flat-leaf bladderwort stems are typically short, less than 0.5 meters long. The leaves are alternately arranged in a tight radiating pattern, similar to a whorl. The finely divided leaves are flattened, serrated, and typically fork one to three times. Bladders only occur on separate leafless stems (often under the sediment), a distinct characteristic of this bladderwort. Flowers are bright yellow, each being five-patterned and two-lipped (similar to a snap dragon flower), and typically occur in clusters of two to four emerging out of the water adorned along stalks. Small, flattened turions are produced at the tips of the stems late in the season. Flat-leaf bladderwort prefers bogs, fens, and mucky lakes, often intermixed with other bladderworts and plants. It can also be found creeping along exposed mudflats, along lake and pond margins, and adorning sediment "hummocks" exposed due to nuisance water lily growth. It provides adequate shade, foraging, and cover opportunities, and fine invertebrate habitat.

Great Duckweed (*Spirodela polyrhiza*. Common Names: Great duckweed, large duckweed. **Native.**). Great duckweed is the largest of the duckweeds, but it is still very small compared to other aquatic macrophytes. It has simple flattened fronds with irregular oval shapes, often up to 1 cm in length and 2.5 to 8.0 mm long. The frond surface is usually green with a conspicuous purple dot. The underside of the frond is magenta with a cluster of 5-12 roots that dangle into the water. Indeed, peering at great duckweed from under the water grants it the appearance a tiny jellyfish. Although great duckweed produces flowers, it usually reproduces via budding, and like other duckweeds, it is capable of rapid growth. It often occurs with other duckweeds, and since it is free floating, it can be moved via the wind or water currents. It derives its nutrients from the water column and often occurs in eutrophic systems. It’s an excellent food source for waterfowl, and is also used by muskrat and fish. The dense mats offer shade and cover for fish.

Heart Pondweed (*Potamogeton perfoliatus*: Common Names: Redhead pondweed, heart pondweed, perfoliate pondweed. **Native.**): Heart pondweed is similar to other clasping-leaf pondweeds. The alternate leaves of heart pondweed tend to be shorter (ranging from 1 to 6 cm), somewhat rounded, and completely wrap around the base of the stem, the latter being a distinguishing characteristic. Leaves typically have 7-15 veins. Stipules are present, but tend to disintegrate later into the season. Floating leaves are not produced, but cylindrical flower spikes adorned with fruit are produced. Fruits have a short beak and 3 indistinct dorsal ridges. Heart pondweed prefers clear soft water, but can occur in shallow or deep water, with a preference for sandy substrates.

Hydrilla (*Hydrilla verticillata*) Common Name: Hydrilla, waterweed. **Exotic, aggressive, Invasive.)** : Hydrilla is native to parts of Asia, and was introduced to the Northeast region in the mid-1900's. Hydrilla is the perfect weedy species, able to outcompete desirable native species due to an array of adaptations. These include growing in a variety of substrates, moving or still waters, tolerating up to 10 ppt salinity, and adept at low-light growth. It is typically rooted in the substrate, but can persist in drifting mats. Although similar to common waterweed, hydrilla has strongly serrated leaves (visible with the naked eye), and have a barbs on the underside of the midrib. The leaves are typically arranged in whorls of 4 to 8, but lower parts of the plant can be in whorls of three, or even opposite in arrangement. Hydrilla readily reproduces via stem fragmentation, and produces turions and hardy tubers to overwinter. Two distinct forms occur in the Northeast: monoecious (generally found in the north) and dioecious (generally more robust and found in southern climes.

Leafy Pondweed (*Potamogeton foliosus*: Common Name: leafy pondweed. **Native.**): Leafy pondweed has freely branched stems that hold slender submersed leaves that become slightly narrow as they approach the stem. The leaf contains 3-5 veins and often tapers to a point. No floating leaves are produced. It produces early season fruits in tight clusters on short stalks in the leaf axils. These early season fruits are often the first grazed upon by waterfowl during the season. Muskrat, beaver, deer and even moose also graze on the fruit. These fruit are often required to distinguish this pondweed from several other thin-leaved pondweeds that occur in the region. It inhabits a wide range of habitats, but usually prefers shallow water. It has a high tolerance for eutrophic conditions, allowing it to even colonize secondary water treatment ponds.

Long-leaf Pondweed (*Potamogeton nodosus*. Common Name: Long-leaf pondweed. **Native.**): Long-leaf pondweed has stems up to two meters long that originate from a branching rhizome. Submersed leaves can be up to 30 cm long, lance-shaped, and taper to a long leaf stalk. Floating leaves also taper on long leaf stalks, which distinguish this pondweed from other similar pondweed species. Flowers and fruit are produced on a thick cylindrical spike. Fruits are somewhat oval, have a short beak, and a lumpy dorsal ridge. Long-leaf pondweed prefers flowing water versus lakes. It inhabits a variety of sediments and can tolerate eutrophic conditions and turbid water. Long-leaf pondweed fruit are grazed on by waterfowls, and portions of the plant are eaten by muskrat, beaver, deer and even moose. Long-leaf pondweed offers excellent invertebrate habitat. Researchers estimate a 20 by 60 meter standing patch can support 33 million invertebrates.

Moneywort (*Lysimachia nummularia*. Common Names: many, including creeping Jenny, creeping Joan, or creeping Charlie, and wandering Jenny plus wandering sailor. **Invasive.**): Moneywort is native to Europe and Southeast Asia, but is common throughout much of the USA, particularly the east and west coasts and the Midwest. It is a low-growing perennial with creeping stems that can reach over two feet long. Leaves are opposite and oval in shape, somewhat resembling a small coin. It prefers shaded soils in moist areas such as wetlands, roadside ditches and stream shorelines. Moneywort typically spreads vegetatively, but it does produce seeds that are dispersed via flood waters. Its possible animals spread the seeds as well. Moneywort can create dense mat-like growth that has the potential to overcrowd desirable native plants.

Mud Plantain (*Heteranthera reniformis*. Common Names: mud plantain, kidney-leaved mud plantain. **Native.**): Mud plantain is an emergent plant that prefers wet sediment often located along tidal marshes or river shorelines. Its leaves are alternate, shaped like a kidney with backward facing rounded lobes. Leaves range from 1 to 4 cm and are often bright to dark green, sometimes with a glossy or even waxy surface. It produces white flowers and fruit in a capsule (that can split into two seams). Its northern range limit is southern New England.

Muskgrass (*Chara* sp. Common Names: muskgrass, stonewort, chara. **Native.**): Muskgrass is actually a multi-branched algae that appears as a higher plant. It is simple in structure and has rhizoids instead of true roots. The branches of muskgrass has ridges that are often encrusted with calcium carbonate. This grants the entire plant a “crusty” feel and appearance. The side branches develop in whorls that look like the spoke in a wheel. Muskgrass is easily identified by a pungent, skunky odor. It prefers softer sediments, and can often be found in deeper water than other plants. As such, it’s considered an early pioneer, the first species to colonize a disturbed lakebed.

Pickerelweed (*Pontedaria cordata*. Common names: Pickerel weed. **Native.**) Pickerelweed is a native emergent plant that inhabits lake margins and sluggish stream from ankle deep to several meters deep. It was glossy heart-shaped leaves that originate from a sprawling rhizome. The leaf blade is adorned with numerous parallel veins. The flower spike is crammed with small blue flowers, a distinguishing characteristic. Pickerelweed is very common in the Northeast. Reproduction is by rhizome spread and late season seed dispersal. The flowering stalk plays host to a myriad of insect species, while the seeds are often consumed by waterfowl. The rhizomes and stems offer shade and habitat for fish. Another ecological benefit of pickerelweed is shoreline stabilization and established beds help to dampen wave action.

Sago Pondweed (*Potamogeton pectinatus*: Common Name: Sago, Sago Pondweed. **Native**). The stems of sago pondweed originate from fine rhizomes studded with starchy tubers. The leaves are three to 10 cm long and very thin, resembling pine needles, complete with a sharp point. The branches often are forked several times, resulting in a fan-like arrangement. Stipules are fused to the leaves creating a stipular sheath. Flowers and fruit are produced on a slender stalk that can be submersed, or float on the water. Sago pondweed is widespread, and often inhabits water one to two meters deep. It can tolerate a variety of sediment types and a wide range of water conditions. It is adapted to thrive in low-light, high turbid conditions, and is often the last surviving plant when such conditions persist for an extended amount of time. Sago pondweed is considered a top food producer for waterfowl, which graze heavily on its fruit and tubers. Juvenile fish also utilize sago pondweed as a food source and shelter.

Small Pondweed (*Potamogeton pusillus*. Common Name: Small Pondweed. **Native.**): Small pondweed has slender stems and a slight rhizome that branches repeatedly near the ends. Only submersed leaves are produced, and these are linear, attaching directly to the stem of the plant. The leaves have three veins and the mid-vein is usually bordered by several rows of lacunar (hollow) cells. There is usually a pair of raised glands at the base of the leaf attachment. Membranous stipules are wrapped around the stem in early growth, but as the plant ages, these tend to break down and becoming shredded in appearance and free. Flowers and fruits are produced in 1 to 4 whorls on a slender stalk. The fruit is plump with a smooth back and a short hooked beak. Small pondweed can tolerate turbid environments and inhabits shallow zones to a depth of 3 meters. Small pondweed is grazed upon by waterfowl, muskrat, deer, beaver, and even moose. Locally, it can be a very important link in the ecological balance of a lake system. It also provides suitable grazing opportunities and cover for numerous fish.

Small Duckweed (*Lemna minor.* Common Names: Small duckweed, water lentil, lesser duckweed. **Native**). Small duckweed is a free floating plant, with round to oval-shaped leaf bodies typically referred to as fronds. The fronds are small (typically less than 0.5 cm in diameter), and it can occur in large densities that can create a dense mat on the water's surface. Each frond contains three faint nerves, a single root (a characteristic used to distinguish it from other duckweeds), and no stem. Although it can produce flowers, it usually reproduces via budding at a tremendous rate. Its population can double in three to five days. Since it is free floating, it drifts with the wind or water current, and is often found intermixed with other duckweeds. Since it's not attached to the sediment, it derives nutrients directly from the water, and is often associated with eutrophic conditions. It overwinters by producing turions late in the season. Small duckweed is extremely nutritious and can provide up to 90% of the dietary needs for waterfowl. It's also consumed by muskrat, beaver and fish, and dense mats of duckweed can actually inhibit mosquito breeding.

Spatterdock (*Nuphar variegata*. Common Name: yellow pond lily, bullhead pond lily, spatterdock. **Native.**): Spatterdock leaf stalks emerge directly from a submerged fleshy rhizome. Spatterdock has heart-shaped leaves with a prominent notch. Depending on the habitat, these leaves can be held aloft via erect stems. A distinguishing characteristic of spatterdock is the leaf stalk, which bears a winged margin. Flowering occurs in the summer and, the flowers open during the day and close at night. Spatterdock typically inhabits quiet water less than two meters deep with a soft substrate, such as ponds, shallow lakes and slow-moving streams. The leaves offer shade and protection for fish, and the leaves, stems, and flowers are grazed upon by muskrats, beaver, and sometimes, even deer.

Stonewort (*Nitella* sp. Common Names: stonewort, nitella. **Native.**): Stonewort is actually a multi-branched macro-algae that appears as a higher plant. It lacks conductive tissue and roots, using simple anchoring structures called rhizoids. Stem lengths can reach 0.5 meters, and leaves are arranged in whorls. Although similar in appearance to muskgrass, stonewort has smooth stems and branches, and lacks the distinct musky odor. Stonewort inhabits soft sediments in the deeper water of lakes. It can be found as deep as 10 meters. Fish and waterfowl graze on stonewort.

Water Primrose (*Ludwigia* sp. Common Name: red ludwigia, water primrose. **Native.**): Ludwigia is a perennial plant that often grows along lake shorelines or in moist habitats. There is also a submersed form with only the tips exposed. Ludwigia usually is less than 50 cm in total length and has opposite elliptical leaves. It often takes on a reddish to purple hue, and has small green to red flowers. It commonly occurs in shallow waters, such as ditches, ponds streams and freshwater marshes. Submersed ludwigia offers some habitat for juvenile fish and aquatic invertebrates, but its leaves and fruit provides little nutritional value for grazing waterfowl.

Water Moss (*Fontinalis* sp. Common Name: water moss. **Native.**): Water mosses are submerged mosses that are attached to rocks, trees, logs, and other hard substrates by false rootlets located at the base of their stems. The stems are dark-green to brown, and about one foot long. The leaves share a similar color as the stems, and are usually ovate with fine-toothed margins. Water moss is utilized by aquatic invertebrates, and as a breeding site for small fish. Water moss rarely reaches nuisance levels

Water Stargrass (*Zosterella dubia* (=*Heteranthera dubia*): Common Name: Water stargrass**.** **Native**): Water stargrass has slender free-branched stems that originate from rhizomes. The leaves are narrow and alternate, attaching directly to the stem. Leaves can be up to 15 cm long, and lack a prominent midvein, a distinguishing characteristic. Water stargrass can inhabit a wide range of water depths and sediment types, and can tolerate reduced clarity environments. Yellow star-shaped flowers (pictured) are produced by midsummer, but reproduction is usually via over wintering rhizomes. Water stargrass is a locally important waterfowl food source, and provides suitable cover and foraging for fish.

Water Starwort (*Callitriche heterophylla*. Common Name: Large water starwort. **Native.**): Water starwort is a shallow-rooted submersed plant with a fine stem, usually less than a meter long. Submersed leaves are opposite and ribbon-like, while floating are rounded and crowded at the top, forming a floating rosette at the surface. Different species of water starwort can be discerned by examining the fruiting bodies, produced by mid- to late summer. It is well adapted to cool water temperatures, and often starts growing early in the spring. Water starwort provides suitable food for a variety of waterfowl, and the stem clusters offer shelter and forage opportunities for herbivorous fish.

White Water Crowfoot (*Ranunculus longirostris*. Common Names: White water crowfoot, water crowfoot. **Native.**): White water crowfoot stems originate from trailing runners and buried rhizomes. The stems are long and branched, with limp leaves (unlike similar water crowfoot species in the region) situated in an alternate pattern. The leaves have a noticeable stalk, and the plant produces white flowers. White water crowfoot prefers high alkalinity water, and usually occurs in water less than two meters deep. It is also common in streams. When fruit and flowers are produced, white water crowfoot is a preferred food source of dabbling ducks and other waterfowl. If it occurs in shallow water, upland game birds (such as grouse) even graze on it. It provides excellent habitat for invertebrates, but only a fair food producer for trout.

Wild Celery (*Vallisneria americana*. Common Names: Wild celery, eel-grass, tape-grass. **Native**.): Wild Celery has long flowing ribbon-like leaves that have a basal arrangement from a creeping rhizome. The leaves can be up to two meters long, have a cellophane-like texture, with a prominent center stripe and finely serrated edges. The leaves are mostly submersed, although they can reach the surface allowing the tips to trail. Male and female flowers are produced on separate plants, but reproduction is usually via over wintering rhizomes and tubers. Wild celery usually inhabits hard substrate bottoms in shallow to deep water. It can tolerate a wide variety of water chemistries. Wild celery is the premiere food source for waterfowl, which greedily consume all parts of the plant. Canvasback ducks (*Aythya vallisneria*) enjoy a strong relationship with wild celery, going so far to alter their migration routes based on its abundance. Extensive beds of wild celery are considered excellent shade, habitat and feeding opportunities for fish, and commonly are used in submersed vegetation restoration projects due to its availability ease of growth and high quality.

Results

Task 1: 2017 Macrophyte Abundance in the Treatment Area Discussion

In September of 2017, sections of the D&R Canal were re-surveyed for the presence of submersed aquatic vegetation (SAV). Since this section of the canal had rooted hydrilla documented in 2016, and we injected Fluridone for 120 days from a point in Lambertville, this survey could be considered a post-treatment survey. The treatment sections of the canal include over 18 miles of the waterway, and comprise Task 1 of the 2017 monitoring effort. That said, the injection did not terminate for the season until September 28th, about 3 to 4 weeks following the timing of this survey. Therefore one could expect even better control based on the results presented herein. The timing of the 2017 survey was selected to coincide with the 2016 survey timing for a direct comparison. For this discussion, it would be helpful for the reader to refer to the distribution tables and the summary of percent abundance by section data tables, located in the appendix of this report. The following discussion is based on species abundance, presented by section. For the purposes of this discussion, medium and dense abundance is typically assumed to be nuisance amounts by lake managers.

Table 4, below summarizes the 2017 percent occurrence (or frequency of occurrence) data for all of the aquatic plants collected and observed during the survey. In addition, the 2016 data is summarized as well, for a quick comparison from 2016 (non-treatment) to 2017 (essentially, post-treatment).

In 2017, we surveyed the same 597 sample stations throughout the treatment sections of the D&R Canal, using similar procedures as employed in 2016. In 2017, aquatic plants were documented at 458 sample stations, which is equivalent to 76.7%. This represents a decrease in overall aquatic plant abundance when compared to 2016 data (96.5%). This is expected, based on the herbicide injection. Nearly 200 stations (n=197, or 43%) were considered trace density, with another 171 stations supporting sparse (or 37%) density. Therefore, 80% of the sites that had aquatic plants in 2017 were non-nuisance abundance. At 73 stations (or 16%) the abundance was medium, and at 17 (or 4%) of the stations were considered dense. This data was supported by visual observation by SLM staff and Authority staff. This suitable reduction in overall submersed aquatic plant growth was achieved without the use of mechanical plant removal via hydro-rake in 2017.

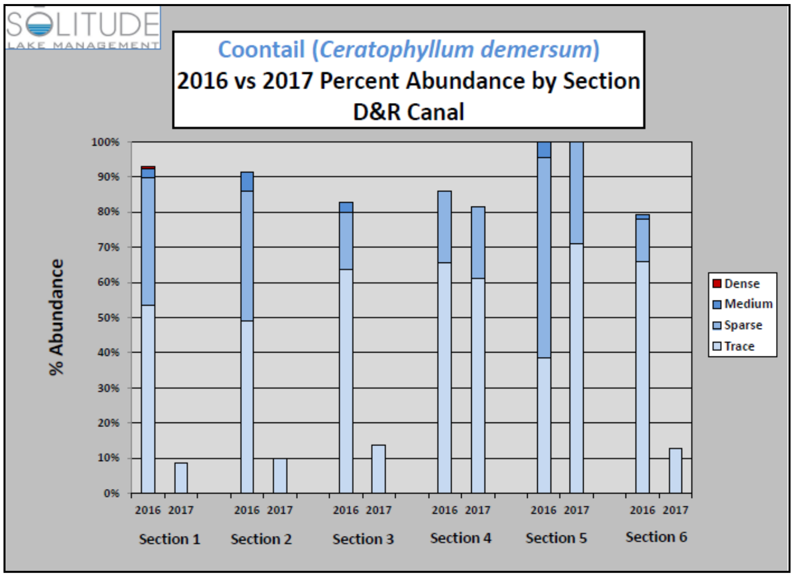
The two most common aquatic plants collected in 2017 are not even considered rooted plants: small duckweed and common watermeal. Both of these are tiny floating plants often at the whim of water currents, wind, and accumulating among submersed plants at the surface or among floating-leaf plant communities such as water lilies or watershield. Small duckweed was observed at just over 300 stations (or 50.4%), but that was a decrease from nearly 90% of the stations in 2016. It is interesting that in 2016, we did not observe any common watermeal during our surveys. But in 2017, common watermeal occurred at 275 stations, which represented 46.1% of the stations. We did observed common watermeal in several other New Jersey water bodies for the first time in 2017, so it could have been a seasonal factor. Or the reduction in submersed aquatic plant growth throughout the treatment area (see above) could have played a role in the appearance of common watermeal this year. Almost all (94%) of the common watermeal occurrences were considered trace abundance.

Table 4 Submersed Aquatic Plant Abundance Summary: Treatment Area 2016 and 2017 D&R Canal

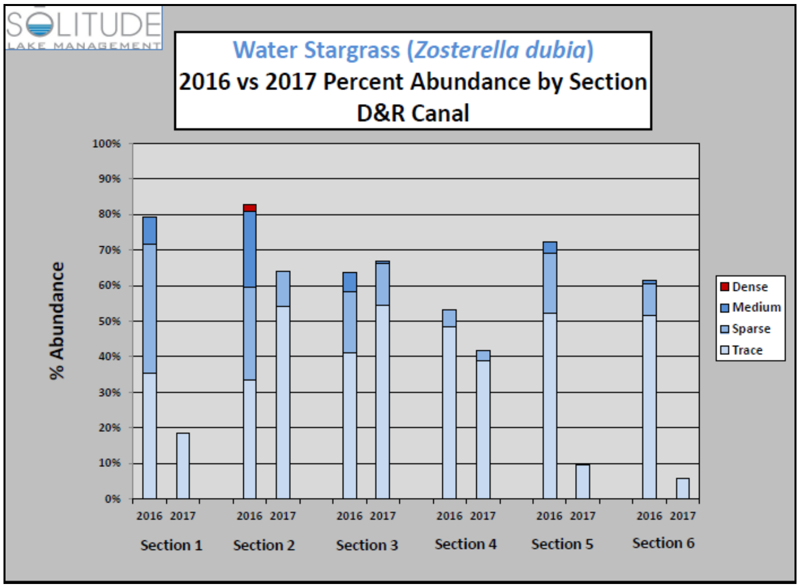
Common Name	Scientific Name	2016 Site Occurrence	2016 % Occurrence	2017 Site Occurrence	2017 % Occurrence
Overall SAV		**576**	**96.5%**	**458**	**76.7%**
Small Duckweed	*Lemna minor*	536	89.8%	301	50.4%
Common Watermeal	*Wolffia* sp.	0	0.0%	275	46.1%
Coontail	*Ceratophyllum demersum*	507	84.9%	155	25.9%
Water Stargrass	*Zosterella dubia*	399	66.8%	172	28.8%
Hydrilla	*Hydrilla verticillata*	337	56.4%	31	5.2%
Wild Celery	*Vallisneria americana*	313	52.4%	236	39.5%
Common Waterweed	*Elodea canadensis*	196	32.8%	42	7.0%
Benthic Filamentous Algae		189	31.7%	260	43.6%
Brittle Naiad	*Najas minor*	143	24.0%	1	0.1%
Eurasian Water Milfoil	*Myriophyllum spicatum*	60	10.1%	5	0.8%
Water Starwort	*Callitriche palustris*	59	9.9%	30	5.0%
Spatterdock	*Nuphar variegata*	55	9.2%	38	6.4%
Watermoss	*Fontinalis* sp.	44	7.4%	23	3.9%
Leafy Pondweed	*Potamogeton foliosus*	19	3.2%	43	7.2%
Muskgrass	*Chara* sp.	11	1.8%	4	0.7%
Curly-leaf Pondweed	*Potamogeton crispus*	9	1.5%	0	0.0%
Long-leaf Pondweed	*Potamogeton nodosus*	7	1.2%	8	1.3%
Pondweed species	*Potamogeton* sp.	6	1.0%	0	0.0%
White Water Crowfoot	*Ranunculus longirostris*	3	0.5%	0	0.0%
Great Duckweed	*Spirodela polyrhiza*	2	0.3%	0	0.0%
Common Bladderwort	*Utricularia vulgaris*	2	0.3%	0	0.0%
Arrowhead rosette	*Sagittaria* sp.	2	0.3%	0	0.0%
Water Primrose	*Ludwigia* sp.	0	0.0%	45	7.5%

In 2016, the submersed aquatic plant community was dominated by coontail (84.9%), water stargrass (66.8%), hydrilla (56.4%), wild celery (52.4%) and common waterweed (32.8%). All of these plants still dominated the submersed community in 2017, but all have experienced a significant decrease in percent occurrence. We expected suitable control of hydrilla, but based on the injection rates, we were unsure just what extent of native plant growth suppression would be realized.

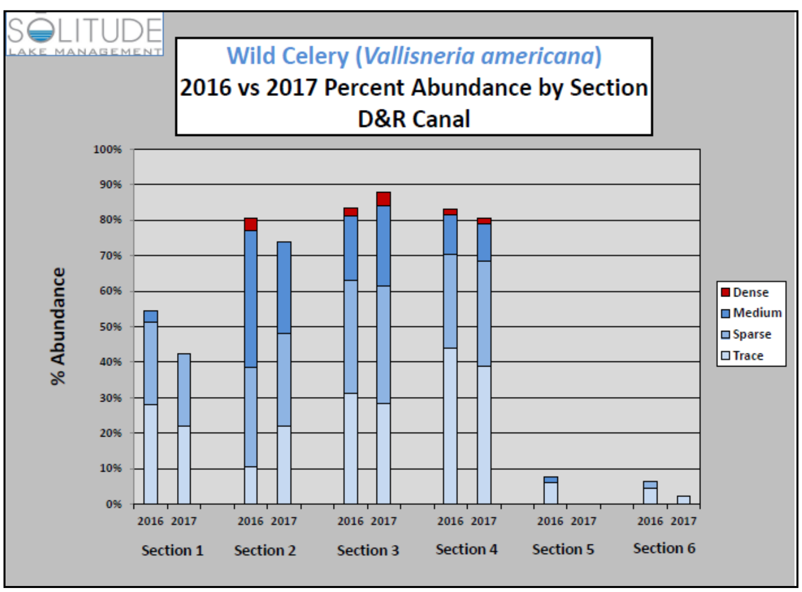
In 2017, coontail was collected at 155 stations (or 25.9%). This represents a significant decrease from 2016, when coontail occurred at 507 stations (or 84.8%). In 2016, coontail commonly occurred throughout the sections surveyed, although most of the sites were trace or sparse. Sections 1, 3 and 5, had the highest amounts of coontail, at times at the water's surface in locations. In 2017, most of sits (80%) were considered trace density. The remaining 20% of the sites were sparse density. Numerous coontail specimens collected in 2017 displayed signs of chlorosis from the herbicide injection program. The graph below displays the changes in the distribution and abundance of coontail from 2016 to 2017.



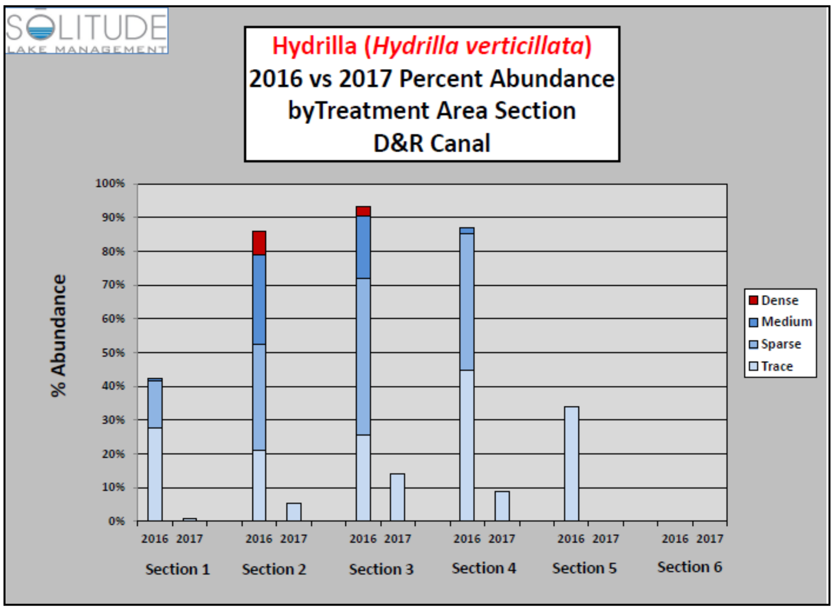
In 2017, water stargrass was collected at 172 (or 28.8%) of the stations surveyed. This represents a significant decrease from 2016, when water stargrass occurred at 399 (or 66.8%) of the stations. In 2016, water stargrass occurred throughout the survey area occasionally at medium density. It was often times at the surface (intermixed with other plants) and had distinct emergent yellow flowers. In 2017, we did not observe any flowers, and 86% of the stations were considered trace density. At 13% of the stations, we observed sparse abundance, while the remaining site was medium density. The graph below displays the changes in the distribution and abundance of water stargrass from 2016 to 2017.



In 2017, wild celery occurred at 236 (or 39.5%) of the stations surveyed in the treatment area. Although this represents a decrease when compared to 2016 data, this desirable native species only declined from 52.4% occurrence. In 2016, wild celery was most common in sections 2, 3 and 4 (along the feeder side and often intermixed with hydrilla) with medium and dense abundances noted, plus flower production. Even though we observed a decrease in overall abundance, we still observed medium (52, or 22%) and dense (6, or 3%) wild celery growth in 2017. Trace and sparse wild celery growth were evenly distributed at 38%. Examination of wild celery in the field revealed some minor signs of herbicide damage at most locations and on most dates. The graph below displays the changes in the distribution and abundance of wild celery from 2016 to 2017.



Hydrilla was our target plant for control via herbicide injection in 2017. In 2017, hydrilla was collected at 31 stations (or 5.2% of the total stations). All 31 hydrilla occurrences were considered trace density, and all showed significant signs of herbicide damage (yet were still rooted). In addition, we did not observe any floating hydrilla fragments in the canal during the survey. In 2016, we observed numerous floating hydrilla fragments, even down in section 6. In 2016, hydrilla was collected at 56.4% (or 337) stations. Hydrilla growth was most common in sections 2, 3 and 4 often occurring at sparse or greater abundance. In sections 2 and 3, medium and dense stations were common occurrences. In these areas, we often observed abundant flowering in particular dense hydrilla beds. The figure below depicts the change in abundance section by section in 2016 (pre-treatment) and 2017 (post-treatment). Considering another 3-4 weeks of active herbicide injection post survey, we observed excellent hydrilla control in 2017.



Benthic filamentous algae abundance and distribution increased in 2017. This year, we collected benthic filamentous algae at 260 (or 43.6%) of the sites throughout the treatment area. This is logical as the herbicide injection clearly reduced the abundance of overall aquatic plant growth, opening up the substrate for colonization of filamentous algae (which is not controlled by Fluridone). In 2016, benthic algae was observed at 189 (or 31.7%) of the stations.

Brittle naiad and Eurasian water milfoil are two invasive submersed aquatic plants that occurred commonly throughout the treatment area in 2016. Brittle naiad occurred at 143 (or 24.0%) of the stations in 2016, while Eurasian water milfoil occurred at 60 (or 10.1%) of the stations pre-treatment. In 2017, brittle naiad was almost completely controlled, occurring at just one (or 0.1%) of the stations surveyed. This single site was trace abundance. Since brittle naiad is a prolific seed producer, we would expect it to recover if active herbicide injection was not conducted in follow-up years. In 2017, Eurasian water milfoil decreased to five stations (or 0.8%).

Water starwort, spatterdock (yellow water lily) and watermoss are all native species. In 2016 these occurred between 7.4% and 9.9% of the stations surveyed. Each experienced a decrease post treatment, but only by about 50%. Water starwort decreased from 9.9% of the stations in 2016 to 5.0% of the stations in 2017. Spatterdock decreased from 9.2% in 2016 to 6.4% in 2017. Watermoss decreased from 7.4% in 2016 to 3.9% in 2017.

Leafy pondweed is a desirable thin-leaved pondweed that commonly occurs in the Northeast. We observed an increase in abundance of this pondweed from 2016 to 2017. In 2016, leafy pondweed was collected at 3.2% of the stations, while in 2017, it was collected at 7.2% of the stations. Since this is typically a low-growing plant, it's possible it benefited from the overall reduction in aquatic plant growth that was crowding it out.

Curly-leaf pondweed is the only invasive pondweed in the region. In 2016, we collected it (likely the fall growth form) at 1.5% stations. But in 2017, we did not collect or observe any curly-leaf pondweed in the treatment area.

Muskgrass, a macro-algae occurred at 11 (or 1.8%) of the stations in 2016, but decreased to four (or 0.7%) stations in 2017.

Long-leaf pondweed, although it did not occur often, remained stable from 2016 to 2017. In 2016, long-leaf pondweed was collected at 7 (or 1.2 %) of the stations. In 2017, it was collected at 8 (or 1.3%) of the stations in this section of the canal.

Water primrose is a semi-emergent aquatic plant that often occurs on lake or stream margins. This aquatic plant was not documented during our 2016 survey, but biologists occasionally observed it exposed on the canal banks. In 2017, it was observed in the canal waters at 45 (or 7.5%) of the treatment area stations. This was likely a function of higher water levels in 2017 as opposed to 2016.

The remaining aquatic plants collected or observed in 2016 (pondweed sp., white water crowfoot, great duckweed, common bladderwort and arrowhead rosette) all occurred at 1.0% or fewer of the stations in 2016. None of these aquatic plants were collected or observed in 2017.

Task 2: Macrophyte Abundance in the Remainder of the Canal Discussion

In 2017, the D&R Canal Hydrilla Management Plan called for GPS-referenced surveys in the remainder of the canal, from its origin at the Delaware River to where it spills into the Raritan River in New Brunswick. This represents nearly 40 miles of additional canal. The purpose of this task was to confirm that no hydrilla was established in other parts of the canal, to establish baseline aquatic plant communities, and identify any additional invasive aquatic plants that could be a potential operational or ecological threat to the system. Twenty five different aquatic plants (although not all are considered true submersed plants; a few were floating species and some were emergent species), were collected for this task. Several of these plants were not observed in the treatment area.

Please note that the upper part of the feeder canal (north of the Lambertville Lock) could be considered non-treatment area, whereas the lower part of the main canal (downstream of Alexander Road to where the canal exits into the Raritan River) could be considered treatment area since FasTest results revealed detectable Fluridone in this section.

In 2017, we surveyed 1,216 stations in for the task of monitoring to remainder of the canal. Aquatic plants were collected or observed at 1,038 (or 85%) of the stations. Most of these stations supported sparse abundance aquatic plant growth (402 stations, or 39%). Trace abundance accounted for 29% of the vegetated stations, while medium abundance accounted for 22% of the vegetated stations. Dense abundant stations rounded out the assemblage at 10% of the vegetated stations. Therefore, approximately one third of the vegetated stations (331, or 32%) could be considered nuisance growth. Table 5, below, is summary of the frequency of occurrence data for this task.

Hydrilla was not collected or observed at any of these 1,216 stations. In addition, we did not observe any hydrilla floating fragments in these sections during our surveys. All common waterweed specimens (see discussion, below) were closely examined to confirm its identification.

Table 5: 2017 Summary of Aquatic Plants Collected in the Remainder of the D&R Canal

Common Name	Scientific Name	# Stations	%
Overall SAV		**1038**	**85.4%**
Small Duckweed	*Lemna minor*	819	67.4%
Watermeal	*Wolffia sp.*	689	56.7%
Coontail	*Ceratophyllum demersum*	616	50.7%
Benthic Filamentous Algae		580	47.7%
Wild Celery	*Vallisneria americana*	476	39.1%
Water Starwort	*Callitriche palustris*	160	13.2%
Water Stargrass	*Zosterella dubia*	158	13.0%
Common Waterweed	*Elodea canadensis*	127	10.4%
Spatterdock	*Nuphar variegata*	94	7.7%
Common Bladderwort	*Utricularia vulgaris*	66	5.4%
Water Primrose	*Ludwigia* sp.	65	5.3%
Watermoss	*Fontinalis* sp.	61	5.0%
Small Pondweed	*Potamogeton pusillus*	32	2.6%
Fanwort	*Cabomba caroliniana*	30	2.5%
Stonewort	*Nitella* sp.	25	2.1%
Arrowhead rosette	*Sagittaria* sp.	18	1.5%
Eurasian Water Milfoil	*Myriophyllum spicatum*	17	1.4%
Long-leaf Pondweed	*Potamogeton nodosus*	9	0.7%
Leafy Pondweed	*Potamogeton foliosus*	7	0.6%
Pickerelweed	*Pontedaria cordata*	6	0.5%
Floating Filamentous Algae		5	0.4%
Moneywort	*Lysimachia nummularia*	4	0.3%
Curly-leaf Pondweed	*Potamogeton crispus*	3	0.2%
Flat-leaf Bladderwort	Utricularia intermedia	2	0.2%
White Water Crowfoot	*Ranunculus longirostris*	2	0.2%
Sago Pondweed	*Stuckenia pectinata*	2	0.2%
Mud Plantain	*Heteranthera reniformis*	1	0.1%
Heart Pondweed	*Potamogeton perfoliatus*	1	0.1%
Hydrilla	*Hydrilla verticillata*	0	0.0%

The two most common aquatic plants that occurred in the remainder of the canal were small duckweed and common watermeal. Both of these are tiny floating aquatic plants, and not considered submersed plants. They often accumulate on floating-leaf plants (such as water lilies), among emergent plant stands (such as arrowhead), or even among the stems of submersed plant growth that has reached the surface and become matted. Small duckweed (the most commonly occurring between the two) was observed at 819 (or 67.4%) of the stations. Over half of these stations (436, or 53%) were trace density, while sparse density small duckweed accounted for 41% of the vegetated stations. Medium (5%) and a few dense (1%) stations rounded out the frequency of occurrence of small duckweed. Common watermeal was observed 56.7% of the stations. Similar to small duckweed, 95% of the stations were trace or sparse abundance, while medium (4%) and dense stations (<1%) rounded out the occurrence of these plant.

The most common true submersed aquatic plant collected was coontail. It was collected at 616 (or 50.7%) of the stations surveyed for this task. At 511 (or 83%) of these vegetated stations, the coontail was considered trace density. At 99 (or 16%) of the vegetative stations coontail was considered sparse abundance, with another six (or 1%) of the stations considered medium abundance. No dense stations were collected.

Benthic filamentous algae was collected at 580 (or 47.7%) of the total stations surveyed during this task. Benthic filamentous algae typically occurred on exposed canal bottom substrate. Over half (339 (or 58%) of the stations were considered trace density. Sparse stations accounted for 19%, while medium abundance stations accounted for 14%. At 8% of the stations, the abundance of benthic algae was considered dense. The abundance of benthic algae was visually confirmed early in the season, and later in the season by complaints by at least one of the drinking water facilities.

Wild celery was collected at 476 (or 39.1%) of the stations surveyed for this task. This is nearly identical to the frequency of occurrence throughout the treatment area in 2017 (39.5%). Wild celery enjoyed a varied distribution of abundances in these areas of the canal. At 187 (or 39%) of the stations with wild celery, its abundance was considered trace. At 158 (or 33%) of the stations it was considered sparse. Medium abundance stations accounted for 16%, while dense stations accounted for 12%.

Water starwort was collected at 160 (or 13.2%) of the stations surveyed during this task. At 156 (or 98%) of these stations, the abundance was considered trace. This is typical, as this plant is delicate and often does not develop into dense matted beds. Four (or 3%) of the stations that had water starwort were considered sparse. No medium or dense stations were collected.

Water stargrass was collected at 158 (or 13.0%) of the stations surveyed for this task in 2017. At 149 (or 94%) of these stations the abundance was trace. The remaining 6% of the stations were sparse abundance.

Common waterweed was collected at 127 (or 10.4%) of the stations surveyed for this task. Most stations were trace abundance (112, or 88%). But occasionally more established beds of common waterweed were observed and collected. At 13 (or 10%) of the stations, we collected sparse growth common waterweed. In addition, two stations (or 2%) were considered medium density.

Spatterdock is the only true water lily we collected at the D&R Canal, often occurring along the margins with erect pads among the other emergent growth. Spatterdock was observed or collected at 94 (or 7.7%) of the stations surveyed for this particular task. Most stations (84, or 89%) were trace abundance, often being a few scattered pads in a general area. At 10 (or 11%) of the stations we observed sparse growth, which included a greater abundance of pads at the surface.

Several aquatic plants occurred at 1% to 5% of the stations surveyed. These included common bladderwort (5.4%), water primrose (5.3%), watermoss (5.0%), small pondweed (2.6%), fanwort (2.1%), stonewort (a macro-algae, collected at 2.1%), arrowhead (submersed rosette form, collected at 1.5%) and Eurasian water milfoil (1.4%).

Fanwort, despite its relative low occurrence in the canal (30 stations), deserves special attention. It was collected at all trace density stations located in and around the Kingston/Rocky Hill section of the canal. There are two maps in the appendix that display the occurrence of fanwort in the D&R Canal. Fanwort is a very aggressive submersed aquatic plant, and although it does not produce subterranean tubers like hydrilla, could be an ecological threat to the nearby watersheds, and has the potential to interfere with water flow through the canal. Based on the infrequent occurrence and relatively low station abundance (possibly inhibited by water chemistry or the low dose herbicide application) of fanwort in 2017 it appears to be a recent infestation. Control of this invasive plant should be considered in future years, although a dredging program is scheduled to begin in 2018 in the areas with documented fanwort growth.

Ten aquatic plants and floating mats of filamentous algae (which are simply benthic mats of algae that reach the surface) round out the aquatic plant assemblage collected during this task of our 2017 monitoring efforts in the D&R Canal. These include long-leaf pondweed (0.7%), leafy pondweed (0.6%), the emergent pickerelweed (0.5%), moneywort (0.3%), curly-leaf pondweed (0.2%), flat-leaf bladderwort (0.2%), white water crowfoot (0.2%), sago pondweed (0.2%), mud plantain (0.1%), and heart pondweed (0.1%). Several of these are considered to be desirable native pondweeds, but obviously at very low occurrence and abundance. Curly-leaf pondweed and moneywort (along with Eurasian water milfoil, discussed above) are all considered to be invasive species but at the recorded occurrence are considered non-nuisance at this time. They should be monitored in the future, however.

Task 3: Supplemental Aquatic Vegetation Survey Discussion

Supplemental weed rake toss surveys were conducted at the end of each month (June, July, August and September) starting a month following the activation of the herbicide injection. On all four dates we surveyed three GPS-referenced stations at Lower Ferry Road (LFR), Scudder's Falls (SCF), and River Drive (RR). In July we conducted surveys at Whitehead Road (WHR, two stations), and in late September we conducted surveys at Kingston (two stations, KN). The early September data set was pulled from the treatment area surveys (Task 1).

June 2017

In June at LFR, overall aquatic plant abundance was sparse (one site) to medium (2 sites). Hydrilla was collected at all three stations, on all but two rake tosses. Hydrilla abundance was trace (two stations) to sparse (one station). All hydrilla specimens displayed signs of herbicide damage. Wild celery was collected at all three stations, all at sparse density. It displayed little to no herbicide injury. Trace amounts of coontail were collected at two stations, showing some signs of injury. Sparse leafy pondweed (resulting in an overall abundance of trace) was collected on one weed rake toss. Trace amounts of small duckweed and Eurasian water milfoil occurred at one station (LF2).

At Scudder's Fall's medium overall aquatic plant abundance was collected at two stations, with sparse growth at the third. Hydrilla was collected at all three stations. Two of these were trace abundance and one was sparse. All hydrilla specimens displayed herbicide injury. Wild celery was well established at all three stations at this site. Two stations were medium, and the last was sparse. All wild celery appeared robust, with only potentially minor herbicide damage. At one station, we collected trace coontail. Trace amounts of leafy pondweed were collected at two of the three stations.

At River Drive overall aquatic plant abundance was trace at two stations and sparse at one station. Although no rooted hydrilla was collected at station RR2, we did observe two damaged floating fragments of hydrilla. Wild celery was collected at two stations; one was trace and the other was sparse. Wild celery plants were about 8" to 12" long. We also collected trace amounts of leafy pondweed, water stargrass, coontail and small duckweed at one station at this site. The coontail showed signs of herbicide damage.

July 2017

In July at Lower Ferry Road, we collected overall aquatic plants at sparse (two stations) and medium (one station) abundance. We did collect trace hydrilla on two rake tosses at the same station. One was a tiny piece of hydrilla, while the other was 2-3 diminutive stems. Both displayed significant signs of herbicide damage. Wild celery commonly occurred at this site, and did display whitening of plant tissue (possibly herbicide injury). One station was medium density while the other two were sparse density. Small duckweed was present at all three stations. Eurasian water milfoil was collected at one station at trace density. Coontail and additional Eurasian water milfoil was observed near the bridge.

At Scudder's Falls overall aquatic plant density varied from sparse to medium to dense abundance (one station each). We found one tiny piece of hydrilla (that was difficult to confirm identity since most of its leaflets were missing) on one weed rake toss. The wild celery continues to be very robust at this site, with one each sparse, medium and dense station. Again, it was difficult to determine if whitening was herbicide injury on these plants. Trace small duckweed was present at all three stations. Single trace water stargrass and leafy pondweed stations were also present.

We observed reduced aquatic plant growth at the River Drive site. Overall plant abundance was sparse (one station), trace (one station) or absent (one station) here on this date. No hydrilla was collected or observed on this date. Wild celery was sparse at one station and trace at another. Trace small duckweed was observed at two stations only.

In July, we also conducted weed rake tosses at the Whitehead Road Bridge. One station was established on each side of the bridge. On this date, we collected medium dense plants at one station and dense abundance at the other station. No hydrilla was collected or observed. Each station supported trace amounts of wild celery. Each station also had medium dense coontail, plus common waterweed (sparse at one station and medium at the other). Each station supported small duckweed (sparse at one and trace at the other), and one stem (trace) of water stargrass was collected at one station. All plant specimens displayed varying degrees of herbicide damage.

Early September 2017

In early September at Lower Ferry Road we observed varied total aquatic plant abundances, with one medium, one sparse, and one station devoid of aquatic plants. The station with medium overall aquatic plant growth supported medium abundances of wild celery, and the floating plants common watermeal and small duckweed. The sparse station supported sparse growth of wild celery and trace amounts of both common watermeal and small duckweed. At this site, one heavily damaged floating (not rooted) hydrilla fragment was also observed.

At Scudder's Falls two stations supported medium abundance aquatic plants while the last station had trace abundance aquatic plants. One medium station supported medium growth of wild celery, and trace growth of several other plants including coontail, common waterweed, small duckweed, water stargrass and water primrose. The other medium station had wild celery and trace amounts of water stargrass and leafy pondweed. The trace station had trace wild celery (derived from one sparse weed rake sample).

We observed very low abundance aquatic plants at River Drive in early September. Each station supported trace growth, with trace small duckweed observed at all stations. Only one station had trace wild celery abundance. This was very consistent with visual observation at this site, likely due to its proximity to the injection site.

Late September 2017

On the final supplemental sampling event conducted in late September (on the final morning of active injection), we first conducted surveys at two stations near Kingston looking for rooted fanwort. Both stations (one near the gate, the other in the turning basin) supported medium density overall aquatic plants. At one station (the turning basin), we collected sparse coontail, small duckweed and common watermeal. In addition, we collected medium benthic filamentous algae and trace amounts of common bladderwort. At the other station (the gate), we collected sparse amounts of coontail, small duckweed and benthic filamentous algae. Trace amounts of common watermeal, water stargrass and common bladderwort were also collected here. We did not collect any fanwort, hydrilla or wild celery at either of these sites.

At Lower Ferry Road, we observed a visible reduction in overall aquatic plant growth. Two trace stations and one sparse was collected. Wild celery (two trace and one sparse) was collected at all three stations. Small duckweed (both trace) was collected at two stations. Sparse common watermeal was collected at one station. We did visually observe one trace patch of water stargrass by the bridge (not collected on the weed rake).

At Scudder's Falls, we observed one medium station and two trace stations. At the medium station, we collected medium wild celery, trace small duckweed, and trace of the macro-algae stonewort. The trace stations had similar assemblages of trace wild celery, leafy pondweed and small duckweed at both stations, plus stonewort at one station.

At River Drive, two stations did not support any aquatic plants. The remaining station had trace aquatic plant growth. This consisted of one 4" to 6" piece of wild celery collected on one weed rake toss. This specimen displayed significant herbicide damage.

Task 4: Hydrilla Tuber Density Discussion

Hydrilla tuber sampling was conducted by SLM field biologists on October 16 and 17, 2017. We collected sediment cores at the same five sampling stations established in 2016 that formed the baseline tuber density. Using the established stations is crucial to assess the changes in tuber abundance following control efforts. One sample station is located in each of the five sections (#1-5) that we originally observed rooted hydrilla growth in 2016. A map of the 2017 sample stations with GPS coordinates is located in the Appendix of this report. Table 6, below, is a summary of the tuber monitoring efforts in 2016 and 2017. It includes the number of cores collected at each station (both years), the calculated tuber density (per m^2) per year, and the percent change in tuber density from 2016 to 2017.

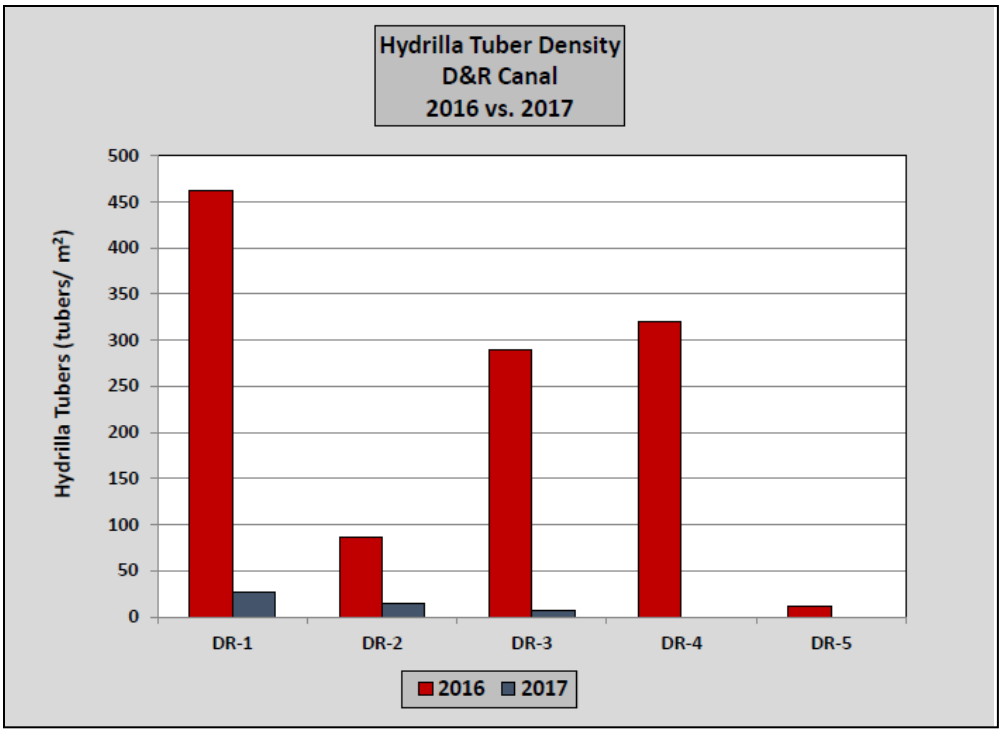
Table 6: D&R Canal 2016 and 2017 Hydrilla Tuber Summary

Sample Site	2016 # Cores	2016 Tubers (m^2)	2017 # of Cores	2017 Tubers (m^2)	% Change 2016 to 2017
DR-1	3	462.8	10	26.5	94.27
DR-2	5	85.6	14	15.2	82.24
DR-3	5	288.9	14	7.6	97.37
DR-4	3	320.4	12	0	100.00
DR-5	5	10.7	10	0	100.00

In 2016, we collected three to five cores at each station to calculate hydrilla tuber density. Hydrilla tuber densities ranged from 10.7 tubers/m^2 to 462.8 tubers/m^2. The highest tuber density (462.8 tubers/m^2) was in section 1, near the first documented rooted beds of hydrilla while the lowest tuber density occurred at section 5, at 10.7 tubers/m^2. This makes sense, as we assume that the initial hydrilla infestation occurred in section 1, and here it would have the greatest time to establish a tuber bank. It is also logical that section 5 would have the lowest tuber density, since we assume that the hydrilla in this section only recently has become rooted here. This is also supported by the SAV data we collected.

In 2017, we observed a significant decrease in hydrilla tubers at all five stations. Due to this decrease (which was expected due to the herbicide injection), we increased the number of cores per section to 10 to 14. We would expect to increase the number of cores required to be sampled again in 2018 (and 2019). Tuber density ranged from 26.5 tubers per m^2 (station DR-1) to 0.0 tubers per m^2 (at stations DR4 and DR-5). In 2017, we did not collect any turions at any of the five stations. This is logical as there was no active vegetative hydrilla growth in the canal during and following the four month herbicide application. For reference, in 2016, turion densities ranged from 0.0 turions/m^2 to 203.3 turions/m^2. These results clearly confirm that our 2017 herbicide injection disrupted new hydrilla tuber growth.

As summarized in the table above, we observed over 94% hydrilla tuber density reduction at four of the five stations. Two of the stations displayed 100% reduction. At station DR-2, we observed greater than 82% reduction in hydrilla tubers. Furthermore, most of the tubers collected appeared to be well-developed with signs of oxidation. This likely represents tubers deposited in prior years. This reduction in hydrilla tuber density, coupled with the visual and weed rake monitoring data provides a clear picture of suitable target plant control in year one of program. The graph below depicts the change in hydrilla tuber abundance from 2016 to 2017.



Summary of Findings

- As part of a three year hydrilla control program in the D&R Canal, SOLitude Lake Management performed four aquatic vegetation monitoring tasks in 2017. These included re-mapping the 2016 treatment area of the canal (Task 1), mapping all the SAV in the remaining 40 miles of the canal (Task 2), monthly supplemental vegetation mapping at select stations (Task 3) and hydrilla tuber monitoring (Task 4).
- In September, we re-mapped all the SAV in 18.31 miles of the canal, considered to be the treatment area (Task 1), based on 2016 occurrence of hydrilla. The same 597 stations were monitored using the same procedures.
- In the treatment area, we observed a decrease in overall submersed aquatic vegetation, and a decrease in most native aquatic plants (such as coontail, water stargrass and wild

celery). Coontail and water stargrass displayed the greater reduction in percent occurrence. Wild celery decreased from 52.4% to 39.5%.

- Hydrilla was the target plant for control. We observed a decrease from 56.4% in 2016 to 5.2% in 2017. All plant samples collected displayed significant herbicide injury. In addition, we did not observe any floating hydrilla fragments in the canal during surveys.
- For Task 2, we surveyed 1,216 stations situated every 50 meters apart starting at the origin of the canal at the Delaware River, to where it enters the Raritan River in New Brunswick. A total of 26 different aquatic plants (plus benthic and floating filamentous algae) were collected/observed during this task. These surveys were conducted in mid-August to late September.
- Submersed/floating aquatic vegetation was documented at 85% of the total stations for Task 2.
- Small duckweed was the most commonly occurring aquatic plant, observed at 67% of the total stations. Coontail (51%) was the most common rooted aquatic plant.
- **Hydrilla was not collected or observed at any stations during Task 2.**
- Fanwort, an aggressive submersed aquatic plant, was documented during Task 2, at 30 trace sites in the Kingston/Rocky Hill area.
- For Task 3, three sampling stations at three locations (Lower Ferry Road, Scudder's Falls, and River Drive) were sampled at the end of June, July and September. The late August data was pulled from the Task 1 dataset. In addition, on one date, Whitehead Drive was sampled (two stations) and Kingston (two stations) was sampled.
- For Task 4, hydrilla tuber sampling was conducted at the same five stations established in 2016. Additional core samples (10 to 14) were conducted at each station to increase our odds of collecting tubers. The tuber densities ranged from 0.0 tubers/m^2 (at two stations, DR-4 and DR-5) to 26.5 tubers/m^2. The highest tuber density was in section 1.
- Tuber density reductions from 2016 to 2017 varied between 82.24% and 100.00%.

2018 Recommendations

The 2018 monitoring program for the D&R Canal is detailed in the D&R Canal Hydrilla and Other Submersed Aquatic Vegetation Management Plan that was drafted in 2017. It includes Task 1, treatment area SAV monitoring and Task 4, hydrilla tuber monitoring. At this time Tasks 2 and 3 are not planned for 2018. We do recommend the following changes for 2018.

- Since hydrilla tuber densities have already decreased significantly, in 2018, we recommend a further increase in the number of cores per station. We suggest 15 to 22 cores per station following the 2018 treatment program.

- The discovery of fanwort, and the potential control of that invasive species requires additional monitoring effort. We recommend 2018 surveys in the areas that fanwort was collected in 2017 plus an additional 2,500 meters down canal, since it spreads via fragmentation. Since this section of the canal is due to be dredged in 2018, this monitoring effort should compliment that program in regard to scope and timing.
- Although Carnegie Lake is not under the jurisdiction of the Authority, it is recommended that the lake be surveyed to determine if fanwort is present in that basin. Based on its proximity to the fanwort identified in the canal, it could be the source of the infestation, or at risk of infestation.
- We also recommend the Authority conduct routine baseline water quality sampling at three to four established stations throughout the Canal. We recommended temperature and dissolved oxygen, pH, and conductivity data be collected at a minimum.

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Appendix A: Task 1 Data

Appendix B: Task 2 Data

Appendix C: Task 3 Map and Data

Appendix D: Assorted Maps and Data

Delaware and Raritan Canal **Treatment Area**
2017 Aquatic Macrophyte Abundance Distribution

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
Total Sites	597									
Overall Abundance	458	77%	197	43%	171	37%	73	16%	17	4%
Small Duckweed	301	50%	283	94%	17	6%	1	0%	0	0%
Watermeal	275	46%	259	94%	15	5%	1	0%	0	0%
Benthic Filamentous Algae	260	44%	170	65%	58	22%	20	8%	12	5%
Wild Celery	236	40%	89	38%	89	38%	52	22%	6	3%
Water Stargrass	172	29%	148	86%	23	13%	1	1%	0	0%
Coontail	155	26%	124	80%	31	20%	0	0%	0	0%
Water Primrose	45	8%	45	100%	0	0%	0	0%	0	0%
Leafy Pondweed	43	7%	42	98%	1	2%	0	0%	0	0%
Common Waterweed	42	7%	40	95%	2	5%	0	0%	0	0%
Spatterdock	38	6%	26	68%	10	26%	2	5%	0	0%
Hydrilla	31	5%	31	100%	0	0%	0	0%	0	0%
Water Starwort	30	5%	29	97%	1	3%	0	0%	0	0%
Watermoss	23	4%	15	65%	8	35%	0	0%	0	0%
Long-Leaf Pondweed	8	1%	8	100%	0	0%	0	0%	0	0%
Eurasian Water Milfoil	5	1%	5	100%	0	0%	0	0%	0	0%
Muskgrass	4	1%	4	100%	0	0%	0	0%	0	0%
Brittle Naiad	1	0%	1	100%	0	0%	0	0%	0	0%
Arrowhead	0	0%	0	0%	0	0%	0	0%	0	0%
Common Bladderwort	0	0%	0	0%	0	0%	0	0%	0	0%
Curly-Leaf Pondweed	0	0%	0	0%	0	0%	0	0%	0	0%
Fanwort	0	0%	0	0%	0	0%	0	0%	0	0%
Flat-Leaved Bladderwort	0	0%	0	0%	0	0%	0	0%	0	0%
Floating Filamentous Algae	0	0%	0	0%	0	0%	0	0%	0	0%
Mud-Plantain	0	0%	0	0%	0	0%	0	0%	0	0%
Heart Pondweed	0	0%	0	0%	0	0%	0	0%	0	0%
Moneywort	0	0%	0	0%	0	0%	0	0%	0	0%
Pickeralweed	0	0%	0	0%	0	0%	0	0%	0	0%
Sago Pondweed	0	0%	0	0%	0	0%	0	0%	0	0%
Small Pondweed	0	0%	0	0%	0	0%	0	0%	0	0%
Stonewort	0	0%	0	0%	0	0%	0	0%	0	0%
Water Crowfoot	0	0%	0	0%	0	0%	0	0%	0	0%

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
1-1.5	1	M	40.365387°	-74.945939°																															
1-1.5	2	M	40.364972°	-74.945775°	T					T																									
1-1.5	3	M	40.364528°	-74.945579°	T					T																									
1-1.5	4	M	40.364081°	-74.945383°																															
1-1.5	5	M	40.363663°	-74.945278°	T		T			T																									
1-1.5	6	M	40.363233°	-74.945041°	T					T																									
1-1.5	7	M	40.36279°	-74.944873°	S		T			T																									S
1-1.5	8	M	40.362318°	-74.944707°	T		T			T																									
1-1.5	9	M	40.361942°	-74.944588°	S		T																												S
1-1.5	10	M	40.361482°	-74.944451°	T					T																									
1-1.5	11	M	40.36105°	-74.944305°	S					T	T								T																S
1-1.5	12	M	40.360599°	-74.944164°	S		T			T																									S
1-1.5	13	M	40.360148°	-74.944097°	M		S			T	T															T									S
1-1.5	14	M	40.361829°	-74.944262°	S		S																												
1-1.5	15	M	40.361773°	-74.943667°	D		D																												
1-1.5	16	M	40.3588°	-74.943878°																															
1-1.5	17	M	40.358291°	-74.943812°																															
1-1.5	18	M	40.358364°	-74.943388°	T		T																												
1-1.5	19	M	40.358592°	-74.943632°	T		T																												
1-1.5	20	M	40.357906°	-74.94348°	T		T																												
1-1.5	21	M	40.357897°	-74.943743°																															
1-1.5	22	M	40.35742°	-74.943648°																															
1-1.5	23	M	40.356995°	-74.943559°																															
1-1.5	24	M	40.356505°	-74.943561°																															
1-1.5	25	M	40.356038°	-74.943549°																															
1-1.5	26	M	40.355639°	-74.943568°																															
1-1.5	27	M	40.355177°	-74.943558°																															
1-1.5	28	M	40.354728°	-74.943568°	T					T																									
1-1.5	29	M	40.354276°	-74.943647°																															
1-1.5	30	M	40.353832°	-74.94381°																															
1-1.5	31	M	40.353373°	-74.943873°																															
1-1.5	32	M	40.352905°	-74.94398°																															
1-1.5	33	M	40.352468°	-74.943994°																															
1-1.5	34	M	40.351982°	-74.943952°	T					T																									
1-1.5	35	M	40.351569°	-74.94396°																															
1-1.5	36	M	40.351149°	-74.943915°																															
1-1.5	37	M	40.350688°	-74.943872°																															
1-1.5	38	M	40.350243°	-74.943845°																															
1-1.5	39	M	40.34978°	-74.943848°																															
1-1.5	40	M	40.34935°	-74.94378°																															
1-1.5	41	M	40.348859°	-74.943731°																															
1-1.5	42	M	40.348445°	-74.943671°																															
1-1.5	43	M	40.347939°	-74.943627°																															
1-1.5	44	M	40.34752°	-74.943599°																															
1-1.5	45	M	40.347055°	-74.943493°	T		T																												
1-1.5	46	M	40.346648°	-74.943352°																															
1-1.5	47	M	40.346217°	-74.943185°																															
1-1.5	48	M	40.345779°	-74.942967°																															
1-1.5	49	M	40.34538°	-74.942737°																															
1-1.5	50	M	40.344946°	-74.942486°																															
1-1.5	51	M	40.344532°	-74.942216°																															
1-1.5	52	M	40.344138°	-74.941972°	T		T				T																								
1-1.5	53	M	40.34379°	-74.941744°	T		T				T																								
1-1.5	54	M	40.34338°	-74.941382°																															
1-1.5	55	M	40.342963°	-74.941145°																															
1-1.5	56	M	40.342595°	-74.940807°																															
1-1.5	57	M	40.342232°	-74.940448°	T		T			T								T																	
1-1.5	58	M	40.341854°	-74.940118°	T																														T

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
1-1.5	59	M	40.341486°	-74.93978°	T																															T
1-1.5	60	M	40.341146°	-74.939369°	T																															T
1-1.5	61	M	40.340809°	-74.93899°																																
1-1.5	62	M	40.340459°	-74.938637°																																
1-1.5	63	M	40.340198°	-74.938146°																																
1-1.5	64	M	40.339955°	-74.937628°																																
1-1.5	65	M	40.339787°	-74.937079°	S																															S
1-1.5	66	M	40.339666°	-74.936519°	T																															T
1-1.5	67	M	40.33954°	-74.935961°																																
1-1.5	68	M	40.339383°	-74.935425°																																
1-1.5	69	M	40.339244°	-74.934836°																																
1-1.5	70	M	40.339038°	-74.934354°																																
1-1.5	71	M	40.338802°	-74.933819°																																
1-1.5	72	M	40.338503°	-74.933367°																																
1-1.5	73	M	40.33816°	-74.932905°																																
1-1.5	74	M	40.3378°	-74.932509°																																
1-1.5	75	M	40.337491°	-74.9321°																																
1-1.5	76	M	40.337197°	-74.93169°																																
1-1.5	77	M	40.336864°	-74.93129°																																
1-1.5	78	M	40.336525°	-74.930864°																																
1-1.5	79	M	40.336193°	-74.93045°																																
1-1.5	80	M	40.335871°	-74.930018°																																
1-1.5	81	M	40.335565°	-74.929611°																																
1-1.5	82	M	40.335212°	-74.92918°																																
1-1.5	83	M	40.334913°	-74.928796°																																
1.5	84	M	40.334623°	-74.928386°																																
1.5	85	M	40.334283°	-74.927964°																																
1.5	86	M	40.333953°	-74.927499°																																
1.5	87	M	40.333652°	-74.927073°																																
1.5	88	M	40.333327°	-74.926641°	T																					T										
1.5	89	M	40.332966°	-74.926292°																																
1.5	90	M	40.332577°	-74.926037°																																
1.5	91	M	40.332168°	-74.925911°																																
1.5	92	M	40.33174°	-74.925709°																																
1.5	93	M	40.331313°	-74.925585°																																
1.5	94	M	40.330846°	-74.925514°																																
1.5	95	M	40.330401°	-74.925296°																																
1.5	96	M	40.330013°	-74.925034°																																
1.5	97	M	40.329677°	-74.924629°																																
1.5	98	M	40.329401°	-74.924201°	T		T																			T										
1.5	99	M	40.32906°	-74.92377°																																
1.5	100	M	40.32879°	-74.923341°																																
1.5	101	M	40.328461°	-74.922895°	S		T																									T				S
1.5	102	M	40.32813°	-74.922455°																																
1.5	103	M	40.327804°	-74.922056°																																
1.5	104	M	40.327512°	-74.921662°																																
1.5	105	M	40.327198°	-74.921214°	T																					T						T				T
1.5	106	M	40.326854°	-74.920789°																																
1.5	107	M	40.326509°	-74.920407°	T		T																													
1.5	108	M	40.326192°	-74.920002°																																
1.5	109	M	40.325852°	-74.919619°	S																					T										S
1.5	110	M	40.325543°	-74.919222°	S																															S
1.5	111	M	40.325224°	-74.918748°	T																															T
1.5	112	M	40.324896°	-74.918362°																																
1.5	113	M	40.324566°	-74.91796°																																
1.5	114	M	40.32428°	-74.91758°	T		T																													
1.5	115	M	40.323941°	-74.917125°	T		T																													
1.5	116	M	40.323606°	-74.916768°																																

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1.5	117	M	40.323254°	-74.916314°																																
1.5	118	M	40.322929°	-74.915939°	T		T																													
1.5	119	M	40.322617°	-74.915522°	S		T																			T										S
1.5	120	M	40.322286°	-74.915126°	T																															T
1.5	121	M	40.321951°	-74.914724°	T																					T										
1.5	122	M	40.321621°	-74.914323°																																
1.5	123	M	40.321294°	-74.913915°	T																															T
1.5	124	M	40.320992°	-74.913501°																																
1.5	125	M	40.320677°	-74.913024°	T																											T				
1.5	126	M	40.320439°	-74.912601°	T																											T				
1.5	127	M	40.320158°	-74.912116°	T																					T						T				T
1.5	128	M	40.319891°	-74.911621°																																
1.5	129	M	40.319657°	-74.911125°																																
1.5	130	M	40.319407°	-74.910611°	T																											T				
1.5	131	M	40.319166°	-74.910137°	T																					T						T				T
1.5	132	M	40.31893°	-74.909649°																																
1.5	133	M	40.31872°	-74.909106°	T																											T				
1.5	134	M	40.318507°	-74.908576°	S																															S
1.5	135	M	40.318333°	-74.908073°																																
1.5	136	M	40.31811°	-74.907462°	T																											T				T
1.5	137	M	40.317944°	-74.906981°	T					T																										
1.5	138	M	40.317768°	-74.906451°	S																															S
1.5	139	M	40.317564°	-74.905904°																																
1.5	140	M	40.317365°	-74.905369°	T																															T
1.5	141	M	40.31717°	-74.9048°	T																															T
1.5	142	M	40.317046°	-74.904282°																																
1.5	143	M	40.316923°	-74.903688°																																
1.5	144	M	40.316823°	-74.903107°																																
1.5	145	M	40.316816°	-74.902531°																																
1.5	146	M	40.316818°	-74.901989°																																
1.5	147	M	40.316904°	-74.901397°	T		T													T																
1.5	148	M	40.31699°	-74.900829°	T						T																					T				
1.5	149	M	40.317036°	-74.900224°	T																											T				
1.5	150	M	40.317031°	-74.899635°																																
1.5	151	M	40.316986°	-74.899026°																																
1.5	152	M	40.316861°	-74.898426°																																
1.5	153	M	40.316757°	-74.897887°																																
1.5	154	M	40.316603°	-74.897314°																																
1.5	155	M	40.3165°	-74.896754°																																
1.5	156	M	40.316315°	-74.896201°																																
1.5	157	M	40.31613°	-74.895676°																																
1.5	158	M	40.315932°	-74.89513°																																
1.5	159	M	40.315774°	-74.894586°																																
1.5	160	M	40.315569°	-74.89403°	T		T																			T										
1.5	161	M	40.315387°	-74.893499°																																
1.5	162	M	40.315217°	-74.892998°																																
1.5	163	M	40.315003°	-74.892414°																																
1.5	164	M	40.314832°	-74.891906°	T		T																													
1.5	165	M	40.314513°	-74.891342°																																
2	1	M	40.314115°	-74.890707°	T																					T										
2	2	M	40.313834°	-74.890256°	T		T																			T										T
2	3	M	40.313555°	-74.889805°	T		T			T																										
2	4	M	40.313271°	-74.889342°	T																					T										
2	5	M	40.313005°	-74.888939°	T																					T										T
2	6	M	40.312694°	-74.888443°	T																											T				
2	7	M	40.312418°	-74.887991°	T		T																			T										
2	8	M	40.312112°	-74.887541°	T		T																			T								T		T
2	9	M	40.311853°	-74.887053°	T		T																			T						T				T

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2	10	M	40.311567°	-74.886588°	T		T																			T						T		T		
2	11	M	40.311272°	-74.886143°	T		S				T															T								T		T
2	12	M	40.311011°	-74.885676°	T		S																			T						T		T		
2	13	M	40.310725°	-74.885227°	T		T																			T								T		
2	14	M	40.310478°	-74.884734°	T		T																													
2	15	M	40.310223°	-74.884234°	T		T																			T								T		
2	16	M	40.309985°	-74.883738°			T																			T								T		
2	17	M	40.309707°	-74.883255°	T		T																			T						T		T		
2	18	M	40.309433°	-74.882802°	T																					T						T		T		
2	19	M	40.309178°	-74.88232°	T		T																			T					T	T		T		T
2	20	M	40.308899°	-74.881831°	T																					T					T	T		T		
2	21	M	40.308598°	-74.881371°																						T										
2	22	M	40.308338°	-74.880896°																																
2	23	M	40.308108°	-74.880421°	S																					T						S				S
2	24	M	40.307823°	-74.879925°	T																					T								T		T
2	25	M	40.307565°	-74.879416°	S																					T								T		M
2	26	M	40.307355°	-74.878957°	S																					T								T		S
2	27	M	40.307017°	-74.878477°	S						T															T						T		T		T
2	28	M	40.306767°	-74.878095°	S					T	T															T								T		M
2	29	M	40.306531°	-74.877574°	S		T				T															T						T		T		S
2	30	M	40.306284°	-74.877126°	T		T																			T						T		T		S
2	31	M	40.305995°	-74.876632°	M		S																			T						S		T		M
2	32	M	40.305753°	-74.876127°	T		T			T																T						T		T		S
2	33	M	40.305518°	-74.875717°	S		T																			T						T		T		S
2	34	M	40.305256°	-74.87522°	S		S			T																S						T	T	S		S
2	35	M	40.304978°	-74.874741°	S																					T						T	T	T		S
2	36	M	40.304709°	-74.874261°	S													T								S						T		S		T
2	37	M	40.304441°	-74.873787°	M																					T						S		T		M
2	38	M	40.304107°	-74.873339°	S																					T						T		T		M
2	39	M	40.303795°	-74.872952°	M		S												T							T						S		T		M
2	40	M	40.303455°	-74.872527°	S														T							T						S		T		M
2	41	M	40.303086°	-74.872198°	M		T																			T						T		T		S
2	42	M	40.302727°	-74.871936°	M		T																			S								S		M
2	43	M	40.302338°	-74.87161°	M		T												T							T						T		T		M
2	44	M	40.301916°	-74.87134°	S																					S						T		S		M
2	45	M	40.301528°	-74.871062°	S		T			T																T						T		T		S
2	46	M	40.301167°	-74.870782°	T		T																			S								T		S
2	47	M	40.300742°	-74.870432°	S		T				T															T						T		T		M
2	48	M	40.300346°	-74.870189°	S																					S						T		T		S
2	49	M	40.299948°	-74.869843°	M		T			T																T						T		T		M
2	50	M	40.299592°	-74.869485°	T		T			T																T					T	T		T		T
2	51	M	40.299222°	-74.869111°	S													T								T								T		S
2	52	M	40.298871°	-74.868725°	T													T								T						T		T		T
2	53	M	40.298524°	-74.868404°	M		T												T				T			T						T		T		M
2	54	M	40.298145°	-74.868031°	S		T																			T						T		T		M
2	55	M	40.297725°	-74.86769°	M		T												T							T						S		T		M
2	56	M	40.297359°	-74.867435°	M		T																			T							T	T		M
2	57	M	40.296947°	-74.867117°	S		T																			T						T		T		S
3	1	M	40.296546°	-74.866829°																																
3	2	M	40.29618°	-74.866554°	S																															S
3	3	M	40.29584°	-74.866264°	T																															T
3	4	M	40.295446°	-74.86597°	T		T												T							T								T		T
3	5	M	40.295074°	-74.86566°	S																					T								T		S
3	6	M	40.294682°	-74.865359°	S		T												T							T						T		T		S
3	7	M	40.294264°	-74.865042°	S														T							T								T		S
3	8	M	40.2939°	-74.864743°	S		T																			T						T		T		S
3	9	M	40.293527°	-74.864451°	S		T												T							T								T		S
3	10	M	40.293113°	-74.864109°	S		S																			T						T		T		S

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3	11	M	40.29272°	-74.86382°	M		T																			S						T		S		D
3	12	M	40.292358°	-74.863541°	M		S																			T						S		T		M
3	13	M	40.291977°	-74.863239°	M		T												S							T						S		T		M
3	14	M	40.291574°	-74.862921°	S		S												T							T						T		T		S
3	15	M	40.291196°	-74.862617°	S														T							T						T		T		M
3	16	M	40.290831°	-74.862318°	D		S												T							T						S		T		D
3	17	M	40.29041°	-74.862023°	M		S				T															T						S		T		M
3	18	M	40.290044°	-74.861716°	M		T											T	T							T						T		T		D
3	19	M	40.289644°	-74.861453°	S		T												T							T						T		T		S
3	20	M	40.289215°	-74.861139°	M		S			T																T						S		T		M
3	21	M	40.288837°	-74.860873°	S		T												T							T						T		T		S
3	22	M	40.28843°	-74.860582°	M		T			T									T							T						S		T		M
3	23	M	40.288092°	-74.860285°	S		T											T	T							T						T		T		S
3	24	M	40.287659°	-74.859989°	M		S												T							T						T		T		S
3	25	M	40.287273°	-74.859684°	S		T												T							T						T		T		S
3	26	M	40.2869°	-74.859399°	D														T							T					T	S		T		D
3	27	M	40.286485°	-74.859077°	S		T																			T						T		T		S
3	28	M	40.286109°	-74.858807°	S		T				T								T							T						T		T		S
3	29	M	40.285667°	-74.858579°	M		S												T							T						T		T		M
3	30	M	40.285248°	-74.858368°	S		T												T							T						T		T		S
3	31	M	40.284782°	-74.85822°	T																					T								T		S
3	32	M	40.284377°	-74.858039°																						T								T		
3	33	M	40.283939°	-74.857803°	M		T																			T						T		T		M
3	34	M	40.283515°	-74.857542°	T		T																									T				
3	35	M	40.283103°	-74.857216°	M						T															T						T		T		M
3	36	M	40.282784°	-74.857006°	S																					T						T		T		S
3	37	M	40.282387°	-74.856615°	S		T																			T						T		T		S
3	38	M	40.282001°	-74.856287°	S		T											T								T						T		T		S
3	39	M	40.281654°	-74.855964°	T		T											T								T						T		T		T
3	40	M	40.281209°	-74.85567°	T																					T						T		T		T
3	41	M	40.280874°	-74.855375°	T																					T								T		T
3	42	M	40.280498°	-74.855018°	T																					T						T		T		T
3	43	M	40.280084°	-74.854746°	S		T											T								T								T		S
3	44	M	40.279674°	-74.854471°	S		T																			T						T		T		S
3	45	M	40.279273°	-74.854222°	S		T																			T						T		T		S
3	46	M	40.278868°	-74.853971°	S																					T								T		S
3	47	M	40.278463°	-74.853723°	S		S																			T						S		T		S
3	48	M	40.278049°	-74.853467°	M																					T						S		T		M
3	49	M	40.277626°	-74.853203°	S		T																			T						T		T		S
3	50	M	40.277246°	-74.853003°	M		T																			S						S		S		M
3	51	M	40.276813°	-74.852894°	S																											T				S
3	52	M	40.276366°	-74.852861°	T		T																			T						T		T		
3	53	M	40.275953°	-74.852852°	M		S				T															T						S		T		S
3	54	M	40.275499°	-74.852842°	S																					T						T		T		S
3	55	M	40.275047°	-74.852837°	T																					T								T		T
3	56	M	40.274593°	-74.852745°	S		T																			T						T		T		S
3	57	M	40.274148°	-74.852659°	T																					T						T		T		T
3	58	M	40.273719°	-74.852573°	T																					T						T		T		T
3	59	M	40.273245°	-74.852444°	T		T				T															T								T		T
3	60	M	40.272815°	-74.852283°			T																			T								T		
3	61	M	40.272378°	-74.852088°	M		T																			T						T		T		M
3	62	M	40.271954°	-74.85188°	S																					T					T	T	S	T		S
3	63	M	40.271543°	-74.85167°	M		T																			T						T		T		M
3	64	M	40.271105°	-74.851471°	S		T				T							T																		S
3	65	M	40.270681°	-74.851263°	M		T				T															T								T		M
3	66	M	40.270284°	-74.851066°	S		S																			T						T		T		M
3	67	M	40.269826°	-74.850826°	M		S																			T								T		M
3	68	M	40.269416°	-74.850578°	M		T			T								T								T								T		M

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
3	69	M	40.269024°	-74.850312°	M																					T						T		T		M
3	70	M	40.268636°	-74.850048°	M																											S				M
3	71	M	40.268219°	-74.849791°	S		T											T								T						T		T		S
3	72	M	40.267813°	-74.849517°	M													T														T				M
3	73	M	40.267427°	-74.849256°	D		T																			T						T		T		D
3	74	M	40.267024°	-74.848988°	S		T																			T								T		S
3	75	M	40.266603°	-74.848714°	M		T																			T						T		T		M
3	76	M	40.266179°	-74.848451°	S																					T								T		S
3	77	M	40.265798°	-74.84819°	S																					T								T		S
3	78	M	40.265411°	-74.847958°	T																															T
3	79	M	40.265007°	-74.84765°	M														T													T				M
3	80	M	40.264612°	-74.847406°	M					T	T															T					T	T		T		M
3	81	M	40.264231°	-74.847059°	M		T				T															T						T		T		M
3	82	M	40.263816°	-74.846743°	S																					T								T		S
3	83	M	40.263449°	-74.846483°	M		T																			T						S		T		M
3	84	M	40.263104°	-74.846081°	M		T				T															T						M	T	T		M
3	85	M	40.262765°	-74.845683°	M														T							S						T		S		M
3	86	M	40.262406°	-74.845341°	S		T																			T					T	T		T		S
3	87	M	40.262088°	-74.844934°	T		T												T				T								T	T	T			T
3	88	M	40.261749°	-74.844512°	S														T							T					T	T		T		S
3	89	M	40.261444°	-74.844088°	S		S																T			T						T		T		T
3	90	M	40.261108°	-74.843631°	S		T																T			T						T		T		S
3	91	M	40.260801°	-74.84324°	T		T																			T						T		T		T
3	92	M	40.260521°	-74.842824°	T																					T					T			T		S
3	93	M	40.260219°	-74.842372°	T		T				T															T					T	T		T		T
3	94	M	40.259923°	-74.84194°	T																					T					T			T		T
3	95	M	40.259591°	-74.841497°	T		T																			T					T		T	T		
3	96	M	40.25931°	-74.841091°	T																										T		T			T
3	97	M	40.258988°	-74.840651°	S		T				T															T					T	T		T		T
3	98	M	40.258676°	-74.84021°	M		T											T								T					T	S		T		M
3	99	M	40.258375°	-74.839775°	S																					T						S		T		S
3	100	M	40.258056°	-74.839331°	T													T								T						T		T		T
3	101	M	40.257762°	-74.838932°	T						T							T														T				T
3	102	M	40.257439°	-74.838528°	T						T							T								T						T		T		T
3	103	M	40.257099°	-74.83809°	T																					T							T	T		T
3	104	M	40.256745°	-74.837754°	T																					T							T	T		T
3	105	M	40.2564°	-74.837368°	T														T							T						T		T		T
3	106	M	40.256049°	-74.836996°	T		T											T								T						T		T		
3	107	M	40.255699°	-74.836607°	T		T																									T				T
3	108	M	40.25535°	-74.836268°	T													T																		
3	109	M	40.255009°	-74.835852°	T															T												T				
3	110	M	40.254679°	-74.83552°	T																											T				
3	111	M	40.254319°	-74.835114°	T													T														T				
3	112	M	40.253995°	-74.834619°																						T								T		
3	113	M	40.253719°	-74.834207°	T													T								T								T		
3	114	M	40.253367°	-74.833772°	T													T																		T
3	115	M	40.25305°	-74.833363°																								T								
3	116	M	40.252669°	-74.833025°	T													T								T								T		
3	117	M	40.252263°	-74.832795°	T					T																T		T						T		T
3	118	M	40.251919°	-74.832568°																								T								
3	119	M	40.251419°	-74.832263°																						T							T	T		
3	120	M	40.250995°	-74.831917°	T						T																									
3	121	M	40.250693°	-74.831519°																																
3	122	M	40.250372°	-74.83109°	T						T															T								T		
3	123	M	40.25011°	-74.830634°	T						T															T						T		T		
3	124	M	40.250427°	-74.830219°																																
3	125	M	40.250744°	-74.830028°	T					T	T															T								T		
3	126	M	40.250239°	-74.829992°																																

Delaware and Raritan Canal - Treatment Area
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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
3	127	M	40.249816°	-74.830169°	T																											T				
3	128	M	40.249518°	-74.829667°																																
3	129	M	40.249255°	-74.829218°																																
3	130	M	40.248957°	-74.828744°	T																					T						T		T		
3	131	M	40.248714°	-74.828265°	T																															T
3	132	M	40.248459°	-74.82781°	T		T																									T				T
3	133	M	40.248196°	-74.82734°			T																													
3	134	M	40.24791°	-74.82689°																																
3	135	M	40.24767°	-74.826389°																																
3	136	M	40.247356°	-74.825936°																																
3	137	M	40.247072°	-74.825468°	T													T														T				T
3	138	M	40.246838°	-74.82502°	T																					T								T		T
3	139	M	40.246592°	-74.824539°	T																															T
3	140	M	40.246381°	-74.824013°	T																					T						T		T		T
3	141	M	40.246144°	-74.823511°	T																															T
3	142	M	40.245979°	-74.822941°	T																															T
3	143	M	40.245777°	-74.822417°	T																					T						T		T		T
3	144	M	40.245635°	-74.821759°																																
3	145	M	40.245471°	-74.821282°	T																					T								T		S
3	146	M	40.245315°	-74.820763°																																
3	147	M	40.245153°	-74.820215°	T																															T
3	148	M	40.245001°	-74.81965°	M													T								S								S		M
3	149	M	40.244875°	-74.819145°																																
4	1	M	40.244583°	-74.818575°	M																					M								M		M
4	2	M	40.244317°	-74.818126°	S																					T								T		S
4	3	M	40.244039°	-74.817631°	S					T	T		T						T							T					T			T		T
4	4	M	40.243775°	-74.817092°	S					T																S						T		S		T
4	5	M	40.24357°	-74.816592°	S		T			T	T									T						T								T		
4	6	M	40.243363°	-74.816092°	T					T	T							T	T							T						T		T		
4	7	M	40.243195°	-74.815508°	S					T	T		T													T								T		T
4	8	M	40.242998°	-74.814936°	T																					T								T		
4	9	M	40.242856°	-74.814451°	T			T			T															T								T		
4	10	M	40.242699°	-74.813862°	S		T				S		T					T		T						T						T		T		T
4	11	M	40.242576°	-74.813334°	S					T	S							T								T							T	T		
4	12	M	40.242369°	-74.8128°	S		T				S							T								T					T			T		T
4	13	M	40.242191°	-74.812205°	S		T				S															S								S		S
4	14	M	40.241999°	-74.811709°	S						T															T								T		S
4	15	M	40.241833°	-74.811131°	T		T				T		T						T							T								T		
4	16	M	40.241661°	-74.810572°	T						T		T													T								T		
4	17	M	40.241475°	-74.810079°	M		T			T	T									T						S					T	T		S		M
4	18	M	40.241284°	-74.80952°	S		T			S	T								T							T					T		T	T		S
4	19	M	40.241149°	-74.808977°	S		T				S								T							T					T			T		S
4	20	M	40.240968°	-74.80845°	S						S								T							T						T		T		T
4	21	M	40.240778°	-74.807889°	S		T			T	S							T								T						T	T	T		T
4	22	M	40.240595°	-74.807375°	S		T				S							T								T								T		T
4	23	M	40.240328°	-74.806888°	S		S			S	S								T	T						T								T		T
4	24	M	40.240094°	-74.806383°	S		S			T	S								T	T						T								T		S
4	25	M	40.239828°	-74.80592°	T						T																									
4	26	M	40.239615°	-74.805435°																																
4	27	M	40.239366°	-74.804941°	S		T				T								T							T					T	T	T	T		S
4	28	M	40.239172°	-74.804395°	S						T															T								T		T
4	29	M	40.238968°	-74.8039°	S		S				T									T						S					T	T		S		S
4	30	M	40.238828°	-74.803362°	S		S																													M
4	31	M	40.238661°	-74.802757°	T		T																			T								T		T
4	32	M	40.238505°	-74.802176°	S		T				T															T					T			T		T
4	33	M	40.238365°	-74.80163°	S						S															T						T		T		T
4	34	M	40.238175°	-74.801053°	S		T				T															T								T		S
4	35	M	40.238046°	-74.800565°	T						T															T							T	T		T

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
4	36	M	40.237835°	-74.800008°	S		S				T															T							T	T		T
4	37	M	40.237702°	-74.799446°	T						T																									T
4	38	M	40.23754°	-74.798845°	T		S				T															T					T			T		T
4	39	M	40.237272°	-74.798336°	S		T			T	T															T					T	T	T	T		S
4	40	M	40.237053°	-74.797865°	T						T															T					T	T	T	T		S
4	41	M	40.236796°	-74.797371°	T						T															T						T		T		S
4	42	M	40.236603°	-74.796858°	S						T															T						T	T	T		S
4	43	M	40.236445°	-74.796308°	S					T	T															T						T		T		S
4	44	M	40.236296°	-74.795763°	T						T															T								T		T
4	45	M	40.236201°	-74.795207°	M		T				T															T					T	T	T	T		M
4	46	M	40.236043°	-74.794608°	T																										T					
4	47	M	40.235945°	-74.794081°	T																					T								T		T
4	48	M	40.23581°	-74.793481°																																
4	49	M	40.235631°	-74.792921°	S						T															T					T	T		T		M
4	50	M	40.235468°	-74.7924°	T																					T								T		
4	51	M	40.235311°	-74.791822°	T						T															T								T		
4	52	M	40.235144°	-74.791285°	T		T				T															T					T			T		T
4	53	M	40.234998°	-74.790717°	T																					T						T		T		
4	54	M	40.234865°	-74.790178°	S						T								T							T					T	T		T		S
4	55	M	40.234695°	-74.78963°	T																					T						T		T		T
4	56	M	40.23452°	-74.789109°	D																					T								T		D
4	57	M	40.234321°	-74.788521°	S						T								T												T	T				T
4	58	M	40.234134°	-74.787992°	S						S															T					T		T	T		T
4	59	M	40.233906°	-74.787413°	S						T															T					T	S		T		S
4	60	M	40.233774°	-74.786973°	S																					T						T		T		S
4	61	M	40.23353°	-74.7864°	M						T								T							T					T	T		T		M
4	62	M	40.233299°	-74.785911°	M		T				T															T					T	T	T	T		S
4	63	M	40.233082°	-74.785338°	M						T								T							T						S		T		M
4	64	M	40.232876°	-74.784845°	S						S															T							T	T		S
4	65	M	40.232663°	-74.784332°	S						T															T								T		S
4	66	M	40.232435°	-74.783808°	S		T				T															T						T		T		T
4	67	M	40.232269°	-74.78328°	T		T				T															T						T		T		T
4	68	M	40.232075°	-74.78274°	S						T															T						T		T		T
4	69	M	40.23183°	-74.782222°	T		T				T															T								T		
5	1	M	40.245537°	-74.733112°	T						T															T						T		T		
5	2	M	40.245844°	-74.732621°	T						T																					T				
5	3	M	40.246183°	-74.732228°	S		T				S															T								T		
5	4	M	40.246505°	-74.731816°	T		T				T															T								T		
5	5	M	40.246836°	-74.731415°	T		T				T																									
5	6	M	40.247154°	-74.731012°	T						T															T								T		
5	7	M	40.247502°	-74.730615°																																
5	8	M	40.247807°	-74.730198°	S					T	T															T								T		
5	9	M	40.248118°	-74.72982°	T						T															T								T		
5	10	M	40.248432°	-74.729337°	T						T																									
5	11	M	40.248701°	-74.728894°																																
5	12	M	40.248949°	-74.728403°	S						T															T		S						T		
5	13	M	40.249099°	-74.727782°	M		T				S															T		S			T			T		
5	14	M	40.249266°	-74.727265°	S						S																									
5	15	M	40.249452°	-74.72664°							T																	T								
5	16	M	40.249525°	-74.72595°	T						T															T								T		
5	17	M	40.24969°	-74.725573°	S		T				T																	T			T					
5	18	M	40.249854°	-74.725008°	T					T	T															T					T		T	T		
5	19	M	40.250047°	-74.72447°	S		T				T															T		T						T		
5	20	M	40.250319°	-74.723995°	T						T																									
5	21	M	40.250576°	-74.723503°	T		T				T																									
5	22	M	40.250849°	-74.72299°	S		T				S															T								T		
5	23	M	40.25108°	-74.72252°	T						T															T					T					
5	24	M	40.25137°	-74.722093°	T		T				T																									

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
5	25	M	40.251673°	-74.721648°	T		T																													
5	26	M	40.252029°	-74.721274°	S		T				T															T								T		
5	27	M	40.252355°	-74.720864°	S						S															T					T	T		T		
5	28	M	40.252709°	-74.720497°	S		T				S																					T				
5	29	M	40.253064°	-74.720178°	S		T				T															T						T		T		
5	30	M	40.253419°	-74.719831°	S						T															T								T		
5	31	M	40.253803°	-74.71945°	S		T				S															S										
5	32	M	40.254132°	-74.719155°	S		T				S																									
5	33	M	40.25452°	-74.718843°	T						T																									
5	34	M	40.254945°	-74.71855°	S						S															T										
5	35	M	40.255326°	-74.718305°	T		T				T															T										
5	36	M	40.255757°	-74.718069°	T						T																								T	
5	37	M	40.256184°	-74.717899°	S		T				S																									
5	38	M	40.256632°	-74.717748°	S		T				S																									
5	39	M	40.257062°	-74.717648°	T						T																									
5	40	M	40.257478°	-74.717526°	T						T																									
5	41	M	40.257956°	-74.717366°	S						S																					T				
5	42	M	40.258429°	-74.717215°	T						T																				T					
5	43	M	40.258869°	-74.716998°	T		T				T																									
5	44	M	40.259302°	-74.716768°	S		T				T																	T								
5	45	M	40.259706°	-74.716519°	T		T				T															T										
5	46	M	40.260123°	-74.716263°	T		T				T																									
5	47	M	40.260475°	-74.715927°	S		T				S																								T	
5	48	M	40.2609°	-74.715704°	T						T																								T	
5	49	M	40.261338°	-74.715482°	S						S															T										
5	50	M	40.261758°	-74.715359°	T						T																									
5	51	M	40.262213°	-74.715243°	T						T																								T	
5	52	M	40.262669°	-74.715119°	T		T				T																								T	
5	53	M	40.263105°	-74.715003°	T		T				T																									
5	54	M	40.263534°	-74.714757°	T						T																									
5	55	M	40.26392°	-74.714511°	T						T																									
5	56	M	40.264346°	-74.714202°	S		T				S															T		T								
5	57	M	40.264692°	-74.71384°	S						S																									
5	58	M	40.265033°	-74.713423°	T						T																									
5	59	M	40.265365°	-74.712983°	T						T																				T		T			
5	60	M	40.265691°	-74.71258°	T						T																									
5	61	M	40.265989°	-74.712182°	T						T																									
5	62	M	40.266327°	-74.71177°	S						S																				T					
5	63	M	40.266644°	-74.711382°	S		T				S																									
5	64	M	40.266988°	-74.710961°	T		T				T																									
5	65	M	40.267307°	-74.710594°	T						T																									
6	1	M	40.302483°	-74.688213°	T		T																													
6	2	M	40.302818°	-74.687764°	S		T																			T		T								
6	3	M	40.303085°	-74.687302°	T		T				T															T		T								
6	4	M	40.303404°	-74.68687°	T		T																			T						T	T	T		
6	5	M	40.303669°	-74.686413°	T		T																			T								T		
6	6	M	40.303962°	-74.685992°	T		T																					T								
6	7	M	40.30425°	-74.685519°	S		S																			T								T		
6	8	M	40.304557°	-74.685094°	S		S																			T								T		
6	9	M	40.30479°	-74.684713°	S		S																			T								T		
6	10	M	40.305136°	-74.684167°	S		S																													
6	11	M	40.305429°	-74.683716°	S		S																													
6	12	M	40.305719°	-74.683244°	D		D																													
6	13	M	40.305568°	-74.682786°	D		D																			S		S						S		
6	14	M	40.30601°	-74.682795°	S																					T		S						T		
6	15	M	40.306279°	-74.682355°	S		S																													
6	16	M	40.306572°	-74.68192°	S		S																			T								T		
6	17	M	40.306877°	-74.681457°	M		M																			T								T		

Delaware and Raritan Canal - Treatment Area
Aquatic Vegetation Survey
September 1, 2017 - September 8, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
6	18	M	40.307168°	-74.681041°	M		M																			T								T		
6	19	M	40.307434°	-74.680587°	D		D																			T								T		
6	20	M	40.307729°	-74.680128°	D		D																			T								T		
6	21	M	40.308021°	-74.679657°	D		D				T															T							T	T		
6	22	M	40.308286°	-74.679216°	D		D				T															T							T	T		
6	23	M	40.308576°	-74.678771°	D		D																			T								T		
6	24	M	40.308874°	-74.678296°	D		S																			T								T		T
6	25	M	40.309154°	-74.677851°	M		M																			T								T		T
6	26	M	40.30948°	-74.677456°	M		M																			T								T		
6	27	M	40.309784°	-74.676986°	S		S																												T	
6	28	M	40.310127°	-74.676628°	M		M																													
6	29	M	40.31052°	-74.6763°	D		D																													
6	30	M	40.310865°	-74.675999°	M		M																			T								T		
6	31	M	40.311259°	-74.675679°	M		M																													
6	32	M	40.311658°	-74.675366°	T		T																													
6	33	M	40.312035°	-74.67501°	S		S																												T	
6	34	M	40.312417°	-74.674723°	S		S																													
6	35	M	40.312812°	-74.674443°	S		S																												T	
6	36	M	40.313185°	-74.674098°	S		T																												T	
6	37	M	40.313551°	-74.673764°	M		M				T																									
6	38	M	40.313927°	-74.673475°	M		M																			T						T		T		
6	39	M	40.314323°	-74.673133°	S		S																			T								T		
6	40	M	40.314691°	-74.672883°	S		S				T															T								T	T	
6	41	M	40.315104°	-74.672484°	S																														S	
6	42	M	40.315504°	-74.672188°	S		T																												T	
6	43	M	40.315787°	-74.671859°	S		S																											S		
6	44	M	40.316147°	-74.671449°	S		T																			T							T		S	
6	45	M	40.316429°	-74.670996°	M		M																					T							T	
6	46	M	40.316741°	-74.670499°	S		S																													
6	47	M	40.316977°	-74.670075°	S		S																											T		
6	48	M	40.317237°	-74.669584°	M		M																					T								
6	49	M	40.31751°	-74.669093°	S		S																												S	
6	50	M	40.317766°	-74.668606°	S		S																												S	
6	51	M	40.318032°	-74.668165°	M		M																			T		T							S	
6	52	M	40.318257°	-74.667674°	D		D																												S	
6	53	M	40.318514°	-74.667179°	M		M																									T			S	
6	54	M	40.318764°	-74.666688°	D		D				T																								S	
6	55	M	40.319013°	-74.666203°	D		D				T															T								T	T	
6	56	M	40.319266°	-74.66572°	S		S				T															T								T		
6	57	M	40.319533°	-74.66518°	S		S				T															T								T		
6	58	M	40.31978°	-74.664728°	M		M																			S						T		S		
6	59	M	40.320042°	-74.664235°	M		M																			T								T		
6	60	M	40.320296°	-74.663718°	M		M																			T								T		
6	61	M	40.320558°	-74.663228°	M		S				T															T		T						T		
6	62	M	40.320816°	-74.662759°	S		S																			T		T						T		
6	63	M	40.321108°	-74.662308°	S		S																					T						T		
6	64	M	40.321444°	-74.661902°	M		M																													
6	65	M	40.321789°	-74.661494°	M		M																													
6	66	M	40.322126°	-74.661094°	S		S																			T								T		
6	67	M	40.32245°	-74.660651°	S		S																			T								T		
6	68	M	40.322757°	-74.660256°																															T	
6	69	M	40.323081°	-74.659879°	S		S																			T								T		
6	70	M	40.323394°	-74.659496°																																
6	71	M	40.323705°	-74.659072°	T		T																			T		T						T	T	
6	72	M	40.324022°	-74.658647°	T		T																			T								T		
6	73	M	40.324357°	-74.658223°	S		T																			T		S						T		
6	74	M	40.324673°	-74.657812°	M		M																			T		S						T		
6	75	M	40.324991°	-74.657416°	T		T																					T								

Delaware and Raritan Canal - Treatment Area
Aquatic Vegetation Survey
September 1, 2017 - September 8, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
6	76	M	40.325316°	-74.657005°	T		T																					T								
6	77	M	40.325648°	-74.656609°																																
6	78	M	40.325996°	-74.656155°	M																					T		M						T		
6	79	M	40.32631°	-74.655802°	S		S				T																	S								
6	80	M	40.326669°	-74.655439°	M		S																					S								
6	81	M	40.327047°	-74.655145°																																
6	82	M	40.327455°	-74.654836°																																
6	83	M	40.327861°	-74.654567°	T																							T				T				
6	84	M	40.328285°	-74.654311°	T																							T								
6	85	M	40.32868°	-74.654066°	T		T																					T								
6	86	M	40.329089°	-74.653846°	M		M																					S								
6	87	M	40.329486°	-74.653642°	M		S																			T		M						T		
6	88	M	40.329892°	-74.653442°	S		S																					S								
6	89	M	40.330314°	-74.65322°	T																					T		T						T		
6	90	M	40.330712°	-74.653006°	T		T																			T		T						T		
6	91	M	40.331138°	-74.652757°	S		S																			T		T						T		
6	92	M	40.331564°	-74.652524°																																

Delaware and Raritan Canal **40 Miles**
2017 Aquatic Macrophyte Abundance Distribution

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
Total Sites	1216									
Overall Abundance	1038	85%	305	29%	402	39%	226	22%	105	10%
Small Duckweed	819	67%	436	53%	335	41%	43	5%	5	1%
Watermeal	689	57%	340	49%	318	46%	29	4%	2	0%
Coontail	616	51%	511	83%	99	16%	6	1%	0	0%
Benthic Filamentous Algae	580	48%	339	58%	113	19%	81	14%	47	8%
Wild Celery	476	39%	187	39%	158	33%	74	16%	57	12%
Water Starwort	160	13%	156	98%	4	3%	0	0%	0	0%
Water Stargrass	158	13%	149	94%	9	6%	0	0%	0	0%
Common Waterweed	127	10%	112	88%	13	10%	2	2%	0	0%
Spatterdock	94	8%	84	89%	10	11%	0	0%	0	0%
Common Bladderwort	66	5%	57	86%	9	14%	0	0%	0	0%
Water Primrose	65	5%	65	100%	0	0%	0	0%	0	0%
Watermoss	61	5%	59	97%	2	3%	0	0%	0	0%
Small Pondweed	32	3%	32	100%	0	0%	0	0%	0	0%
Fanwort	30	2%	30	100%	0	0%	0	0%	0	0%
Stonewort	25	2%	25	100%	0	0%	0	0%	0	0%
Arrowhead	18	1%	15	83%	3	17%	0	0%	0	0%
Eurasian Water Milfoil	17	1%	16	94%	1	6%	0	0%	0	0%
Long-Leaf Pondweed	9	1%	7	78%	1	11%	1	11%	0	0%
Leafy Pondweed	7	1%	7	100%	0	0%	0	0%	0	0%
Pickerel Weed	6	0%	5	83%	1	17%	0	0%	0	0%
Floating Flamentous Algae	5	0%	5	100%	0	0%	0	0%	0	0%
Moneywort	4	0%	4	100%	0	0%	0	0%	0	0%
Curly-leaf Pondweed	3	0%	3	100%	0	0%	0	0%	0	0%
Flat-leaved Bladderwort	2	0%	2	100%	0	0%	0	0%	0	0%
Sago Pondweed	2	0%	2	100%	0	0%	0	0%	0	0%
Water Crowfoot	2	0%	2	100%	0	0%	0	0%	0	0%
Mud-Plantain	1	0%	0	0%	1	100%	0	0%	0	0%
Heart Pondweed	1	0%	1	100%	0	0%	0	0%	0	0%
Brittle Naiad	0	0%	0	0%	0	0%	0	0%	0	0%
Hydrilla	0	0%	0	0%	0	0%	0	0%	0	0%
Muskgrass	0	0%	0	0%	0	0%	0	0%	0	0%

Delaware and Raritan Canal - **ALL SITES**
2017 Aquatic Macrophyte Abundance Distribution

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
Total Sites	1813									
OVERALL PLANT ABUNDANCE	1354	75%	496	37%	534	39%	240	18%	84	6%
SMALL DUCKWEED	978	54%	683	70%	256	26%	34	3%	5	1%
WATERMEAL	822	45%	545	66%	249	30%	26	3%	2	0%
BENTHIC FILAMENTOUS AGLAE	707	39%	486	69%	139	20%	54	8%	28	4%
COONTAIL	703	39%	570	81%	127	18%	6	1%	0	0%
WILD CELERY	699	39%	271	39%	242	35%	124	18%	62	9%
WATER STARGRASS	329	18%	296	90%	32	10%	1	0%	0	0%
WATER STARWORT	189	10%	184	97%	5	3%	0	0%	0	0%
COMMON WATERWEED	169	9%	152	90%	15	9%	2	1%	0	0%
SPATTERDOCK	129	7%	108	84%	19	15%	2	2%	0	0%
WATER PRIMROSE	110	6%	110	100%	0	0%	0	0%	0	0%
WATERMOSS	84	5%	74	88%	10	12%	0	0%	0	0%
COMMON BLADDERWORT	66	4%	57	86%	9	14%	0	0%	0	0%
LEAFY PONDWD	50	3%	49	98%	1	2%	0	0%	0	0%
SMALL PONDWEED	32	2%	32	100%	0	0%	0	0%	0	0%
HYDRILLA	31	2%	31	100%	0	0%	0	0%	0	0%
FANWORT	30	2%	30	100%	0	0%	0	0%	0	0%
STONEWORT	25	1%	25	100%	0	0%	0	0%	0	0%
EURASIAN WATER MILFOIL	22	1%	21	95%	1	5%	0	0%	0	0%
ARROWHEAD	18	1%	15	83%	3	17%	0	0%	0	0%
LONG-LEAF PDWD	17	1%	15	88%	1	6%	1	6%	0	0%
FLOATING FILAMENTOUS ALGAE	5	0%	5	100%	0	0%	0	0%	0	0%
MONEYWORT	4	0%	4	100%	0	0%	0	0%	0	0%
MUSK GRASS	4	0%	4	100%	0	0%	0	0%	0	0%
CURLY-LEAF PONDWEED	3	0%	3	100%	0	0%	0	0%	0	0%
FLAT-LEAVED BLADDERWORT	2	0%	2	100%	0	0%	0	0%	0	0%
PICKEREL WEED	2	0%	2	100%	0	0%	0	0%	0	0%
SAGO PONDWEED	2	0%	2	100%	0	0%	0	0%	0	0%
WATER CROWFOOT	2	0%	2	100%	0	0%	0	0%	0	0%
BRITTLE NAIAD	1	0%	1	100%	0	0%	0	0%	0	0%
HEART PONDWEED	1	0%	1	100%	0	0%	0	0%	0	0%
MUD PLANTAIN	1	0%	0	0%	1	100%	0	0%	0	0%

2017 SUPPLEMENTAL SURVEYS
6/29, 7/28. 9/5, 9/6 and 9/28

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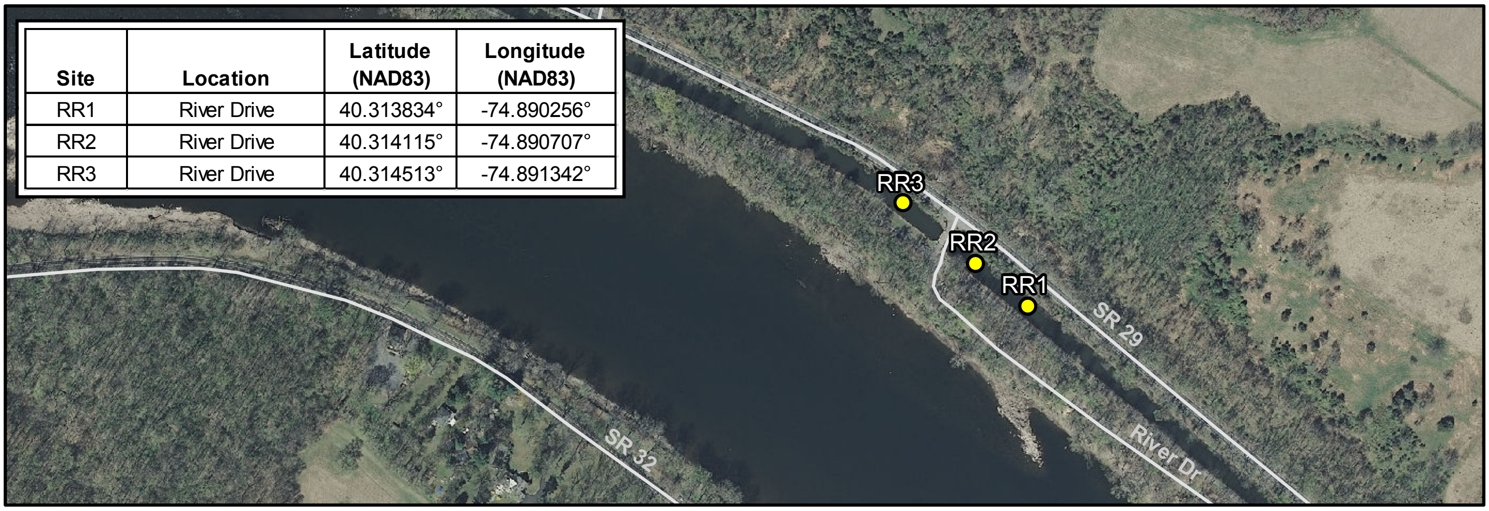
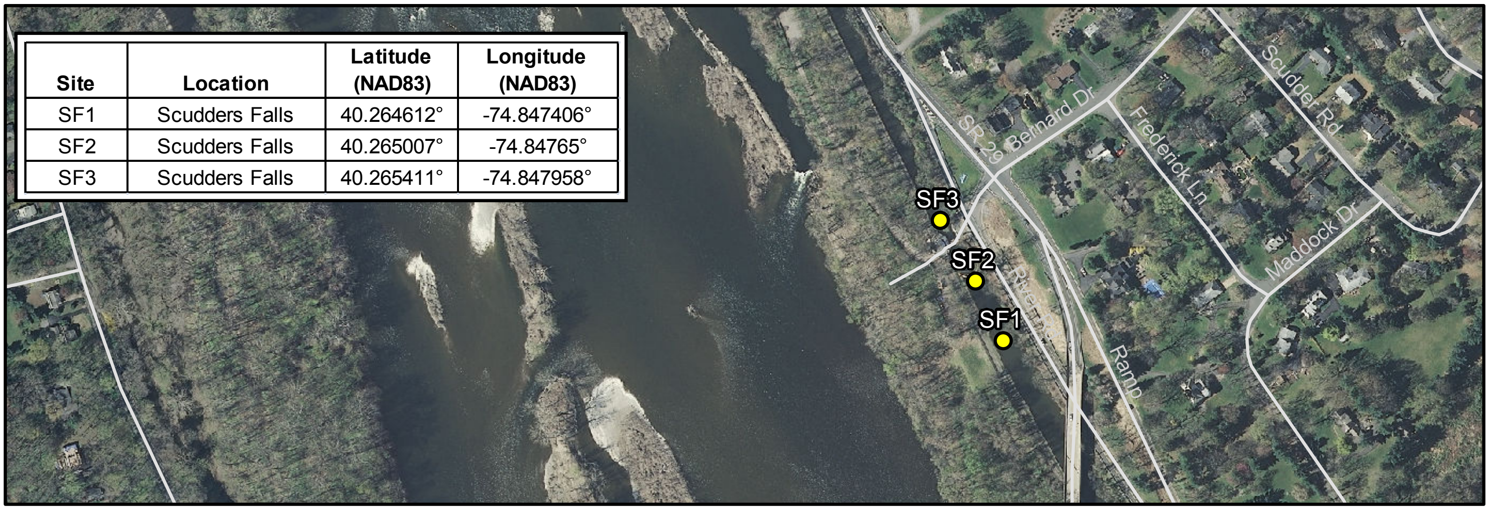
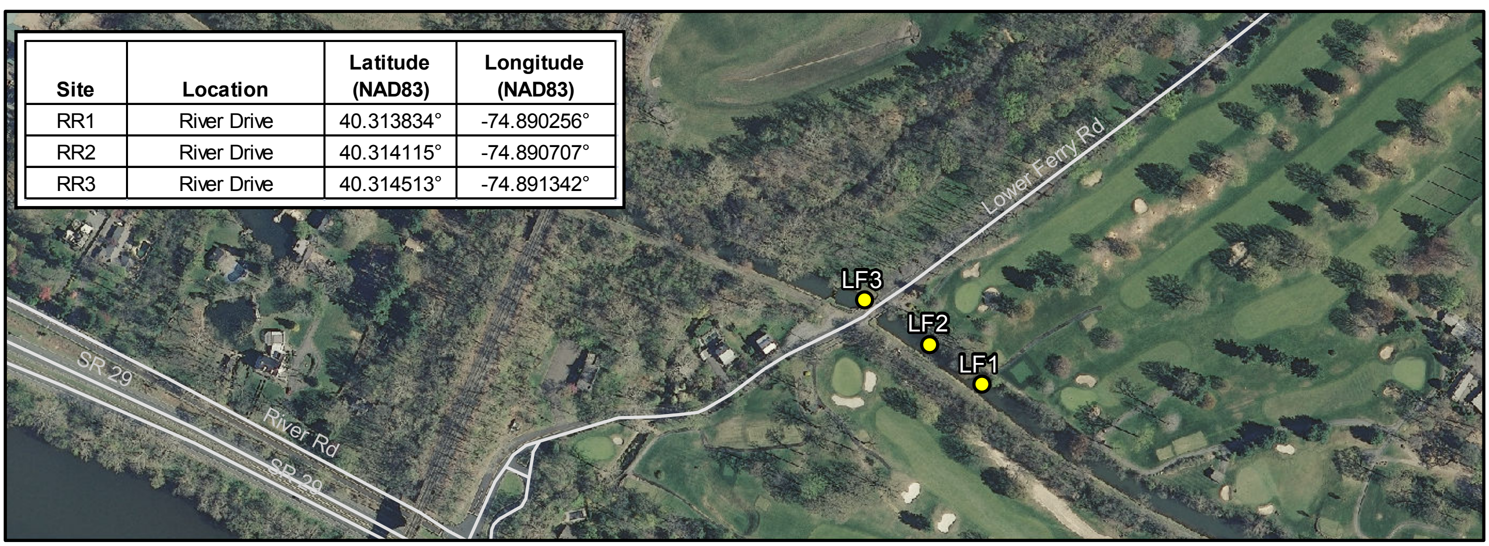


Site	Location	Latitude (NAD83)	Longitude (NAD83)
RR1	River Drive	40.313834°	-74.890256°
RR2	River Drive	40.314115°	-74.890707°
RR3	River Drive	40.314513°	-74.891342°



Site	Location	Latitude (NAD83)	Longitude (NAD83)
SF1	Scudders Falls	40.264612°	-74.847406°
SF2	Scudders Falls	40.265007°	-74.84765°
SF3	Scudders Falls	40.265411°	-74.847958°



Site	Location	Latitude (NAD83)	Longitude (NAD83)
RR1	River Drive	40.313834°	-74.890256°
RR2	River Drive	40.314115°	-74.890707°
RR3	River Drive	40.314513°	-74.891342°

Delaware and Raritan Canal
New Jersey

DELAWARE & RARITAN CANAL

380 190 0 380 Feet

N

1:5,575

Map Date: 2/23/2018
File: DRCanal_SuppSurveys_2017
Prepared by: KM
Office: Washington, NJ

D&R Canal Supplemental Aquatic Vegetation Surveys

SamplePt	Sample	Total_Sub	Hydrilla	Wild Celery	Coontail	Common Waterweed	Leafy Pondweed	Small Duckweed	Eurasian Water Milfoil	Water Stargrass				
SamplePt	Sample	Total_Sub												
062917-LFR1	A	S		S										
	B	S	T	S			S							
1	M	S	T	S			T							
062917-LFR2	A	M	T	T	T			T	T					
	B	S		S	T									
2	M	M	T	S	T			T	T					
062917-LFR3	A	M	S	S	T									
	B	S	S	T										
3	M	M	S	S	T									
062917-SCF1	A	M	T	M			T							
	B	M		M			T							
4	M	M	T	M			T							
062917-SCF2	A	M	S	M	T		T							
	B	M	T	M	T									
5	M	M	S	M	T		T							
062917-SCF3	A	S	S	S										
	B	T		T										
6	M	S	T	S										
062917-RR1	A	T	T											
	B	T					T			T				
7	M	T	T				T			T				
062917-RR2	A	T		T		T								
	B	S		S				T						
8	M	S		S		T		T						
062917-RR3	A	T		T										
	B	T		T	T									
9	M	T		T	T									

D&R Canal Supplemental Aquatic Vegetation Surveys

SamplePt	Sample	Total_Sub	Hydrilla	Wild Celery	Coontail	Common Waterweed	Leafy Pondweed	Small Duckweed	Eurasian Water Milfoil	Water Stargrass				
SamplePt	**Sample**	**Total_Sub**												
072817-LFR1	A	S		S				T						
	B	M		M				T						
1	M	M		M				T						
072817-LFR2	A	S	T	S				S						
	B	S	T	S				S	T					
2	M	S	T	S				S	T					
072817-LFR3	A	S		S										
	B	S		S				T						
3	M	S		S				T						
072817-SCF1	A	M		M				T						
	B	D		D				T						
4	M	D		D				T						
072817-SCF2	A	S		S				T						
	B	T	T	T			T	T		T				
5	M	S	T	S			T	T		T				
072817-SCF3	A	M		M				T						
	B	S		S				T						
6	M	M		M				T						
072817-RR1	A	S		S				T						
	B	T		T				T						
7	M	S		S				T						
072817-RR2	A													
	B	T		T				T						
8	M	T		T				T						
072817-RR3	A													
	B													
9	M													
072817-WHR1	A	S		T	S	S		T						
	B	M		T	M	S		T		T				
10	M	M		T	M	S		T		T				
072817-WHR2	A	M		T	M	S		T						
11	B	D		T	M	M		S						
11	M	D		T	M	M		S						

D&R Canal Supplemental Aquatic Vegetation Surveys

SamplePt	Sample	Total_Sub	Hydrilla	Wild Celery	Coontail	Common Waterweed	Leafy Pondweed	Small Duckweed	Eurasian Water Milfoil	Water Stargrass	Common Watermeal	Water Primrose		
SamplePt	**Sample**	**Total_Sub**												
090617-LFR1	A	S		S				T			T			
	B	T						T			T			
1	M	S						T			T			
090617-LFR2	A	M		M				M			M			
	B	M		M				M			M			
2	M	M		M				M			M			
090617-LFR3	A													
	B													
3	M													
090517-SCF1	A	M		M				T				T		
	B	M		M	T	T		T		S		T		
4	M	M		M	T	T		T		T		T		
090517-SCF2	A	M		M			T			T				
	B	S		S										
5	M	M		M			T			T				
090517-SCF3	A	S		S										
	B													
6	M	T		T										
090517-RR1	A	T		T				T						
	B	T		T										
7	M	T		T				T						
090517-RR2	A	T						T						
	B	T						T						
8	M	T						T						
090517-RR3	A	T						T						
	B													
9	M	T						T						

D&R Canal Supplemental Aquatic Vegetation Surveys

SamplePt	Sample	Total_Sub	Hydrilla	Wild Celery	Coontail	Common Waterweed	Leafy Pondweed	Small Duckweed	Eurasian Water Milfoil	Water Stargrass	Watermeal	Stonewort	Benthic Filamentous Al	Common Bladderwort
SamplePt	**Sample**	**Total_Sub**												
092817-LFR1	A	T		T				T						
	B	T		T				T						
1	M	T		T				T						
092817-LFR2	A													
	B	T		T										
2	M	T		T										
092817-LFR3	A	T		T				T			T			
	B	S		S				T			S			
3	M	S		S				T			S			
092817-SCF1	A	S		S				T				T		
	B	M		M				T						
4	M	M		M				T				T		
092817-SCF2	A	T		T			T	T						
	B	T		T				T						
5	M	T		T			T	T						
092817-SCF3	A	T		T			T	T				T		
	B	T		T				T						
6	M	T		T			T	T				T		
092817-RR1	A													
	B													
7	M													
092817-RR2	A													
	B	T		T										
8	M	T		T										
092817-RR3	A													
	B													
9	M													
092817-KN1	A	S			S			S			S		S	
	B	M			T			S			S		M	T
10	M	M			S			S			S		M	T
092817-KN2	A	S			S			T		T	T		S	
	B	M			S			S			T		S	S
11	M	M			S			S		T	T		S	T

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DELAWARE & RARITAN CANAL

Survey Sections and Hydrilla Tuber Sampling Sites

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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August 9, 2017 - September 15, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
A	1	M	40.415279°	-75.046434°	T					T																										
A	2	M	40.415558°	-75.045782°	T					T			T																							T
A	3	M	40.415586°	-75.045169°	T					T																										T
A	4	M	40.415424°	-75.044552°	T					T																										
A	5	M	40.415275°	-75.044031°	T					T																										
A	6	M	40.41508°	-75.043501°	T					T																										
A	7	M	40.414881°	-75.043014°	T					T																										
A	8	M	40.414658°	-75.042441°	T					T			T																	T						
A	9	M	40.414433°	-75.041948°																																
A	10	M	40.414179°	-75.041456°																																
A	11	M	40.413893°	-75.040984°	S					S																						T				
A	12	M	40.413589°	-75.040508°	T					T																						T				
A	13	M	40.413339°	-75.040167°	S					S																						T				
A	14	M	40.413075°	-75.039762°	T					T																										
A	15	M	40.412773°	-75.039276°	T					T																										
A	16	M	40.412499°	-75.038764°	S		T			T																										S
A	17	M	40.412259°	-75.038303°	T		T			T																										
A	18	M	40.412006°	-75.037795°	T					T																										
A	19	M	40.411806°	-75.037264°	T					T																										
A	20	M	40.411548°	-75.036728°	T		T			T																										
A	21	M	40.411315°	-75.03619°	T		T			T																						T				
A	22	M	40.411073°	-75.035714°	T					T																										T
A	23	M	40.410783°	-75.035309°	T		T			T																										
A	24	M	40.410318°	-75.034586°																																
A	25	M	40.410167°	-75.034367°																																
A	26	M	40.40992°	-75.033856°	T					T																						T				
A	27	M	40.409661°	-75.033449°																																
A	28	M	40.409364°	-75.032984°	T					T																				T						
A	29	M	40.409029°	-75.032657°	S					S							T																			
A	30	M	40.408665°	-75.032335°	T					T																										
A	31	M	40.408267°	-75.032034°	T					T																										
A	32	M	40.407849°	-75.031764°	T								T																							
A	33	M	40.407484°	-75.031519°	T					T																										
A	34	M	40.407019°	-75.031195°	T		T			T																										
A	35	M	40.406614°	-75.030969°	T					T																										
A	36	M	40.406257°	-75.030686°	T		T			T																						T				
A	37	M	40.405892°	-75.030323°	T					T																										
A	38	M	40.405602°	-75.029826°																																
A	39	M	40.405382°	-75.029304°	T					T																						T				
A	40	M	40.405264°	-75.028731°	S					S			T																			T				T
A	41	M	40.405165°	-75.028132°	S		T			S	T		S																							T
A	42	M	40.405085°	-75.027567°	S		T			S	T		T																			T				
A	43	M	40.405072°	-75.026919°	S					S	T		T																			T				
A	44	M	40.404943°	-75.02643°	T					T	T																									
A	45	M	40.404749°	-75.025887°	T					T		T																				T				T
A	46	M	40.404643°	-75.025281°	T					T			T																							
A	47	M	40.404649°	-75.024693°	T					T																										T
A	48	M	40.404683°	-75.02408°																																
A	49	M	40.40473°	-75.023479°																																

Delaware and Raritan Canal - Sections A-W
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August 9, 2017 - September 15, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
A	50	M	40.404876°	-75.022908°	T					T																										
A	51	M	40.405045°	-75.022304°	T					T																										
A	52	M	40.405108°	-75.021804°																																
A	53	M	40.405232°	-75.021217°																																
A	54	M	40.40544°	-75.020623°	T					T		T																								
A	55	M	40.405559°	-75.020109°	T					T																										
A	56	M	40.405713°	-75.019541°	T					T			T																							
A	57	M	40.405935°	-75.018937°	T					T																										T
A	58	M	40.406042°	-75.018412°																																
A	59	M	40.406205°	-75.017888°																																
A	60	M	40.406392°	-75.017327°																																
A	61	M	40.406555°	-75.016802°	T					T																										
A	62	M	40.406723°	-75.016203°	T		T																													
A	63	M	40.406856°	-75.015688°	T																											T				T
A	64	M	40.407065°	-75.015162°																																
A	65	M	40.407217°	-75.014634°																																
B	1	M	40.40753°	-75.013479°	T		T			T																										
B	2	M	40.407557°	-75.012922°	T					T			T																			T				T
B	3	M	40.407625°	-75.012315°	T					T	T																									
B	4	M	40.407753°	-75.01177°	T					T			T																			T				
B	5	M	40.407918°	-75.011212°	T					T	T																					T				
B	6	M	40.408106°	-75.010662°	T					T			T																							
B	7	M	40.408247°	-75.010088°	T					T	T																					T				
B	8	M	40.40841°	-75.009545°																																
B	9	M	40.408543°	-75.00898°	S					S									T													T				
B	10	M	40.408756°	-75.008441°	S					T																										S
B	11	M	40.408945°	-75.00796°	T		T			T																										
B	12	M	40.409155°	-75.007387°	T																															T
B	13	M	40.409362°	-75.006867°	T					T																										
B	14	M	40.409556°	-75.006327°	T					T																										
B	15	M	40.409788°	-75.005818°																																
B	16	M	40.410031°	-75.005335°	T		T			T																										
B	17	M	40.410319°	-75.004831°	T					T																										
B	18	M	40.410618°	-75.004411°																																
B	19	M	40.410953°	-75.003943°	T					T																										
B	20	M	40.411162°	-75.003429°																																
B	21	M	40.411294°	-75.002872°	T					T																										T
B	22	M	40.411361°	-75.002279°	T																														T	
B	23	M	40.411451°	-75.001718°																																
B	24	M	40.411505°	-75.001121°	T					T																										
B	25	M	40.411608°	-75.000554°																																
B	26	M	40.411674°	-74.999948°																																
B	27	M	40.411713°	-74.999374°																																
B	28	M	40.411685°	-74.998775°																																
B	29	M	40.41164°	-74.998195°																																
B	30	M	40.411556°	-74.997608°																																
B	31	M	40.411497°	-74.997024°																																
B	32	M	40.411471°	-74.996446°	T					T																										
B	33	M	40.411395°	-74.995861°																																

Delaware and Raritan Canal - Sections A-W
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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
B	34	M	40.4113°	-74.995289°	T					T																						T								
B	35	M	40.411154°	-74.994716°																																				
B	36	M	40.411075°	-74.994148°	T		T			T																						T								
B	37	M	40.411004°	-74.993585°																																				
B	38	M	40.41094°	-74.992988°																																				
B	39	M	40.410856°	-74.992423°																																				
B	40	M	40.41074°	-74.991801°	T					T																														
B	41	M	40.410566°	-74.99065°																																				
B	42	M	40.410378°	-74.990084°			T																																	
B	43	M	40.41021°	-74.989572°	T					T																														
B	44	M	40.409989°	-74.98901°																																				
B	45	M	40.409814°	-74.988478°			T																																	
B	46	M	40.409588°	-74.98795°	T					T																						T								
B	47	M	40.409417°	-74.987415°																																				
B	48	M	40.409222°	-74.986892°	T					T																														
B	49	M	40.408769°	-74.985859°	T					T																														
B	50	M	40.407801°	-74.984576°																																				
B	51	M	40.407427°	-74.984202°	S																																			S
B	52	M	40.407122°	-74.98377°	M					T																														D
B	53	M	40.406801°	-74.983343°	S					T																														T
B	54	M	40.406537°	-74.982903°	S					T																														
B	55	M	40.406249°	-74.98244°	S		T			T																						T								S
B	56	M	40.405974°	-74.981968°																																				
B	57	M	40.405732°	-74.981478°																																				
B	58	M	40.405484°	-74.980988°																																				
B	59	M	40.405214°	-74.980493°																																				
B	60	M	40.404996°	-74.979982°																																				
B	61	M	40.404747°	-74.97949°																																				
B	62	M	40.404541°	-74.978966°																																				
C	1	M	40.404353°	-74.97843°																																				
C	2	M	40.404088°	-74.977944°																																				
C	3	M	40.403822°	-74.977444°	T					T																														
C	4	M	40.40362°	-74.976916°	T		T			T																		S												
C	5	M	40.40341°	-74.976399°																																				
C	6	M	40.403176°	-74.975876°	T		T			T																														
C	7	M	40.402998°	-74.97536°	T					T																														
C	8	M	40.402796°	-74.974835°																																				
C	9	M	40.402592°	-74.974288°																																				
C	10	M	40.402467°	-74.973737°																																				
C	11	M	40.402319°	-74.973179°																																				
C	12	M	40.402163°	-74.972606°																																				
C	13	M	40.402055°	-74.972025°	T					T																														
C	14	M	40.401897°	-74.971427°																																				
C	15	M	40.401726°	-74.970892°																																				
C	16	M	40.4016°	-74.970344°																																				
C	17	M	40.401441°	-74.96977°																																				
C	18	M	40.401267°	-74.969246°																																				
C	19	M	40.401257°	-74.968638°																																				
C	20	M	40.401194°	-74.968056°																																				

Delaware and Raritan Canal - Sections A-W
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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
C	21	M	40.40094°	-74.967549°																																
C	22	M	40.40072°	-74.967026°																																
C	23	M	40.400492°	-74.966531°	T					T																							T			
C	24	M	40.40021°	-74.966042°	T					T																										
C	25	M	40.399888°	-74.965607°																																
C	26	M	40.399511°	-74.965175°																																
C	27	M	40.399146°	-74.964766°																																
C	28	M	40.39879°	-74.964409°																																
C	29	M	40.39841°	-74.964107°																																
C	30	M	40.398013°	-74.963846°																																
C	31	M	40.397612°	-74.963507°																																
C	32	M	40.397204°	-74.963271°																																
C	33	M	40.396795°	-74.963029°																																
C	34	M	40.396377°	-74.962792°																																
C	35	M	40.395946°	-74.962598°																																
C	36	M	40.39553°	-74.962378°																																
C	37	M	40.395097°	-74.96217°			T																													
C	38	M	40.394694°	-74.961965°																																
C	39	M	40.394277°	-74.961755°																																
C	40	M	40.393829°	-74.961616°																																
C	41	M	40.393401°	-74.961473°																																
C	42	M	40.39297°	-74.961353°																																
C	43	M	40.392516°	-74.961195°																																
C	44	M	40.392083°	-74.961051°	T					T																										
C	45	M	40.391645°	-74.960874°																																
C	46	M	40.391201°	-74.960669°			S																													
C	47	M	40.390773°	-74.960435°																																
C	48	M	40.390358°	-74.960255°	T		T			T																										
C	49	M	40.38994°	-74.960027°	S	T				S												S				T						T	S	T		
C	50	M	40.38955°	-74.959768°	T					T																										
C	51	M	40.38917°	-74.959481°																																
C	52	M	40.38879°	-74.959147°																																
C	53	M	40.388392°	-74.958818°																																
C	54	M	40.388019°	-74.958455°																																
C	55	M	40.387663°	-74.958145°	S		S																													
C	56	M	40.387294°	-74.957843°																																
C	57	M	40.386905°	-74.957531°																																
C	58	M	40.386523°	-74.957197°																																
C	59	M	40.386197°	-74.956864°																																
D	1	M	40.385796°	-74.956451°																																
D	2	M	40.385492°	-74.956104°																																
D	3	M	40.385147°	-74.955749°																																
D	4	M	40.384744°	-74.955406°																																
D	5	M	40.384385°	-74.955106°																																
D	6	M	40.383942°	-74.95483°																																
D	7	M	40.38356°	-74.954555°																																
D	8	M	40.383124°	-74.954226°	T																															T
D	9	M	40.382723°	-74.953999°																																
D	10	M	40.382324°	-74.953747°																																

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
D	11	M	40.38192°	-74.953439°																																
D	12	M	40.381516°	-74.953197°																																
D	13	M	40.381123°	-74.952922°																																
D	14	M	40.380759°	-74.952595°	T					T																										
D	15	M	40.380319°	-74.952436°																																
D	16	M	40.379983°	-74.952084°																																
D	17	M	40.379516°	-74.951827°																																
D	18	M	40.379111°	-74.951578°	T						T																									
D	19	M	40.378735°	-74.95135°																																
D	20	M	40.378315°	-74.951096°																																
D	21	M	40.377868°	-74.950826°																																
D	22	M	40.37754°	-74.950579°																																
D	23	M	40.377078°	-74.950286°																																
D	24	M	40.376701°	-74.950039°																																
D	25	M	40.376324°	-74.949789°																																
D	26	M	40.37592°	-74.94954°																																
D	27	M	40.375523°	-74.949238°	T					T	T																									
D	28	M	40.375043°	-74.949168°	T		T			T																										
D	29	M	40.374612°	-74.949055°	T					T	T																						T			
D	30	M	40.374128°	-74.948975°	M		T			M																										
D	31	M	40.373731°	-74.948807°																																
D	32	M	40.373263°	-74.948725°	S					M																										
D	33	M	40.372788°	-74.94862°	S					S	T																									
D	34	M	40.372354°	-74.94849°																																
D	35	M	40.371921°	-74.948399°																																
D	36	M	40.371437°	-74.948253°																																
D	37	M	40.371046°	-74.94813°	S					S																										
D	38	M	40.370578°	-74.947963°																																
D	39	M	40.370163°	-74.947822°																																
D	40	M	40.369757°	-74.947655°	T					S																										
D	41	M	40.369312°	-74.947437°	S					S	T																									
D	42	M	40.368886°	-74.947198°																																
D	43	M	40.36842°	-74.946964°	T					T																										
D	44	M	40.368006°	-74.946769°	S					T	S																									
D	45	M	40.367618°	-74.94663°	T					T																										
D	46	M	40.36713°	-74.946486°	T					T																										
D	47	M	40.366739°	-74.94636°	T					T																										
D	48	M	40.366263°	-74.946207°																																
D	49	M	40.36585°	-74.946084°	T					T	T																									
F	1	M	40.231557°	-74.781881°	T																					T										
F	2	M	40.231269°	-74.781428°	T																					T										
F	3	M	40.230966°	-74.78096°	T		T																			T										
F	4	M	40.230611°	-74.780507°	T																					T										
F	5	M	40.230333°	-74.780149°	T																															T
F	6	M	40.229983°	-74.779748°	T																										T					
F	7	M	40.229657°	-74.779375°	T																					T										
F	8	M	40.229327°	-74.778955°	T																															T
F	9	M	40.229015°	-74.778622°																																
F	10	M	40.228584°	-74.77843°																																

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
F	11	M	40.228133°	-74.778385°	S		T																									T				S
F	12	M	40.227643°	-74.778333°	T																					T										
F	13	M	40.227192°	-74.778261°	T	T	T																			T										
F	14	M	40.226768°	-74.778206°	T	T																				T						T				T
F	15	M	40.226258°	-74.778154°																																
F	16	M	40.225383°	-74.777726°																																
F	17	M	40.224958°	-74.777525°	T	T																														
F	18	M	40.224615°	-74.777229°	T	T	T																								T					
F	19	M	40.224262°	-74.776841°	S		S																													
F	20	M	40.223937°	-74.776436°	T		T																													
F	21	M	40.223709°	-74.775991°																																
F	22	M	40.223423°	-74.775494°																																
F	23	M	40.22315°	-74.775029°	T		T																													
F	24	M	40.222918°	-74.774327°	T		T																													
F	25	M	40.222761°	-74.773857°																																
F	26	M	40.222682°	-74.773307°	T		T																									T				
F	27	M	40.222786°	-74.772747°	T		T																													T
F	28	M	40.223248°	-74.772284°																																
F	29	M	40.223434°	-74.771757°																																
F	30	M	40.223296°	-74.771103°																																
F	31	M	40.22324°	-74.770561°																																
F	32	M	40.223173°	-74.770038°																																
F	33	M	40.223104°	-74.769399°																																
F	34	M	40.223335°	-74.768952°																																
F	35	M	40.223527°	-74.768425°	T						T																									
F	36	M	40.223934°	-74.76769°																																
F	37	M	40.224042°	-74.767414°																																
F	38	M	40.224298°	-74.766951°																																
F	39	M	40.224485°	-74.76646°																																
F	40	M	40.22452°	-74.765871°																																
F	41	M	40.224514°	-74.765309°																																
F	42	M	40.224438°	-74.764713°	M																															M
F	43	M	40.224419°	-74.764127°	S																															S
F	44	M	40.224503°	-74.763492°	M																															M
F	45	M	40.224665°	-74.762944°	M																															M
F	46	M	40.22486°	-74.76242°	M																															M
F	47	M	40.225086°	-74.761918°	S	T																														T
F	48	M	40.225316°	-74.761393°	S	T																														T
F	49	M	40.225574°	-74.760848°	T	T																														T
F	50	M	40.225786°	-74.760364°	T																															T
F	51	M	40.22603°	-74.759849°	T																															T
F	52	M	40.226397°	-74.759347°	T																															T
F	53	M	40.238866°	-74.741908°																																
F	54	M	40.239197°	-74.741539°	T	T																		T												
F	55	M	40.23948°	-74.741126°	T	T	T																								T					
F	56	M	40.239831°	-74.740633°																																
F	57	M	40.240109°	-74.740228°																																
F	58	M	40.24043°	-74.739763°																																
F	59	M	40.240702°	-74.739366°	T																			T												

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
F	60	M	40.241026°	-74.738903°																																
F	61	M	40.241306°	-74.738491°	T	T																														
F	62	M	40.241645°	-74.738069°	T	T	T				T																									
F	63	M	40.241953°	-74.737658°	S	S	T																								T					
F	64	M	40.242269°	-74.737272°	T	T	T																													
F	65	M	40.242609°	-74.736842°	S	S					T																									
F	66	M	40.242928°	-74.736452°	S	S																									T					
F	67	M	40.243254°	-74.736035°	T	T					T																				T					
F	68	M	40.243572°	-74.735666°	T	T					T															T										
F	69	M	40.243916°	-74.735256°																																
F	70	M	40.244251°	-74.734865°																																
F	71	M	40.2446°	-74.734441°																																
F	72	M	40.24491°	-74.734053°																																
F	73	M	40.245214°	-74.733671°																																
H	1	M	40.267424°	-74.710443°	T						T															T								T		
H	2	M	40.267757°	-74.71°	S		T				S																									
H	3	M	40.268101°	-74.709575°	T		T				T															T								T		
H	4	M	40.268402°	-74.709168°	T		T																													
H	5	M	40.268714°	-74.708803°	T		T				T															T								T		
H	6	M	40.269051°	-74.708367°	S		T				T																									
H	7	M	40.26939°	-74.707939°	T																											T				
H	8	M	40.269677°	-74.707568°	S		T				S																							T		
H	9	M	40.269995°	-74.707152°	M		S				M															S								T		
H	10	M	40.270362°	-74.706714°	S		T				T															T										
H	11	M	40.270696°	-74.70633°	S		T				S															T								T		
H	12	M	40.271003°	-74.705931°	T						T																									
H	13	M	40.27136°	-74.705513°	S		T				S																									
H	14	M	40.271686°	-74.705093°	T		T				T															T								T		
H	15	M	40.272017°	-74.704772°	T		T				T																									
H	16	M	40.272414°	-74.704455°																																
H	17	M	40.272817°	-74.704135°	S		T				S																									
H	18	M	40.273216°	-74.703894°	T					T	T																									
H	19	M	40.273627°	-74.703632°	M		S				T																					T		T		
H	20	M	40.274046°	-74.703352°	S		S				S																									
H	21	M	40.274454°	-74.703133°	S		T				S																				T		T	T		
H	22	M	40.274872°	-74.702836°	M		T			T	M															T								T		
H	23	M	40.275278°	-74.70259°	S		T				S															T						T		T		
H	24	M	40.275692°	-74.702346°	M		T				S															S						T		T		
H	25	M	40.276085°	-74.702091°	T						T															T		T				T		T		
H	26	M	40.276481°	-74.70186°	S		T				S															T						T	T	T		
H	27	M	40.276924°	-74.701625°	T																					T								T		
H	28	M	40.277326°	-74.701424°	T		T				T															T										
H	29	M	40.277782°	-74.701215°	T		T				T															T										
H	30	M	40.278161°	-74.701018°	T						T																									
H	31	M	40.278608°	-74.700765°	T						T																									
H	32	M	40.279027°	-74.700563°	T		T				S																									
H	33	M	40.279445°	-74.700359°	T						T																									
H	34	M	40.28113°	-74.699541°	S		T																			T		T								
H	35	M	40.28156°	-74.699311°	S		T				T																				T					

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
H	36	M	40.28197°	-74.699136°																																
H	37	M	40.282426°	-74.698914°	T		T				T																									
H	38	M	40.282859°	-74.698706°	S		S																													
H	39	M	40.283227°	-74.698527°	S		T				S															T					T			T		
H	40	M	40.283684°	-74.698289°	S		T				S															T										
H	41	M	40.284121°	-74.69808°	T		T				T															T							T	T		
H	42	M	40.284521°	-74.697855°	T		T				T															T										
H	43	M	40.284944°	-74.697628°	S		T				T															T			T				T	T		
H	44	M	40.285332°	-74.697466°																																
H	45	M	40.285777°	-74.697223°	S		T				T															T								T		
H	46	M	40.286166°	-74.697057°	S		T				S															S						T	T	T		
H	47	M	40.286639°	-74.696834°	S		T				T															T										
H	48	M	40.287046°	-74.696618°	T		T				T																		T			T				
H	49	M	40.287468°	-74.696439°	T		T				T															T						T				
H	50	M	40.287906°	-74.696204°	T						T															T										
H	51	M	40.288306°	-74.695988°	T		T				T																					T				
H	52	M	40.288763°	-74.695798°	T		T				T																									
H	53	M	40.289178°	-74.695542°	T		T				T															T										
H	54	M	40.289584°	-74.69539°	S		T																			T										
H	55	M	40.290044°	-74.695153°	T		T																									T				
H	56	M	40.290405°	-74.694993°	T		T																									T				
H	57	M	40.290824°	-74.694757°	T																					T						T				
H	58	M	40.291282°	-74.694545°	T																											T				
H	59	M	40.291702°	-74.694358°	S		S				T															T		T				T				
H	60	M	40.292086°	-74.694135°	S		S				T															T			T							
H	61	M	40.292536°	-74.693955°	T		T																			T						T				
H	62	M	40.29293°	-74.693741°	S		M																													
H	63	M	40.293367°	-74.693512°																																
H	64	M	40.293798°	-74.693291°	S		T																			T										
H	65	M	40.294163°	-74.693083°	S		M				T															S			T							
H	66	M	40.294626°	-74.692848°	S		T				T															T		T								T
H	67	M	40.295047°	-74.692659°	S		S																									T				T
H	68	M	40.295471°	-74.692492°	S		S																			T										
H	69	M	40.295895°	-74.692273°	S		S																													
H	70	M	40.2963°	-74.692049°	S		S																			T										
H	71	M	40.296722°	-74.691876°	M		M																			T										T
H	72	M	40.297158°	-74.691638°	T		T																			T										
H	73	M	40.297581°	-74.691444°	S		S																			S										T
H	74	M	40.297986°	-74.691221°	S		S				T															T										
H	75	M	40.298411°	-74.691029°	S		T				T																									T
H	76	M	40.298831°	-74.690821°	S		S				T															T										T
H	77	M	40.299266°	-74.690616°	T		T																													
H	78	M	40.299673°	-74.690392°	S		S				T															T							T			T
H	79	M	40.300104°	-74.690197°	S		S																			T										
H	80	M	40.300503°	-74.689981°	T		T																													
H	81	M	40.300953°	-74.689704°	S		T																			T		T	T							
H	82	M	40.301309°	-74.689454°	M		M																			T		T								
H	83	M	40.301707°	-74.689065°	S		T				T															T		T								T
H	84	M	40.302035°	-74.688758°	S		T																			T		S								

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
J	1	M	40.331909°	-74.652321°																																
J	2	M	40.332317°	-74.652094°	S		S																					T								
J	3	M	40.332456°	-74.652601°	T		T																													
J	4	M	40.332696°	-74.652828°	D		D																			T								T		
J	5	M	40.332809°	-74.652674°	D		D																			T		T						T		
J	6	M	40.332559°	-74.652396°	S		S																													
J	7	M	40.332752°	-74.651874°																																
J	8	M	40.333156°	-74.651649°	T																					T		T								
J	9	M	40.333561°	-74.651419°	T																					T								T		
J	10	M	40.333979°	-74.651201°	T						T																									
J	11	M	40.334401°	-74.650941°																																
J	12	M	40.334825°	-74.650745°	T						T																									
J	13	M	40.335235°	-74.650488°																																
J	14	M	40.335627°	-74.650267°	T		T				T															T		T								
J	15	M	40.336061°	-74.650001°	T		T																			T										
J	16	M	40.336448°	-74.649735°	S						S																					T	T			
J	17	M	40.33685°	-74.649431°	S		S																			T							S			
J	18	M	40.337273°	-74.649092°	T		T				T															T										
J	19	M	40.337646°	-74.648835°	T																					T								T		
J	20	M	40.338033°	-74.648547°	T																							T								
J	21	M	40.338408°	-74.648253°	T		T																													
J	22	M	40.338821°	-74.647894°	T																							T								
J	23	M	40.339121°	-74.647555°																																
J	24	M	40.339513°	-74.647144°	T																					T										
J	25	M	40.339817°	-74.646725°	T						T																	T								
J	26	M	40.34011°	-74.646296°	T		T				T																					T	T			
J	27	M	40.340437°	-74.645857°	T																							T								
J	28	M	40.340729°	-74.645446°																																
J	29	M	40.341017°	-74.644967°	T		S																			T		T								
J	30	M	40.341289°	-74.644462°	S		S				T					T										T		T					T			
J	31	M	40.341444°	-74.643877°	T																					T		T								
J	32	M	40.341553°	-74.643328°	T																					T		T								
J	33	M	40.341599°	-74.642761°	S																					T		T					T			
J	34	M	40.341659°	-74.642183°																																
J	35	M	40.341718°	-74.641605°																																
J	36	M	40.341758°	-74.641027°	T		T																										T			
J	37	M	40.341827°	-74.640434°	T		T				T															T										
J	38	M	40.341864°	-74.639836°	T																							T								
J	39	M	40.341917°	-74.639246°	T		T				T															T							T			
J	40	M	40.341976°	-74.638657°																																
J	41	M	40.342031°	-74.638098°	T		T																			T										
J	42	M	40.342089°	-74.637481°	T		T																			T							T			
J	43	M	40.34213°	-74.636883°	T		T				T															T						T	T			T
J	44	M	40.342178°	-74.636319°	S		T				T															T								T		
J	45	M	40.342241°	-74.635756°	S		S																			T							T			
J	46	M	40.342289°	-74.635147°																																
J	47	M	40.342351°	-74.634579°	S		S				T															T										
J	48	M	40.342369°	-74.633972°	T		T				T															T							T			
J	49	M	40.342423°	-74.633389°	T		T				T															T										

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
J	50	M	40.342474°	-74.632805°	S																					T		S						T		
J	51	M	40.342596°	-74.632223°	T						T															T		T								
J	52	M	40.342721°	-74.631645°	S						T															T		S								
J	53	M	40.342865°	-74.631066°	D		D				T															T		S						T		
J	54	M	40.343034°	-74.630521°	D		D		T																	T		S	T			T				
K	1	M	40.343106°	-74.630279°																																
K	2	M	40.343182°	-74.629978°																																
K	3	M	40.343409°	-74.629432°	T		T		T		T															T								T		
K	4	M	40.343637°	-74.628941°	T				T																											
K	5	M	40.343943°	-74.628447°	S		S																			T										
K	6	M	40.344286°	-74.628071°			T		T		T															T		T								
K	7	M	40.344662°	-74.627715°	S		S		T																	T		T						T		
K	8	M	40.345069°	-74.627474°	D		D		T		T															T		T			T	T	T			
K	9	M	40.34551°	-74.627278°	S		T		T		T															T		T			T	T				
K	10	M	40.345931°	-74.627158°	T				T		T															T					T	T	T			
K	11	M	40.346398°	-74.627062°	S		T		S		T															S		T			T	T				
K	12	M	40.346834°	-74.626971°	S		T		T		T															T			T			S				
K	13	M	40.347289°	-74.626861°	M		S		T		T																		T			T	T			T
K	14	M	40.3477°	-74.626783°	S		T		S		T																									T
K	15	M	40.348155°	-74.62667°	S		T		T		T															T					T	T				T
K	16	M	40.348613°	-74.626567°	S		T		T		T															S		S	T			T				T
K	17	M	40.349066°	-74.626456°	M		S		T		T															T			T		T	S	T			M
K	18	M	40.349487°	-74.62638°	M		T		S		T															T	T					T				T
K	19	M	40.349932°	-74.626273°	T				T		T															T						T				
K	20	M	40.350354°	-74.626178°	S		S		T		S															T	T				T	T	T	T		S
K	21	M	40.350821°	-74.626082°	M		S		T		T															T	T				T	T				S
K	22	M	40.351257°	-74.625989°	S		S				T															T			T			T		T		T
K	23	M	40.351717°	-74.625894°	T						T																T									
K	24	M	40.352159°	-74.625778°	S		T				T															T					T	T	T			T
K	25	M	40.352589°	-74.625695°	S		T				S															S		T			T	T	T			
K	26	M	40.353052°	-74.625589°	S		T		T		S															T					T	T	T			T
K	27	M	40.353483°	-74.625493°	S		T		T		T															T						T		T		S
K	28	M	40.353947°	-74.625405°	S						T															T	T	T				T			T	S
K	29	M	40.35438°	-74.625319°	S		T		S		T															S						T				T
K	30	M	40.354817°	-74.625225°	M				S		T															S	T	T			T	S	T			S
K	31	M	40.355267°	-74.625103°	S						S															T					T	T				T
K	32	M	40.355703°	-74.624992°	M		M		T		S															S					T		T			T
K	33	M	40.356164°	-74.624916°	S				T		T															S	T	T			T	T	T			T
K	34	M	40.356608°	-74.624831°	S		T		S		T															T						T	T			T
K	35	M	40.357062°	-74.624701°	S		S				T															S	T	T			T	S	T			T
K	36	M	40.357512°	-74.624628°	M		S				T															S	T	T				T	T			T
K	37	M	40.357931°	-74.624615°	S		T																			T										
K	38	M	40.358392°	-74.624621°	S		T		T		T															T			T			T	T			T
K	39	M	40.35883°	-74.62461°	M		T		T		S															S			T		T					T
K	40	M	40.359286°	-74.624602°	S		T		T		T															T						T	T			T
K	41	M	40.359752°	-74.624609°	S		T				S															T			T		T	T	T			S
K	42	M	40.360181°	-74.624553°	S		T				T															T					T	T	T			S
K	43	M	40.360651°	-74.624422°	M		T				S																		T		T	T	T			S
K	44	M	40.361047°	-74.6243°	S						T				T						T					S	T				T		T			T

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August 9, 2017 - September 15, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
K	45	M	40.361518°	-74.624192°	S		T				T															T			T			T				S
K	46	M	40.36192°	-74.624079°	S				T		T				T											T	T		T		T	T				S
K	47	M	40.362376°	-74.623975°	S				T		T															T	T		T							T
K	48	M	40.36281°	-74.623885°	T		T				T																		T							T
K	49	M	40.363285°	-74.623772°	S				T		S															T		T	T			T	T			S
K	50	M	40.363706°	-74.623655°	S		T		T		T															T					T	T	T			
K	51	M	40.36417°	-74.623521°	S		T		T		T											T				T						T	T			
K	52	M	40.36461°	-74.623408°	S		T				T															S		T			T	T	T			S
K	53	M	40.365034°	-74.623255°	M		T		T		T															S		T			T	T				S
K	54	M	40.365445°	-74.623012°	S						T															T					T	T				S
K	55	M	40.365806°	-74.622771°	S		T				T															T					T	T				S
K	56	M	40.366231°	-74.62251°	S						T															T		T			T	T				T
K	57	M	40.366655°	-74.622248°	S		T		S		T			T												T		T	T		T		T	T		S
K	58	M	40.36705°	-74.621986°	S		T		T		S																		T		T	T				S
K	59	M	40.367475°	-74.621695°	S		T				S			T												S	T	T				T				S
K	60	M	40.367854°	-74.621466°	M						T																									S
K	61	M	40.368256°	-74.621205°	M		S		T		T															T			T							S
K	62	M	40.368669°	-74.620936°	S		T		T		S															S					T	T				
K	63	M	40.369053°	-74.620675°	T						T															S		T				T				
K	64	M	40.369471°	-74.620425°	S				T		T			T												S						T	T			S
K	65	M	40.369864°	-74.620157°	S		T				S			T												T					T	T	T			S
K	66	M	40.370306°	-74.619895°	T						T															T		T			T					T
K	67	M	40.370706°	-74.619642°	S						S		T	T												S	T				T					T
K	68	M	40.371092°	-74.619405°	T		S				T			T												T					T	T				T
K	69	M	40.371501°	-74.619153°	T						T															T						T		T		T
K	70	M	40.371906°	-74.618904°	T		T				T			T												T					T		T	T		
K	71	M	40.372109°	-74.618474°	M		T		S		M			T												S								T		
K	72	M	40.371972°	-74.618113°	M				T		T			T												M			T							
K	73	M	40.372247°	-74.618076°	M		M				S			T												S			T							
K	74	M	40.372357°	-74.618642°	T		T				T															T										
K	75	M	40.372769°	-74.618468°	S		T				T			T												T										
K	76	M	40.373194°	-74.618414°	S		T				S			T												T						T				T
L	1	M	40.37461°	-74.618254°	T																														T	
L	2	M	40.375002°	-74.618172°																																
L	3	M	40.375451°	-74.618145°	T						T															T								T		
L	4	M	40.375901°	-74.618052°	T		T				T															T								T		
L	5	M	40.37632°	-74.617813°	S		S																			T		T						T	T	
L	6	M	40.376707°	-74.617478°	D		D																			T		T						T		
L	7	M	40.377086°	-74.617174°	D		D									T										T										
L	8	M	40.377496°	-74.616984°	S		S																			T								T		
L	9	M	40.377968°	-74.616923°	S		S		T																	S								T		
L	10	M	40.3784°	-74.617005°	M		S		T					T		T										S								T		
L	11	M	40.378843°	-74.617234°	M		S		T							T										T		T					T	T		
L	12	M	40.379255°	-74.617406°	S		S		T		T															T								T		
L	13	M	40.379672°	-74.617608°	M		M				T															T		T					T	T		
L	14	M	40.380102°	-74.617858°	S		S									T										T		T						T		
L	15	M	40.380524°	-74.618071°	S		S				T															T								T		
L	16	M	40.380909°	-74.61836°	M		M				T																	S								
L	17	M	40.381277°	-74.61866°	D		D		T		T																	T								

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
L	18	M	40.381658°	-74.619031°	D		D		T																	T		T								
L	19	M	40.381995°	-74.619374°	M		M		T		T															T								T		
L	20	M	40.382355°	-74.619707°	S		S																													
L	21	M	40.382708°	-74.620065°	S		S				T															T								T		
L	22	M	40.383074°	-74.620392°	T		T				T															T								T		
L	23	M	40.383465°	-74.620709°	T		T				T			T												T								T		
L	24	M	40.383846°	-74.621071°	T		T																			T								T		
L	25	M	40.384199°	-74.621402°	T																					T										
L	26	M	40.384591°	-74.621729°	S		S																			T								T		
L	27	M	40.384951°	-74.622094°	T		T																			T								T		
L	28	M	40.385338°	-74.622412°																																
L	29	M	40.385701°	-74.622646°	T		T				T															T		T						T		
L	30	M	40.386139°	-74.622851°	T		T				T																						T			
L	31	M	40.386572°	-74.623013°	T		T																													
L	32	M	40.38702°	-74.62317°	T																					T		T								
L	33	M	40.387467°	-74.623328°	M		M		T		T															T								T		
L	34	M	40.38789°	-74.623469°	M		M		T		T															T								T		
L	35	M	40.388332°	-74.623645°	S		S				S															T					T			T		
L	36	M	40.388762°	-74.623806°	S		T		T																	S					T			T		
L	37	M	40.389174°	-74.623982°	S		S		T		T															T								T		
L	38	M	40.389628°	-74.624146°	M		M				T			T												S							T	T		
L	39	M	40.390073°	-74.624322°	M		M		T																											T
L	40	M	40.390501°	-74.624507°	M		M		S		T			T												T								T		T
L	41	M	40.390908°	-74.624638°	S		S		T																	T								T		
L	42	M	40.39134°	-74.624881°	T		T				T															T								T		
L	43	M	40.391801°	-74.625003°	T		T		T		T															T								T		
L	44	M	40.39223°	-74.625153°	T				T		T			T												T										
L	45	M	40.392639°	-74.625324°																																
L	46	M	40.393067°	-74.625491°	T		T				T																									
L	47	M	40.393516°	-74.62569°																																
L	48	M	40.393937°	-74.62587°	T						T															T							T	T		
L	49	M	40.3944°	-74.626041°	T						T															T								T		
L	50	M	40.394823°	-74.626192°	T																					T								T		
L	51	M	40.395232°	-74.626359°	T																					T								T		
L	52	M	40.395684°	-74.626541°																																
L	53	M	40.396089°	-74.626712°	T		T																													
L	54	M	40.39654°	-74.626887°	T																					T								T		
L	55	M	40.396963°	-74.627013°	T																					T								T		
L	56	M	40.397414°	-74.627179°																																
L	57	M	40.397866°	-74.627283°	T				T																											
L	58	M	40.398308°	-74.627343°	T		T																			T					T			T		
L	59	M	40.39874°	-74.627396°	T		T																								T					
L	60	M	40.399197°	-74.62751°	T		T																													
M	1	M	40.399675°	-74.627633°	D						T															S								S		D
M	2	M	40.40008°	-74.627865°	D				T		T															T								T		D
M	3	M	40.400454°	-74.628253°	D					T	T															S								S		D
M	4	M	40.400777°	-74.628654°	D					T	T			T																			T		T	D
M	5	M	40.401099°	-74.629066°	S						T															S								S		S
M	6	M	40.401421°	-74.629478°	S					T																S							T	S		S

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
M	7	M	40.401725°	-74.629885°	M						T															T								T	T	M
M	8	M	40.40205°	-74.630316°	S		T			T	T															S							T	S		S
M	9	M	40.402371°	-74.630706°	M				T		T															T								T	T	S
M	10	M	40.402727°	-74.631082°	S		T				T			T																	T		T			S
M	11	M	40.403072°	-74.631426°	S																					T							T	T	T	T
M	12	M	40.403428°	-74.631784°	S		T							T												T							T	T		T
M	13	M	40.403786°	-74.63207°	S		T				T															T							T	T		T
M	14	M	40.404199°	-74.632359°	S						T			T												T							T	T		S
M	15	M	40.404567°	-74.632613°	M		T				T															S	T						T	S		S
M	16	M	40.405017°	-74.632831°	M						T															T							T	T		M
M	17	M	40.405458°	-74.632983°	T		T				T			T													T						T			T
M	18	M	40.405892°	-74.633078°	S						T			T																			T			S
M	19	M	40.406346°	-74.633136°	S		T			T	T			T												T						T	T	T		S
M	20	M	40.406805°	-74.633188°	M		T				T			T												S								S		S
M	21	M	40.407282°	-74.633209°	T						T															T					T		T	T		T
M	22	M	40.407723°	-74.633207°	S		T			T	T			T												T							T	T		S
M	23	M	40.40816°	-74.633138°	M						T			T												S	T				T		T	S		M
M	24	M	40.408615°	-74.633024°	S		T				T										T					T							T	T		S
M	25	M	40.40907°	-74.632918°	T		T																													T
M	26	M	40.409482°	-74.632808°	M																					T								T		M
M	27	M	40.409936°	-74.632657°	M					T	T															T								T		M
M	28	M	40.410384°	-74.63253°	S						T															T							T	T		S
M	29	M	40.410829°	-74.632346°	M						T															S								S		S
M	30	M	40.411242°	-74.632147°	M																					T								T		M
M	31	M	40.411672°	-74.631932°	M		T			T	T															S							T	S		M
M	32	M	40.412076°	-74.631693°	T						T															T					T				T	T
M	33	M	40.412509°	-74.631439°	S		S				T															T								T		T
M	34	M	40.4129°	-74.631187°	M		T				T		T													T							T	T		M
M	35	M	40.41332°	-74.630946°	S		T				T			T												T								T		S
M	36	M	40.41375°	-74.63067°	T		T				T															T								T		
M	37	M	40.414142°	-74.630421°	S		T				T		T													T								T		T
M	38	M	40.414557°	-74.63016°	M					T	T		T													T	T							T	T	M
M	39	M	40.414956°	-74.629933°	S						T															T							T	T		S
M	40	M	40.415361°	-74.629673°	M		T				T			T												S							T	S		M
M	41	M	40.415775°	-74.629407°	M				T	T	S	T														T							T	T		S
M	42	M	40.416177°	-74.629176°	D		T				S															T					T			T	T	D
M	43	M	40.416594°	-74.628909°	D		T			T	T															S								S		D
M	44	M	40.416972°	-74.628622°	D					T	T															S							T	M		D
M	45	M	40.4174°	-74.628368°	D					T	S			T												S								S		D
M	46	M	40.417806°	-74.628083°	D					T	S															T							T	T		D
M	47	M	40.418208°	-74.627875°	D					T	T															S							T	S		D
M	48	M	40.418604°	-74.627661°	D		T				T															S							T	S		D
M	49	M	40.419038°	-74.627404°	D					T	S										T					M							T	M		D
M	50	M	40.419446°	-74.627138°	M						T															S								S		M
M	51	M	40.419868°	-74.626884°	D						T															T							T	T		D
M	52	M	40.420161°	-74.626704°	S		T				T															T								T		S
M	53	M	40.420555°	-74.626461°	M						T									T						S							T	S		M
M	54	M	40.420956°	-74.626208°	D						T									T						S							T	S		D
M	55	M	40.421374°	-74.625963°	M						T									S						S							T	S		M

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
M	56	M	40.42177°	-74.625663°	S					T	T									T						S							T	S		S
M	57	M	40.422143°	-74.62534°	D		T			T	T															S							T	S		D
M	58	M	40.422532°	-74.624997°	D		T			T	S															S							T	S		D
M	59	M	40.422869°	-74.624673°	D		S			T	S															S							T	S		D
M	60	M	40.423246°	-74.624282°	D						T															S							T	S		D
M	61	M	40.423608°	-74.623885°	M						T															S								S		M
M	62	M	40.423993°	-74.623494°	D		T													T						T							T	T	T	D
M	63	M	40.424326°	-74.623092°	D		T				T															T								T		S
M	64	M	40.424657°	-74.622692°	M						T									T						T					T			T		M
M	65	M	40.424991°	-74.622318°	S						T															T					T			T		S
M	66	M	40.425331°	-74.621869°	S																					T							T	T		S
M	67	M	40.425672°	-74.621495°	M						T															S								S		M
M	68	M	40.425973°	-74.621077°	D															M						S								S		D
M	69	M	40.426346°	-74.620692°	D						T															S								S	T	D
M	70	M	40.426701°	-74.620319°	M																					T								T		M
M	71	M	40.427054°	-74.619953°	D						T															T								S		D
M	72	M	40.427408°	-74.619583°	D		T				T															T						T		S		D
M	73	M	40.427773°	-74.619259°	D																					T								T		D
M	74	M	40.428166°	-74.618952°	D		T				T									T						T							T	T	T	D
M	75	M	40.428564°	-74.618688°	S						T															T								T		S
M	76	M	40.428938°	-74.618442°	S						T															T								S		S
M	77	M	40.430131°	-74.617583°	D		T				T															M								M		D
M	78	M	40.430556°	-74.617364°	M		T				T															M								M		M
M	79	M	40.430951°	-74.617099°	M		T				T															M								M		D
M	80	M	40.431339°	-74.616773°	D		T				T															D		T						M		D
M	81	M	40.431753°	-74.616519°	M		T				S															M								M		D
M	82	M	40.432147°	-74.616251°	D		T				T															D								D		D
M	83	M	40.432564°	-74.615998°	M		T																			M								S		D
M	84	M	40.433014°	-74.615766°	M		T				T															M								M		S
M	85	M	40.433428°	-74.615624°	S		T																			S								S		T
M	86	M	40.43388°	-74.615454°	M		T				T															M								M		D
M	87	M	40.434331°	-74.61532°	M		T				T															M		S						S		D
M	88	M	40.434746°	-74.615149°	S		T				T															S		T						T		S
M	89	M	40.435192°	-74.615026°	S		T				T															S								S		D
M	90	M	40.435625°	-74.614881°	M		T				T															M								S		M
M	91	M	40.436033°	-74.61468°	D		T				T															D		T						M		D
M	92	M	40.436505°	-74.614577°	S		T				T															S								S		M
M	93	M	40.436925°	-74.614395°	S		T				T															S								S		M
M	94	M	40.43735°	-74.614199°	D		T				T															D		T						M		D
M	95	M	40.437787°	-74.61404°	S		T				T															S								T		M
N	1	M	40.43824°	-74.613854°	S																					T								T		S
N	2	M	40.43867°	-74.61364°	M																					T								T		M
N	3	M	40.439063°	-74.613413°	T																					T								T		
N	4	M	40.439493°	-74.613231°	M		T				T															T								T		M
N	5	M	40.439911°	-74.613003°	D		T																			T							T	T		D
N	6	M	40.440322°	-74.612778°	T						T															T								T		
N	7	M	40.440752°	-74.612524°	M						T															T								S		M
N	8	M	40.441162°	-74.612271°	D						T															T							T	T		D
N	9	M	40.441549°	-74.611972°	S																					T		T						S		T

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
N	10	M	40.441931°	-74.61163°	S																					T								T		S
N	11	M	40.442278°	-74.611326°	T																					T								T		T
N	12	M	40.442636°	-74.610933°	S																					T								T		S
N	13	M	40.442973°	-74.610576°	M						T															S								S		M
N	14	M	40.44328°	-74.610131°	S						T															T								T		S
N	15	M	40.443577°	-74.609654°	T						T															T								T		T
N	16	M	40.443874°	-74.60919°	M						T															S	T				T			S		M
N	17	M	40.444146°	-74.608734°	M						T															S								S		M
N	18	M	40.444408°	-74.608258°	S						T															T								S		S
N	19	M	40.444654°	-74.607767°	S						T															S		T						S		S
N	20	M	40.44491°	-74.607291°	M						T															S								S		M
N	21	M	40.445175°	-74.606803°	M						T															S		T						S		M
N	22	M	40.445446°	-74.606333°	S						T															S		T						S		S
N	23	M	40.445713°	-74.605838°	S						T															S								S		S
N	24	M	40.445972°	-74.605361°	S																					T								S		
N	25	M	40.446228°	-74.604857°	S						T															T								S		T
N	26	M	40.446486°	-74.604391°	S																					S								S		
N	27	M	40.446745°	-74.603907°	S																					S								S		T
N	28	M	40.447009°	-74.603463°	M						T															T								S		S
N	29	M	40.447259°	-74.602954°	S						T															T								T		S
N	30	M	40.447515°	-74.602497°	S						T															S								S		S
N	31	M	40.447794°	-74.602007°	M						T															S	T							M		M
N	32	M	40.448048°	-74.601524°	S						T															S	T							S		S
N	33	M	40.4483°	-74.601048°	M						T															S						T		S		M
N	34	M	40.448547°	-74.600558°	M		T																			S						T		S		S
N	35	M	40.448817°	-74.600088°	S						T															S								S		T
N	36	M	40.449061°	-74.599606°	S		T				T															S								S		T
N	37	M	40.449333°	-74.599112°	T		T																			T								T		T
N	38	M	40.449584°	-74.598645°	T		T																			T								T		T
N	39	M	40.449843°	-74.598168°	S						T															T								S		T
N	40	M	40.450115°	-74.597661°	S						T															S								S		S
N	41	M	40.450372°	-74.597208°	M						T															S					T			M		M
N	42	M	40.450662°	-74.596699°	S		T				T															S								S		S
N	43	M	40.450901°	-74.596197°	S						T															S		T						S		S
N	44	M	40.451181°	-74.595737°	S						T															S		T			T			S	T	S
N	45	M	40.451469°	-74.595303°	S						T															S								S		T
N	46	M	40.451792°	-74.594884°	S						T															S								S	T	T
N	47	M	40.452109°	-74.594434°	S						T															T								S		S
N	48	M	40.452439°	-74.594023°	S																					S								S		T
N	49	M	40.452763°	-74.593634°	S																					S								S		T
N	50	M	40.453116°	-74.593254°	S																					T								T		S
N	51	M	40.453443°	-74.592859°	M		T																			S								M	T	S
N	52	M	40.453817°	-74.592469°	M						T															S								S		S
N	53	M	40.45413°	-74.592092°	S																					T								S		T
N	54	M	40.454483°	-74.59171°	S						T															T	T	T						T		T
N	55	M	40.454831°	-74.591306°	T						T															T		T						T		T
N	56	M	40.455173°	-74.590909°	T																					T								T		T
N	57	M	40.455499°	-74.590544°	M						T															S					T			S		T
N	58	M	40.455839°	-74.59016°	M						T																				T				T	M

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
N	59	M	40.456172°	-74.589788°	M						T															S		T						S		M
N	60	M	40.456548°	-74.589385°	T																					T								T		T
N	61	M	40.456849°	-74.588993°	S						T															S								S	T	S
N	62	M	40.457199°	-74.58857°	S		T				T															T								S	T	S
N	63	M	40.457516°	-74.588119°	D						T															T		T			T			T		D
N	64	M	40.457791°	-74.587692°	T																					T								T	T	T
N	65	M	40.45807°	-74.587256°	T						T															T								T		T
N	66	M	40.458345°	-74.586782°	S		T																			T								S		
N	67	M	40.458623°	-74.586306°	S																					S								S		T
N	68	M	40.458915°	-74.58585°	S						T															S								S		T
N	69	M	40.459186°	-74.585386°	D						T															S								M		D
N	70	M	40.459458°	-74.584904°	S		T				T															T								T		
N	71	M	40.459726°	-74.584443°	S						T															T								S		S
N	72	M	40.46002°	-74.584011°	S																					S								S		T
N	73	M	40.460302°	-74.583512°	T																					T								T		T
N	74	M	40.460573°	-74.58306°	D						T															S								S		D
N	75	M	40.460873°	-74.58261°	M						T															S								S		M
O	1	M	40.461198°	-74.5822°	S		T																			T								T		S
O	2	M	40.461519°	-74.581779°	S		T				T															S										S
O	3	M	40.461832°	-74.581352°	S		T																			S										T
O	4	M	40.462158°	-74.580932°	M		T				T															M								T		T
O	5	M	40.462492°	-74.580519°	S		T																			S										T
O	6	M	40.462815°	-74.580101°	S		T																			S										S
O	7	M	40.463141°	-74.579674°	M																					M								T		S
O	8	M	40.46343°	-74.579306°	S		T																			S										T
O	9	M	40.463749°	-74.578842°	S																					S										S
O	10	M	40.464031°	-74.578414°	S		T																			S	T	T								T
O	11	M	40.464306°	-74.577927°	S		T																			S								T		T
O	12	M	40.464568°	-74.577444°	S						T															S								T		T
O	13	M	40.46484°	-74.57694°	S																					S								S		S
O	14	M	40.465079°	-74.576473°	M		T																			S								S		S
O	15	M	40.465367°	-74.576004°	S																					S								S		S
O	16	M	40.46568°	-74.57556°	T																					T								T		T
O	17	M	40.466005°	-74.575152°	M																					S								S		M
O	18	M	40.466316°	-74.574785°	M		T				T															S								M		M
O	19	M	40.466668°	-74.574367°	M						T															S								S		M
O	20	M	40.467002°	-74.574041°	M		T																			S								S		M
O	21	M	40.467392°	-74.573722°	S						T															S								S		S
O	22	M	40.467781°	-74.573443°	M																					S		T						S		S
O	23	M	40.468151°	-74.573089°	T		T																			T								S		T
O	24	M	40.468552°	-74.572776°	S						T															S								S		S
O	25	M	40.468934°	-74.57247°	D		T				T															S								S		D
O	26	M	40.469317°	-74.572175°	D		T																			S								S		D
O	27	M	40.469721°	-74.571874°	S																					T								S		S
O	28	M	40.470138°	-74.571673°	M																					S								S		S
O	29	M	40.470593°	-74.571515°	S		T																			S								S		S
O	30	M	40.471053°	-74.571404°	S		T				T															S	T							M		S
O	31	M	40.471512°	-74.571327°	M						T															S	T							S		M
O	32	M	40.471957°	-74.571296°	M		T				T															S								M		M

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
O	33	M	40.472409°	-74.571279°	M																					S								S		S
O	34	M	40.472843°	-74.571294°	S		T				S															S								S		S
O	35	M	40.473319°	-74.57137°	M		T				T															T	T						T	S		M
O	36	M	40.473759°	-74.57146°	S		T																			T								T		S
O	37	M	40.474215°	-74.57155°	M		T																			S								S		M
O	38	M	40.474629°	-74.571658°	M		T				S															T	T					T		S		M
O	39	M	40.475076°	-74.57182°	M		T				T															T								S		M
P	1	M	40.475514°	-74.57202°	S																					T								T		T
P	2	M	40.475928°	-74.572151°	S						T															T								S		S
P	3	M	40.476381°	-74.572449°	S						T															T						T		T		S
P	4	M	40.476756°	-74.57279°	S																					T								T		S
P	5	M	40.477093°	-74.573133°	S																					S								S		S
P	6	M	40.477472°	-74.573479°	S						T															T								T		S
P	7	M	40.477833°	-74.573817°	S						S															T								S		S
P	8	M	40.478214°	-74.574094°	S						T															T								T		T
P	9	M	40.478617°	-74.574315°	S					T	T															T								T		S
P	10	M	40.479043°	-74.574588°	S						T															T						T		S		S
P	11	M	40.479397°	-74.574859°	S						S															T								T		S
P	12	M	40.479818°	-74.575114°	S						T															T								S		S
P	13	M	40.480215°	-74.575377°	S						T															T						T		T		S
P	14	M	40.480622°	-74.575608°	T						T															T						T		T		T
P	15	M	40.481071°	-74.575788°	T						T															T					T			T		T
P	16	M	40.481503°	-74.575954°	T						T																					T				T
P	17	M	40.481929°	-74.576102°	S						S															T						T		T		T
P	18	M	40.48237°	-74.576241°	M						M															T								T		T
P	19	M	40.482816°	-74.576398°	S						S															T								T		T
P	20	M	40.483243°	-74.576544°	S																					S								S		
P	21	M	40.483683°	-74.576686°	S																					T								S		S
P	22	M	40.48414°	-74.576817°	S																					S								S		T
P	23	M	40.484576°	-74.576994°	T						T															T								T		
P	24	M	40.48499°	-74.577121°	T						T															T	T					T		T		
P	25	M	40.485449°	-74.577264°	T						T															T	T						T	T		
P	26	M	40.485893°	-74.577408°	T						T															T						T		T		
P	27	M	40.486312°	-74.577568°	T																					T					T			T		T
P	28	M	40.486749°	-74.577683°	T						T																									T
P	29	M	40.48721°	-74.577838°	S																					T								S		
P	30	M	40.487624°	-74.577984°	T						T															T							T	T		T
P	31	M	40.488068°	-74.578125°	S																					T						T	T	S		
P	32	M	40.488486°	-74.578258°	T						T															T								T		T
P	33	M	40.48893°	-74.578412°	T						T															T								T		
P	34	M	40.489381°	-74.578551°	S						T															T							T	S		T
P	35	M	40.489814°	-74.578695°	S						T															S							T	S		
P	36	M	40.490265°	-74.578839°	T																					T							T	T		T
P	37	M	40.490706°	-74.578971°	S						T															T							T	S		T
P	38	M	40.491125°	-74.579126°	S		T				T															T						T		S		S
P	39	M	40.491558°	-74.579258°	M						T															S								S		M
P	40	M	40.491989°	-74.579402°	T																					T								T		T
P	41	M	40.492434°	-74.579558°	S																					T		T						T		S
P	42	M	40.492841°	-74.579724°	T																					T								T		T

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
P	43	M	40.493283°	-74.579923°	S																															S
P	44	M	40.493699°	-74.580149°	S						T															T		T						S		S
P	45	M	40.494148°	-74.580368°	S						T															T								S		T
P	46	M	40.494538°	-74.580628°	S						T															T	T							S		S
P	47	M	40.494949°	-74.58088°	M																					S								S		S
P	48	M	40.495349°	-74.581134°	S						T															T	T					T		T		S
P	49	M	40.495771°	-74.581386°	S						T															T								T		S
P	50	M	40.496171°	-74.581636°	S						T															S								S		T
P	51	M	40.496571°	-74.581886°	M						T															T								S		S
P	52	M	40.496997°	-74.582141°	M						T															S							T	M		M
P	53	M	40.497394°	-74.582432°	M						T															S								S		M
P	54	M	40.497787°	-74.582738°	M																					S								S		M
P	55	M	40.49816°	-74.583049°	S						T															S						T		S		S
P	56	M	40.498538°	-74.583352°	S						T															T								S		S
P	57	M	40.498896°	-74.583752°	S						T															S								T		T
P	58	M	40.499276°	-74.584021°	S						T															S								S		T
P	59	M	40.499709°	-74.584209°	M						S															S								S		S
P	60	M	40.500167°	-74.584317°	S						T															S								S		T
P	61	M	40.500615°	-74.584296°	S		T				T															S								S		T
P	62	M	40.501067°	-74.584229°	S						T															T						T		T		S
P	63	M	40.501486°	-74.584094°	T						T															T								T		T
P	64	M	40.501894°	-74.583913°	T																					T								T		
P	65	M	40.502352°	-74.583663°	T																					T								T		T
P	66	M	40.502717°	-74.583371°	S																					S								S		S
P	67	M	40.50306°	-74.58295°	D						S															M								D		D
Q	1	M	40.503403°	-74.582543°	S		T				T															T								T		T
Q	2	M	40.503689°	-74.582143°	S		T																			T						T		T		T
Q	3	M	40.504051°	-74.581739°	T						T															T								T		T
Q	4	M	40.504389°	-74.581344°	S		T				S															S		T						S		S
Q	5	M	40.504715°	-74.580918°	S		T				T															S		T				T		S		S
Q	6	M	40.505018°	-74.580501°	T		T																			T						T		T		
Q	7	M	40.505304°	-74.580051°	S		T				T															S								S		T
Q	8	M	40.505621°	-74.579655°	S		T				S															S		T						S		S
Q	9	M	40.505919°	-74.579178°	S		T				T															S		T				T		S		S
Q	10	M	40.50619°	-74.578712°	S		T				T															S		T				T	T	S	T	S
Q	11	M	40.506501°	-74.578289°	S						T															S								S	T	S
Q	12	M	40.506803°	-74.577833°	S		T				T															S							T	S		T
Q	13	M	40.50711°	-74.577421°	S		T				T															S		T						S	T	T
Q	14	M	40.507478°	-74.577065°	S		T				S														T	S								S		T
Q	15	M	40.507869°	-74.576767°	S		T				T															S		T						S	T	T
Q	16	M	40.508255°	-74.576466°	S						T															S							T	S		T
Q	17	M	40.508673°	-74.576194°	S		T				S															T							T	T		
Q	18	M	40.509097°	-74.575952°	T		T				T															T								T		
Q	19	M	40.509496°	-74.575723°	M		T				T															S		T					T	S		M
Q	20	M	40.5099°	-74.575465°	D						S															T						T	T	T	T	D
Q	21	M	40.510319°	-74.575291°	D		T				S															S								S		D
Q	22	M	40.510776°	-74.575093°	T		T																			T								T		
Q	23	M	40.511182°	-74.574901°	T		T																			T							T	T		
Q	24	M	40.511654°	-74.574821°	T						T															T							T	T	T	

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
Q	25	M	40.512116°	-74.574864°	S		T				S														T	T						T	T	T	T	S
Q	26	M	40.512559°	-74.574903°	S		T				S															S						T		S		S
Q	27	M	40.513021°	-74.575014°	T		T				T															T							T	T	T	
Q	28	M	40.513451°	-74.575133°	S		T				S															T		T				T	S	T		T
Q	29	M	40.513896°	-74.575262°	M		T				S															S							T	S	T	S
Q	30	M	40.514324°	-74.575437°	S		T				T															S							T	S		
Q	31	M	40.514752°	-74.575716°	M		T				M															S		T					T	S		T
Q	32	M	40.515153°	-74.575999°	M		T				T										T						S						T	T	S		M
Q	33	M	40.515482°	-74.576423°	M		T				S															S								S		S
Q	34	M	40.515823°	-74.576802°	S		T				S															S		T					T	S	T	T
Q	35	M	40.516156°	-74.577226°	S						S															T							T	T		T
Q	36	M	40.516474°	-74.577637°	S		T				T															S								S	T	
Q	37	M	40.516789°	-74.578058°	S		T				S															T								T	T	S
Q	38	M	40.517049°	-74.578527°	S						T															T								T	T	S
Q	39	M	40.517296°	-74.578997°	S		T				T															S							T	S		T
Q	40	M	40.517594°	-74.579488°	S						T															S		T						S	T	S
Q	41	M	40.517822°	-74.579989°	S						T															T								T	T	T
Q	42	M	40.518061°	-74.580483°	S		T				T															T		T						T	T	S
Q	43	M	40.518283°	-74.581°	S		T				T															S							T	S	T	
Q	44	M	40.51856°	-74.581515°	T						T															T								T		
Q	45	M	40.518785°	-74.582002°	S		T				S															T								T	T	T
Q	46	M	40.51905°	-74.582482°	M		S				T															T								T		T
Q	47	M	40.519301°	-74.582968°	T		T				T															T						T	T	T	T	T
Q	48	M	40.519562°	-74.583403°	T		T																			T								T	T	
Q	49	M	40.519875°	-74.583757°	S		T				T															S								S		
Q	50	M	40.5203°	-74.583999°	S						S															S							T	S		
Q	51	M	40.520713°	-74.584235°	S						T															T						T		T		T
Q	52	M	40.521164°	-74.584359°	S		T				S															T								T		
Q	53	M	40.521616°	-74.584541°	S		T				S															S							T	S	T	S
Q	54	M	40.522047°	-74.584633°	M						M		T													M						S		M		M
Q	55	M	40.522488°	-74.584722°	M						S								T							S							T	S		M
Q	56	M	40.522932°	-74.584683°	M						S								T							S							T	S		M
Q	57	M	40.523388°	-74.584645°	M						S															S		T					S	S		S
Q	58	M	40.523853°	-74.584549°	D						S															M								M		D
Q	59	M	40.524288°	-74.584387°	M						S								T							T								T	T	S
Q	60	M	40.524746°	-74.584208°	S						S															T						T		T	T	T
Q	61	M	40.525134°	-74.584016°	D						S								T							S							T	S	T	D
Q	62	M	40.525494°	-74.583679°	D						T															S						T		S	T	D
Q	63	M	40.525901°	-74.583373°	M						T															S						S		S	T	M
Q	64	M	40.526297°	-74.583101°	S						T															S								S	T	S
Q	65	M	40.526719°	-74.582845°	M						S															T							T	T	S	M
Q	66	M	40.527136°	-74.58262°	S						T															T								T		S
Q	67	M	40.527554°	-74.582379°	S						S															S						T	T	S	T	M
Q	68	M	40.527981°	-74.582198°	S																					T							T	T	T	M
Q	69	M	40.528416°	-74.582013°	S						T															S						S	T	S	T	S
R	1	M	40.52883°	-74.581854°	T						T															T								T		T
R	2	M	40.529268°	-74.581665°	D						T															S								S		D
R	3	M	40.529705°	-74.58149°	S																					S						T		S		S
R	4	M	40.530151°	-74.581319°	M																					T						T		S		M

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Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
R	5	M	40.530554°	-74.581165°	S																					S								S		S
R	6	M	40.530998°	-74.58099°	M																					S						T		M		S
R	7	M	40.531424°	-74.580822°	M						S															S					T	T		S		M
R	8	M	40.531883°	-74.580636°	S						T															T	T							T		S
R	9	M	40.532304°	-74.580465°	T						T															T						T		T		
R	10	M	40.532727°	-74.580284°	S						T															T								T		T
R	11	M	40.533175°	-74.580085°	T																					T								T		T
R	12	M	40.533588°	-74.579842°	T						T															T								T		T
R	13	M	40.53399°	-74.57954°							T															T								T		
R	14	M	40.534359°	-74.579247°	T																					T								T		
R	15	M	40.534741°	-74.578894°	S						T															T							T	T	T	S
R	16	M	40.535089°	-74.578517°	T																												T			T
R	17	M	40.535396°	-74.578103°	M						T															T							T	T	T	M
R	18	M	40.535714°	-74.577639°	T						T															T								T		
R	19	M	40.53598°	-74.577153°	M						S															S							T	S		M
R	20	M	40.536275°	-74.576673°	D						T															S								S	S	D
R	21	M	40.536541°	-74.576202°	M						T															T								T	T	M
R	22	M	40.536788°	-74.57569°	S						T															T							T	T		S
R	23	M	40.537038°	-74.575221°	T						T															T								T		T
R	24	M	40.537308°	-74.574761°	S		T				T															S								S		T
R	25	M	40.537573°	-74.574279°	S						T															S								S		T
R	26	M	40.53784°	-74.573799°	S						T															T							T	T		S
R	27	M	40.538117°	-74.573317°	T						T															T							T	T		T
R	28	M	40.538373°	-74.572843°	T																					T							T	T		T
R	29	M	40.538635°	-74.572369°	S						T															T								S		
R	30	M	40.538933°	-74.571886°	T						T															T								T	T	
R	31	M	40.53921°	-74.57142°	T		T				T															T								T		T
R	32	M	40.539473°	-74.570967°	T																					T								T		
R	33	M	40.539751°	-74.570487°	S						T															T								S		T
R	34	M	40.540027°	-74.570006°	D						S															S						T	T	S		D
R	35	M	40.540281°	-74.569538°	D		T				S															S						T	T	M		D
R	36	M	40.540553°	-74.569025°	S		T				T															T								T		S
S	1	M	40.541255°	-74.567642°	S		S				T															T							T	T		T
S	2	M	40.541567°	-74.56712°	M		M				T															S							T	T		
S	3	M	40.541846°	-74.56664°	D		M				T															S								S		
S	4	M	40.542081°	-74.566172°	D		D				T															S							T	S		
S	5	M	40.542399°	-74.565707°	S		S				S															S								S		
S	6	M	40.542653°	-74.56522°	T		T																			T								T		T
S	7	M	40.542937°	-74.564746°	M		M				T															T							T	T		
S	8	M	40.543151°	-74.564204°	S		S				T															S								S		
S	9	M	40.543345°	-74.563674°	T		T																			T								T		
S	10	M	40.543507°	-74.563129°	T		T				T															T								T		
S	11	M	40.543689°	-74.562572°	M		S																			S								S		
S	12	M	40.543884°	-74.562045°	S		T				T															S								T		
S	13	M	40.544089°	-74.561532°	T		T				T															T								T		
S	14	M	40.544371°	-74.561048°	T																					T								T		
S	15	M	40.544628°	-74.560554°	M		S				T															T								T		
S	16	M	40.54491°	-74.56008°	D		D				T															T								T		
S	17	M	40.545239°	-74.559674°	T																					T								T		

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
S	18	M	40.545546°	-74.559268°	S		S				T															S								S		
S	19	M	40.545867°	-74.558838°	S		T				T															S								S		
S	20	M	40.546176°	-74.558415°	S																					S								S		
S	21	M	40.546481°	-74.55797°	S		T				T															T								T	T	
S	22	M	40.546794°	-74.557498°	S						T															S								S		
S	23	M	40.547093°	-74.557087°	M		M				T															T								T		
S	24	M	40.547375°	-74.556619°	S		T																			S								S		
S	25	M	40.547694°	-74.556209°	S		T				T															S							T	S		
S	26	M	40.548002°	-74.555757°	M		M				S															T								S		
S	27	M	40.548279°	-74.555298°	S		T				T															T								S		
S	28	M	40.548538°	-74.554826°	S		T																			T								T		
S	29	M	40.548777°	-74.554288°	S		T				T															T								S		
S	30	M	40.548989°	-74.553771°	S		S				T															T								T		
S	31	M	40.549219°	-74.55325°	S		T				T															T								T		
S	32	M	40.549357°	-74.552736°	S						S															T						T		S		
S	33	M	40.54959°	-74.552181°	S						S															S						T		S		
S	34	M	40.549786°	-74.551667°	S		S				S															T								S		
S	35	M	40.54999°	-74.551122°	S		S				S															T								T		T
S	36	M	40.550194°	-74.550571°	S		T				T															T							T	S		
S	37	M	40.55037°	-74.550055°	S		S				T															T							T	T		T
S	38	M	40.550565°	-74.549512°	T																					T								T		
S	39	M	40.550808°	-74.548998°	M		M				T															T								T		T
S	40	M	40.55098°	-74.548445°	S		T				T															T								T	T	T
S	41	M	40.551109°	-74.547893°	S		S				T															T							T	T		
S	42	M	40.551283°	-74.547292°	S		T				T															T								T		
S	43	M	40.551518°	-74.546782°	M		M				T															S								S		
S	44	M	40.551832°	-74.546337°	M		M		T		T															S								S		
S	45	M	40.552161°	-74.545931°	T		T				T															T							T	T		
S	46	M	40.552525°	-74.545548°	S		S				S															T								T		
S	47	M	40.552862°	-74.545194°	T		T		T		T															T								T		T
S	48	M	40.553228°	-74.544828°	S		S				T															T						T		T		
S	49	M	40.5535°	-74.544339°	M		M				T															T						S		T		
S	50	M	40.553783°	-74.543889°	M		M				T															T						T		T		
S	51	M	40.554111°	-74.54345°	S		S				T															T								T		T
S	52	M	40.554392°	-74.542996°	S		S		T		T															S						T		S		
S	53	M	40.554647°	-74.542526°	M		M				S															S						T		S		T
S	54	M	40.554916°	-74.542033°	S		S																			S								S		
S	55	M	40.555187°	-74.541545°	M		M				T															T								T		
S	56	M	40.555431°	-74.541074°	T		T				T															T							T	T		
S	57	M	40.555716°	-74.540592°	S		T				T															T								T		
S	58	M	40.555972°	-74.54011°	T		T				T															T								T		
S	59	M	40.556213°	-74.539652°	S						T															S								S	T	
S	60	M	40.556466°	-74.539176°	S		T				S															S						T		S		T
S	61	M	40.55672°	-74.538653°	M		S				S															S								S		
S	62	M	40.556978°	-74.538112°	S		T				T															S						T	T	S		
S	63	M	40.557229°	-74.537687°	M		T			T	S															S								S		S
S	64	M	40.557467°	-74.537187°	S						S															S						T		S		S
S	65	M	40.557677°	-74.536656°	T				T		T															T						T		T		T
S	66	M	40.557905°	-74.536113°	S																					S						T		S		T

Delaware and Raritan Canal - Sections A-W
Aquatic Vegetation Survey
August 9, 2017 - September 15, 2017

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
S	67	M	40.558037°	-74.535497°	S		T				T															S						T		S	T	T
S	68	M	40.558179°	-74.535002°	S						T															S						T	T	S		
S	69	M	40.55831°	-74.53439°	M						T								T							T						S		T		M
S	70	M	40.558412°	-74.53385°	D						T								T							T							T	T		D
S	71	M	40.558518°	-74.53325°	M		T				S															S						T	T	S		M
S	72	M	40.558613°	-74.532684°	M						S															S						T	T	S		M
S	73	M	40.558669°	-74.532076°	M		S				S															S								S		S
S	74	M	40.55877°	-74.53152°	D						S															M						T		M		D
T	1	M	40.558841°	-74.530939°	T																					T								T		
T	2	M	40.558861°	-74.530344°	T																					T								T		
T	3	M	40.558867°	-74.529723°	T		T				T															T								T		
T	4	M	40.558791°	-74.529124°	S		T				T															S								S		
T	5	M	40.558738°	-74.528532°	M						T															S								S		
T	6	M	40.558646°	-74.527868°	T		T																			T								T		
T	7	M	40.558542°	-74.527371°	T		T				T															T								T		
T	8	M	40.558408°	-74.526804°	S		T				T															S								T		
T	9	M	40.55825°	-74.526245°	M		T				T															M								S		T
T	10	M	40.558056°	-74.525746°	S		T																			S								S		T
T	11	M	40.557854°	-74.525201°	M		T																			M								S		
T	12	M	40.55763°	-74.524708°	S																					S								S		
T	13	M	40.557379°	-74.524165°	M		M																			S								T		
T	14	M	40.557096°	-74.523737°	M		S																			M								S		
T	15	M	40.556801°	-74.523311°	S																					S								S		
T	16	M	40.5565°	-74.522887°	M		S																			M								M		
T	17	M	40.55615°	-74.522466°	M		M				T															M								T		
T	18	M	40.555806°	-74.52211°	D		D																			S								T		
T	19	M	40.555462°	-74.521784°	M		M																			M								T		
T	20	M	40.555099°	-74.521455°	D		D																			M								T		
T	21	M	40.554656°	-74.521203°	M		S				T															S								S		
T	22	M	40.554254°	-74.520951°	M		S																			M								S		
T	23	M	40.553818°	-74.520781°	M		S				T															M								S		T
T	24	M	40.55343°	-74.520556°	S		S				T															S								T		
T	25	M	40.553014°	-74.520331°	D		D				T															S								T		
T	26	M	40.552608°	-74.520098°	M		M				T															M								T		T
T	27	M	40.552181°	-74.519866°	D		D																			M								T		
T	28	M	40.551711°	-74.51976°	M		M																			M								S		
T	29	M	40.551302°	-74.519638°	D		D																			D								S		
T	30	M	40.550839°	-74.519621°	M		M																			M								S		
T	31	M	40.550376°	-74.519477°	M		S																			S								T		
T	32	M	40.549937°	-74.519456°	M		S																			M								T		
T	33	M	40.549505°	-74.519308°	M		M																			M								T		
T	34	M	40.549033°	-74.519289°	M		S				T															M								S		
T	35	M	40.548615°	-74.519273°	S		S				T															T								T		
T	36	M	40.548154°	-74.51926°	M		M				T															S								T		
T	37	M	40.547713°	-74.519278°	M		M				T															S								T		
T	38	M	40.547284°	-74.519283°	S		T				T															T						T		T		
T	39	M	40.546812°	-74.519152°	S		T				T															T								T		
T	40	M	40.546398°	-74.518947°	M		M				T															T								T		
T	41	M	40.545914°	-74.518808°	D		D				T															S								T		T

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
T	42	M	40.545509°	-74.51863°	M		M				T															T								T		
T	43	M	40.545089°	-74.51838°	M		M																			M								S		
T	44	M	40.544686°	-74.518103°	S		T				T															S								S		
T	45	M	40.544253°	-74.517881°	T						T															T								T		T
T	46	M	40.543856°	-74.51765°	S		T				T															T								T		
T	47	M	40.54346°	-74.517357°	D		D				S															T								T		
T	48	M	40.543066°	-74.517093°	D		D				T															T								T		
T	49	M	40.542721°	-74.516659°	T		T				T															T								T		
T	50	M	40.542347°	-74.51632°	S		S																			T								T		T
T	51	M	40.542004°	-74.515932°	D		D				S															M							T	S		T
T	52	M	40.541634°	-74.51551°	M		M				T															S								S		S
T	53	M	40.541392°	-74.515055°	M		M				T															S								S		S
T	54	M	40.541027°	-74.514687°																																
U	1	M	40.540435°	-74.513797°	T																					T								T		
U	2	M	40.540132°	-74.513337°	T																					T								T		
U	3	M	40.539875°	-74.512887°	M		M																			T								T		
U	4	M	40.539542°	-74.512279°	T																					T								T		
U	5	M	40.539305°	-74.51194°	S																					S								S		
U	6	M	40.538975°	-74.511498°	D		D				T															T								T		
U	7	M	40.538711°	-74.511027°	D		D				T															T								T		
U	8	M	40.53843°	-74.510577°	S		S																			T								T		
U	9	M	40.53812°	-74.510145°	D		D				T															T								S		
U	10	M	40.537821°	-74.509692°	D		D				T															T								T		
U	11	M	40.537518°	-74.509245°	S		S				T															T								S		
U	12	M	40.537249°	-74.508804°	M		S				T															S								S		
U	13	M	40.536953°	-74.508386°	S		S				T															T								T		
U	14	M	40.536696°	-74.507873°	M		S				T															S								S		
U	15	M	40.5364°	-74.507441°	M		M				T															T								S		
U	16	M	40.536145°	-74.506961°	M		M				T															T								S		
U	17	M	40.535843°	-74.506512°	S		T																			T								S		
U	18	M	40.535521°	-74.506081°	D		D				T															S								S		
U	19	M	40.535253°	-74.5056°	M		M				T															T								S		
U	20	M	40.534983°	-74.505139°	M		M																			T								T		
U	21	M	40.534726°	-74.504667°	M		M				T															T								T		
U	22	M	40.53442°	-74.504184°	D		D																			S								S		
U	23	M	40.534159°	-74.503751°	D		D				T															S								S		
U	24	M	40.533857°	-74.503268°	D		D																			T								T		
U	25	M	40.533595°	-74.502823°	M		M																			S								S		
U	26	M	40.533314°	-74.502319°	S		T																			S								T		
U	27	M	40.53306°	-74.501826°	D		D				T															T								T		
U	28	M	40.532787°	-74.50138°	M		S				T															S								S		
U	29	M	40.532493°	-74.500911°	M		S				T															S								T		
U	30	M	40.532237°	-74.500434°	M		M				T															S								T		
U	31	M	40.531941°	-74.499994°	M		M																			S								T		
U	32	M	40.531664°	-74.499492°	M		S																			S								S		
U	33	M	40.531369°	-74.499033°	M		M				T															T								T		
U	34	M	40.531073°	-74.49856°	S		T																			T								T		
U	35	M	40.530766°	-74.498139°	S		S																			T								T		
U	36	M	40.530438°	-74.49771°	S		S																			S								S		

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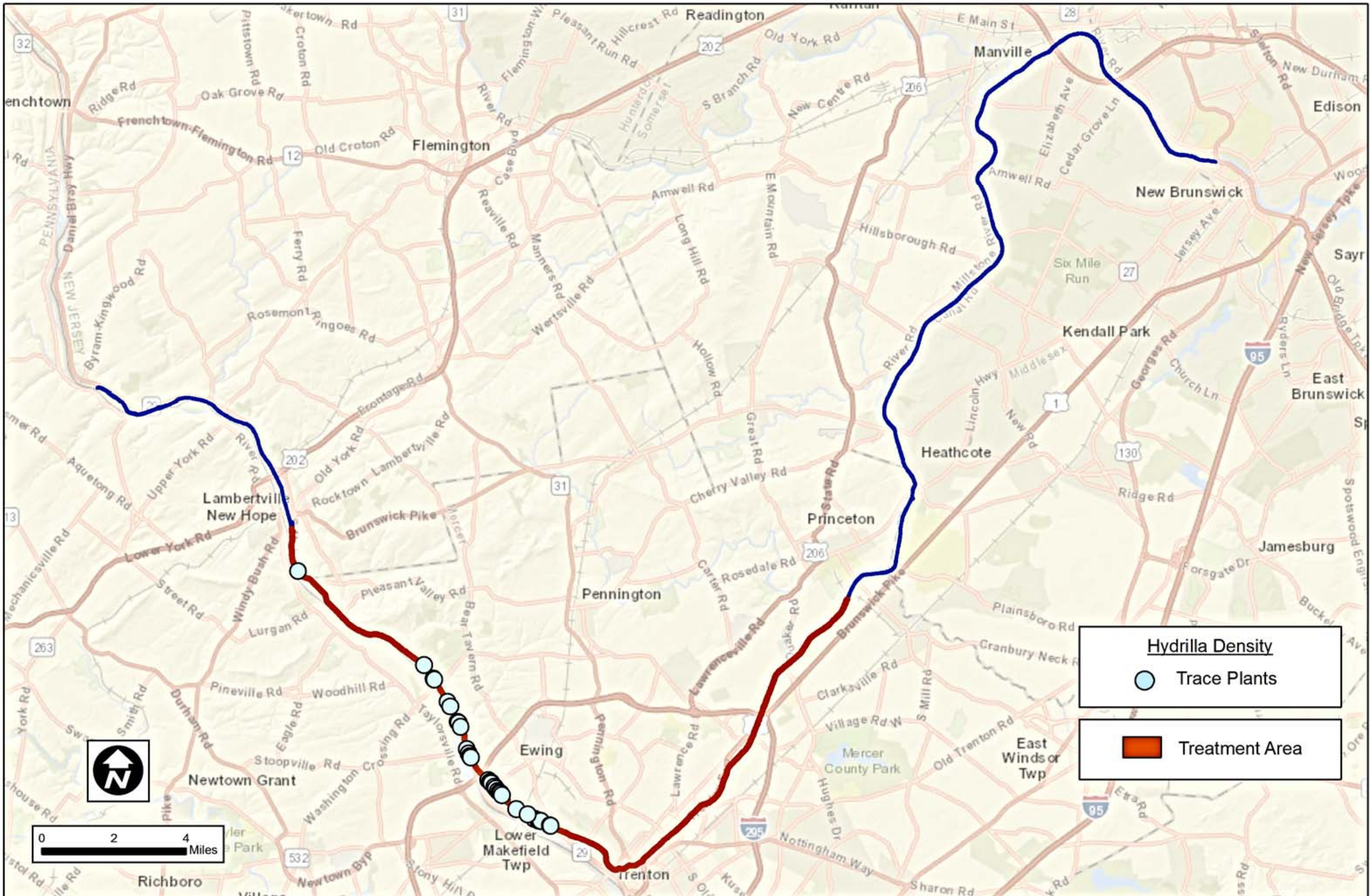
Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
U	37	M	40.530164°	-74.497302°	M		M																			S								S		
U	38	M	40.529801°	-74.496907°	D		D																			S								T		
U	39	M	40.529481°	-74.496485°	D		S																			M								S		
U	40	M	40.529146°	-74.496181°	D		M				T															S								S		
U	41	M	40.52874°	-74.495841°	D		M																			S								S		
U	42	M	40.528436°	-74.495458°	M		M																			S								S		
U	43	M	40.528015°	-74.495153°	D		D																			S								T		
U	44	M	40.527637°	-74.494848°	M		M																			T								T		
U	45	M	40.527241°	-74.494542°	M		M																			S								S		
U	46	M	40.526868°	-74.49426°	S		S				T															S								T		
U	47	M	40.52647°	-74.49393°	S		T																			S								S		
U	48	M	40.526108°	-74.493666°	M		T																			S								T		
U	49	M	40.525679°	-74.493446°	M		S																			S								T		
U	50	M	40.525241°	-74.493244°	M		M																			S								T		
U	51	M	40.524852°	-74.49298°	D		S																			S								S		
U	52	M	40.524459°	-74.492709°	M		S																			S								S		
U	53	M	40.524049°	-74.492474°	S																					S								S		
V	1	M	40.523644°	-74.49221°	M		M																			S								S		
V	2	M	40.52324°	-74.491937°	D		D																			M								S		
V	3	M	40.522835°	-74.491645°	S		T				T															S								S		
V	4	M	40.522453°	-74.491349°	S		T																			S								S		
V	5	M	40.522053°	-74.491071°	M		T																			S								S		
V	6	M	40.521654°	-74.490814°	M		M																			S								S		
V	7	M	40.521273°	-74.490482°	M		M																			S								S		
V	8	M	40.520834°	-74.490226°	M		M				T															S								S		
V	9	M	40.520453°	-74.489942°	M		M				T															S								S		
V	10	M	40.520054°	-74.489673°	S		S																			S								S		
V	11	M	40.51964°	-74.4894°	D		D				T															S								S		
V	12	M	40.519252°	-74.48908°	D		D																			S								T		
V	13	M	40.518832°	-74.488795°	S		S																			S								T		
V	14	M	40.518488°	-74.488533°	M		M																			S								S		
V	15	M	40.518048°	-74.488246°	M		M																			S								T		
V	16	M	40.517658°	-74.487977°	S		S																			S								S		
V	17	M	40.517265°	-74.487721°	S		S																			S								T		
V	18	M	40.516799°	-74.48739°	S		T				T															S								S		
V	19	M	40.516392°	-74.487131°	S		S																			S								S		
V	20	M	40.515997°	-74.486823°	M		M				T															S								S		
V	21	M	40.515568°	-74.486519°	S		S																			S								T		
V	22	M	40.515213°	-74.486201°	M		T																			M								M		
V	23	M	40.514812°	-74.4859°	D		D																			M								M		
V	24	M	40.514411°	-74.485638°	D		D																			T								T		
V	25	M	40.514027°	-74.485301°	S		S																			S								S		
V	26	M	40.513641°	-74.484984°	M		S																			S								S		
V	27	M	40.513273°	-74.484685°	S		T				T															S								S		
V	28	M	40.512913°	-74.48438°	S																					S								S		
V	29	M	40.512547°	-74.484023°	M		M																			S								S		
V	30	M	40.512177°	-74.483678°	D		D																			T		T						S		
V	31	M	40.51185°	-74.483252°	S		S																			S		S						T		
V	32	M	40.511539°	-74.4828°	M		M																			M								T		

Section	Sample Point	Sample	Latitude (NAD83)	Longitude (NAD83)	Overall Plant Abundance	Arrowhead	Benthic Filamentous Algae	Brittle Naiad	Common Bladderwort	Common Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Water Milfoil	Fanwort	Flat-leaved Bladderwort	Floating Filamentous Algae	Heart Pondweed	Hydrilla	Leafy Pondweed	Long-leaf Pondweed	Moneywort	Mud Plantain	Muskgrass	Pickerel Weed	Sago Pondweed	Small Duckweed	Small Pondweed	Spatterdock	Stonewort	Water Crowfoot	Water Primrose	Water Stargrass	Water Starwort	Watermeal	Watermoss	Wild Celery
V	33	M	40.511327°	-74.482303°	D		D				T													S		S								T		
V	34	M	40.511129°	-74.481818°	S		S																			S								T		
V	35	M	40.510877°	-74.481257°	D		D				T															S								T		
V	36	M	40.51069°	-74.480708°	D		D																			S								S		
V	37	M	40.51059°	-74.480142°	D		D																			S								S		
V	38	M	40.510419°	-74.479553°	D		M				T															S								S		
V	39	M	40.510311°	-74.479°	D		M																	T		S								S		
V	40	M	40.510205°	-74.478417°	D		D				T													T		M								M		
V	41	M	40.510139°	-74.477846°	D		D				T															S								T		
V	42	M	40.510036°	-74.477229°	M		M				T															S								S		
V	43	M	40.510122°	-74.476642°	M		S				T															S								S		
V	44	M	40.510058°	-74.476035°	S		T																			S								S		
V	45	M	40.510079°	-74.475422°	M		M				T															S								S		
V	46	M	40.510039°	-74.474829°	S		T																			S								S		
V	47	M	40.509902°	-74.474254°	M		M																			S								S		
V	48	M	40.509835°	-74.473654°	M		M																			S								S		
V	49	M	40.509705°	-74.473085°	S		T																			S								S		
V	50	M	40.509628°	-74.472515°	S		T				T															S								S		
V	51	M	40.509517°	-74.471958°	M		T																			S								S		
V	52	M	40.509432°	-74.471351°	M		M				T															S								S		
V	53	M	40.509311°	-74.470806°	M		M				T															S								S		
V	54	M	40.509124°	-74.470241°	M		M				T															S								S		
V	55	M	40.50896°	-74.469679°	D		D																			S								S		
V	56	M	40.508793°	-74.469117°	M		M				T															S								S		
V	57	M	40.508625°	-74.468572°	D		D				S															S								S		
V	58	M	40.50842°	-74.468024°	M		S				T															S								S		
V	59	M	40.508309°	-74.467481°	M		M				T															S								S		
V	60	M	40.508108°	-74.466925°	T		T																			T								T		
V	61	M	40.50801°	-74.466345°	M		M				T															S								S		
V	62	M	40.507944°	-74.465757°	M		M				T															S								S		
V	63	M	40.507929°	-74.46519°	S		S				T															S								S		
V	64	M	40.507891°	-74.464581°	S		S				T															S		T						S		
W	1	M	40.507969°	-74.463845°	S						T													T		S								S		T
W	2	M	40.50795°	-74.463411°	S		D				T															S								S		
W	3	M	40.507924°	-74.462818°	M		M																			S								S		S
W	4	M	40.507878°	-74.462217°	D		D																			M								M		M
W	5	M	40.507806°	-74.461669°	D		S				T															S								S		S
W	6	M	40.507719°	-74.461081°	M		S				T															M								S		M
W	7	M	40.507629°	-74.460485°	D						T															S								T		D
W	8	M	40.507551°	-74.459898°	M		T																			S								T		S

Delaware and Raritan Canal - **ALL SITES**
2017 Aquatic Macrophyte Abundance Distribution

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
Total Sites	1813									
OVERALL PLANT ABUNDANCE	1354	75%	496	37%	534	39%	240	18%	84	6%
SMALL DUCKWEED	978	54%	683	70%	256	26%	34	3%	5	1%
WATERMEAL	822	45%	545	66%	249	30%	26	3%	2	0%
BENTHIC FILAMENTOUS AGLAE	707	39%	486	69%	139	20%	54	8%	28	4%
COONTAIL	703	39%	570	81%	127	18%	6	1%	0	0%
WILD CELERY	699	39%	271	39%	242	35%	124	18%	62	9%
WATER STARGRASS	329	18%	296	90%	32	10%	1	0%	0	0%
WATER STARWORT	189	10%	184	97%	5	3%	0	0%	0	0%
COMMON WATERWEED	169	9%	152	90%	15	9%	2	1%	0	0%
SPATTERDOCK	129	7%	108	84%	19	15%	2	2%	0	0%
WATER PRIMROSE	110	6%	110	100%	0	0%	0	0%	0	0%
WATERMOSS	84	5%	74	88%	10	12%	0	0%	0	0%
COMMON BLADDERWORT	66	4%	57	86%	9	14%	0	0%	0	0%
LEAFY PONDWD	50	3%	49	98%	1	2%	0	0%	0	0%
SMALL PONDWEED	32	2%	32	100%	0	0%	0	0%	0	0%
HYDRILLA	31	2%	31	100%	0	0%	0	0%	0	0%
FANWORT	30	2%	30	100%	0	0%	0	0%	0	0%
STONEWORT	25	1%	25	100%	0	0%	0	0%	0	0%
EURASIAN WATER MILFOIL	22	1%	21	95%	1	5%	0	0%	0	0%
ARROWHEAD	18	1%	15	83%	3	17%	0	0%	0	0%
LONG-LEAF PDWD	17	1%	15	88%	1	6%	1	6%	0	0%
FLOATING FILAMENTOUS ALGAE	5	0%	5	100%	0	0%	0	0%	0	0%
MONEYWORT	4	0%	4	100%	0	0%	0	0%	0	0%
MUSK GRASS	4	0%	4	100%	0	0%	0	0%	0	0%
CURLY-LEAF PONDWEED	3	0%	3	100%	0	0%	0	0%	0	0%
FLAT-LEAVED BLADDERWORT	2	0%	2	100%	0	0%	0	0%	0	0%
PICKEREL WEED	2	0%	2	100%	0	0%	0	0%	0	0%
SAGO PONDWEED	2	0%	2	100%	0	0%	0	0%	0	0%
WATER CROWFOOT	2	0%	2	100%	0	0%	0	0%	0	0%
BRITTLE NAIAD	1	0%	1	100%	0	0%	0	0%	0	0%
HEART PONDWEED	1	0%	1	100%	0	0%	0	0%	0	0%
MUD PLANTAIN	1	0%	0	0%	1	100%	0	0%	0	0%



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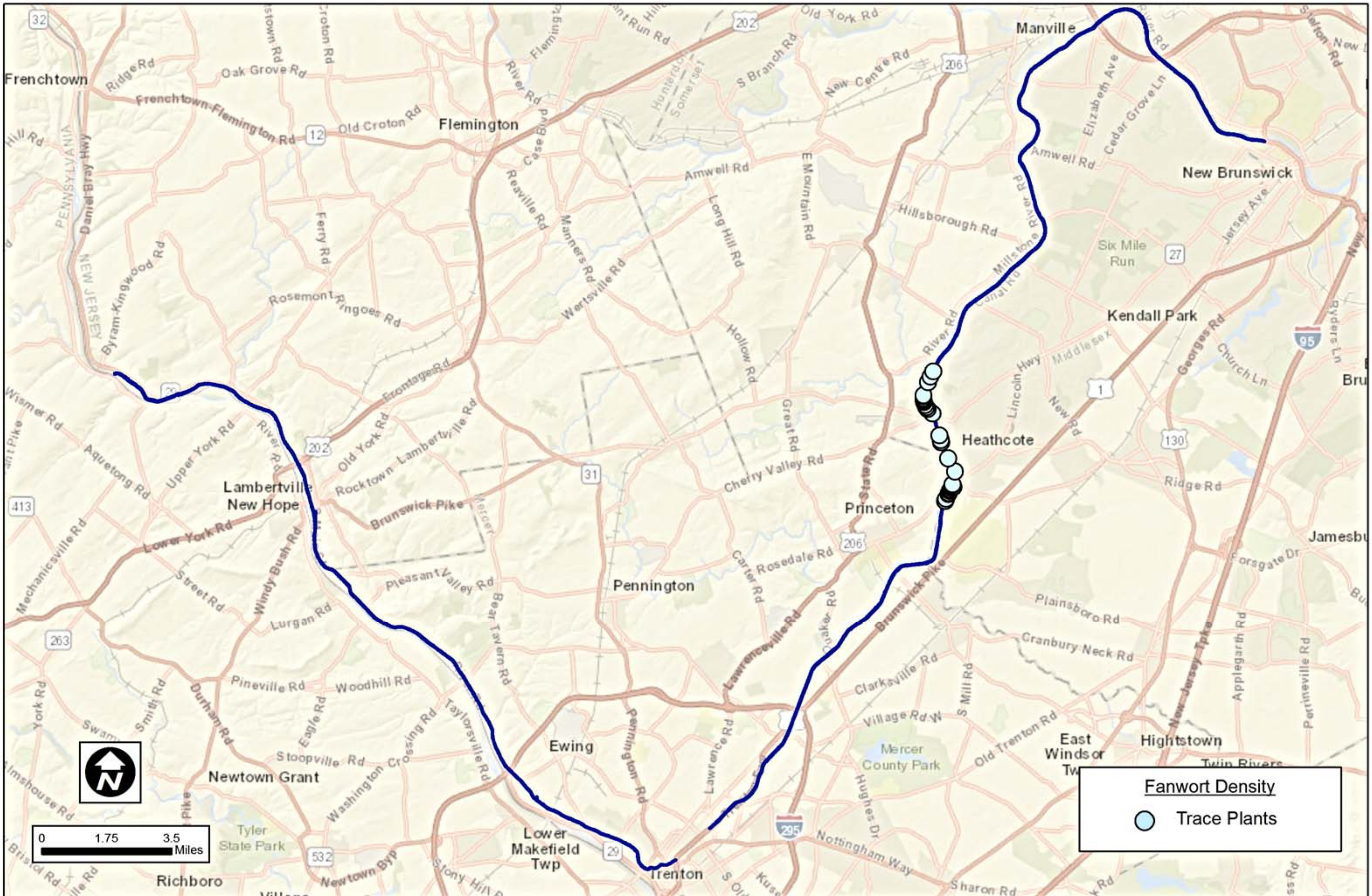

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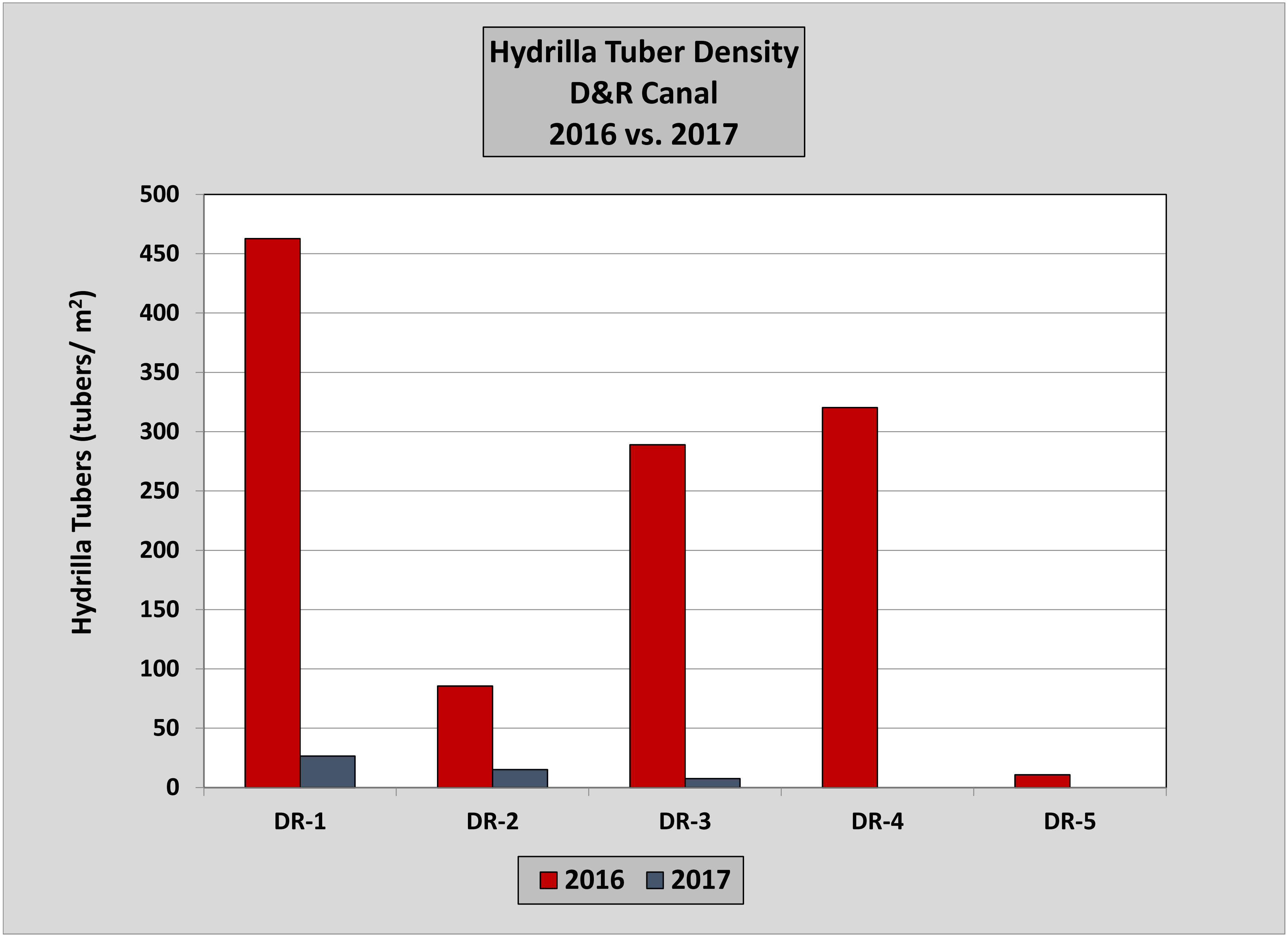

Hydrilla Tuber Density
D&R Canal
2016 vs. 2017
Hydrilla Tubers (tubers/ m2)
500
450
400
350
300
250
200
150
100
50
0
DR-1
DR-2
DR-3
DR-4
DR-5
2016
2017