



**BOLTON
& MENK**

Real People. Real Solutions.



3300 Fernbrook Ln N
Suite 300
Plymouth, MN 55447

Phone: (763) 544-7129
Bolton-Menk.com

March 1, 2024

TO: Tony Brough, Hennepin County

FROM: Carolyn Dindorf, Limnologist

RE: Visual and semi-quantitative estimate of the use of submersed jets to clear floating vegetation from public accesses

Some boat accesses are prone to having excess floating aquatic vegetation in the water at the ramp due to location, winds, and waves pushing the vegetation to the shore, making it easy for those launching or loading boats to pick up plant fragments on the trailer or boat. A simple experiment was completed to provide a visual and semi-quantitative estimate of the benefits of use of submersed jets to minimize the transport of aquatic invasive species by keeping floating vegetation away from ramps.

The experiment took place at the Spring Park boat access at 4141 Shoreline Drive, Spring Park on Lake Minnetonka which has a public ramp and Sheriff's Water Patrol ramp. Hennepin County previously installed submersed jets at both ramps to create a current to move floating aquatic vegetation out of the path of boat trailers as they are backed up and pulled out of the water at the ramp. The field work for the experiment was conducted by Tony Brough, Hennepin County, and Carolyn Dindorf, Bolton & Menk, on the morning of August 29, 2022. Laboratory analysis of samples was conducted by the Saint Anthony Falls Laboratory at the University of Minnesota.

Materials and Methods

Photos were taken at the start of the experiment to document the extent of vegetation in the ramp area. An empty boat trailer hooked up to a pickup truck was used for the test. The trailer was backed down the ramp into the water to a distance normally used for launching a boat and after a few minutes pulled out of and away from the ramp to mimic what would occur during launching a boat. At the public ramp, which is wide enough for three vehicles, the center ramp was used. Vegetation on the trailer was observed and photos taken, and after three minutes, hand collected from the trailer, including the wheels and anything that fell off of the trailer at the parking area, and placed in a zipper-type bag. The submersed jet was turned on at the public access and the process repeated at the Sheriff's Water Patrol ramp. Submersed jets were previously installed on a dock post under the dock at the public access and on the lake bottom in the water at the Sheriff's Water Patrol access. The two accesses are approximately 335 feet apart.



Location of submersed jets (red dots) at the Sheriff's Water Patrol (left) and public boat ramps. Image: Hennepin County

After approximately 45 minutes, while the work was completed at the Sheriff's Patrol ramp and what appeared to be an adequate time to move vegetation away from the public access ramp, the trailer was backed into the water and pulled out and the vegetation observations and collection occurred as previously stated. Since the Sheriff's Patrol ramp had much less floating vegetation, the submersed jet was operated for seven to eight minutes before the trailer was backed in for the "after" measurement.

A quick identification of the vegetation removed from the trailers was completed. Bagged samples were placed in a cooler on ice and delivered to the Bolton-Menk office where they were refrigerated and then transported on ice to the University of Minnesota Saint Anthony Falls lab for analysis of wet and dry weights. At the lab, the samples were dewatered with a salad spinner and placed into heat-resistant metal trays and dried at 96°C (205°F) for at least 24 hours or until the sample weight did not change. The wet and dry weight was recorded and used for data analysis.

Results

The experiment began about 8:15 a.m. on 8/29/22. Conditions were partly cloudy with a WSW wind at 5 – 10 mph and temperature in the low 70's.

Public access "before submersed jet"

A large amount of plant material was collected from the trailer on the "before jet" trial. Plant genera and species observed were wild celery (*Vallisneria americana*), Eurasian watermilfoil (*Myriophyllum spicatum*), coontail (*Ceratophyllum demersum*), bushy pondweed (*Najas* sp.), star duckweed (*Lemna trisulca*), and four Pondweed (*Potamogeton*) species, including curly-leaf, clasping leaf, narrow-leaf, and c.f. white stem pondweed). There were a lot of tiny snails on the wild celery plants.



Plant fragments in water at public access ramp before operation of submersed jet

Public access "after submersed jet"

The "after jet" trial backing in with the trailer was completed after the submersed jet was operated and we had visual confirmation that most of the floating vegetation had been cleared. When the trailer was removed, very little plant material was found on the trailer. Species included, wild celery, coontail, and narrow leaf pondweed. Snails were found on the wild celery fragments.



Plant fragments in water at public access ramp after submersed jet was operated

Sheriff's Patrol "before submersed jet"

The Sheriff's Patrol ramp area had significantly less floating vegetation than the public access. Floating vegetation was found within about two to three feet out from the ramp waterline. A small amount of plant material was removed from the trailer after the first time in and out. There were fewer species at this access compared to the public access ramp. Species included wild celery (with snails), coontail, and narrow-leaf pondweed. Note: the red buoy in the photo shows the location of the submersed jet.



Plant fragments in water at Sheriff's Water Patrol access before operation of submersed jet

Sheriff's Patrol "after submersed jet"

The second trial backing in with the trailer was completed after the submersed jet ran and cleared the access of most floating vegetation as confirmed visually. When the trailer was removed, only one tiny fragment of coontail was found on the trailer.

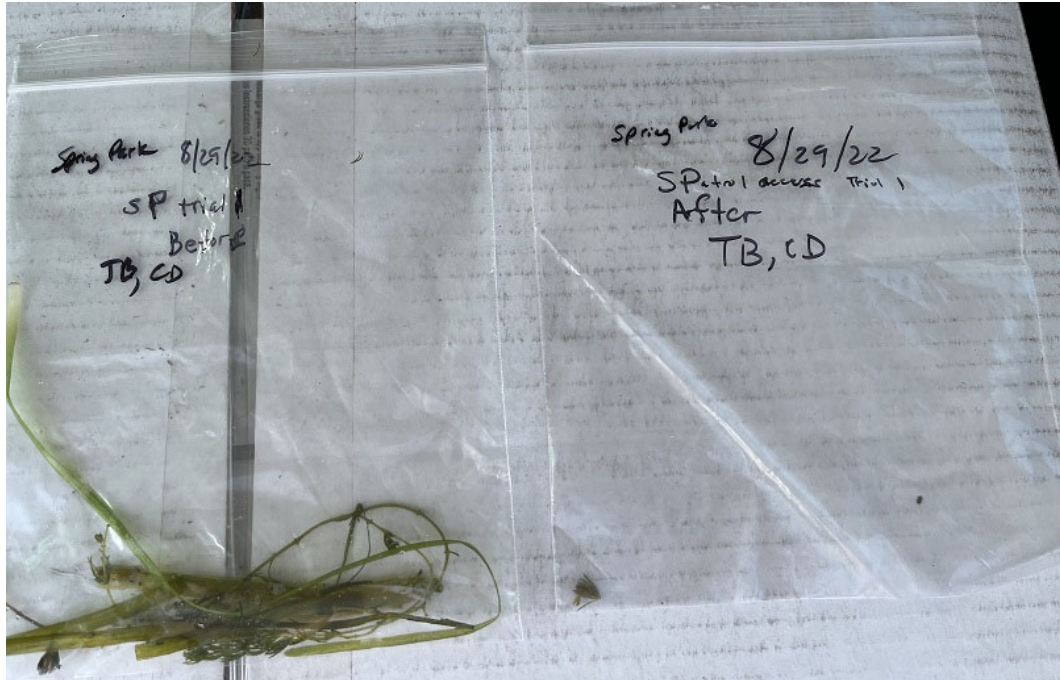


Plant fragments in water at Sheriff's Water Patrol access ramp after submersed jet was operated

The photos below show the bagged aquatic vegetation collected before and after operation of the submersed jets for each site.



Vegetation collected from trailer at Public access before (left) and after (right) jet use



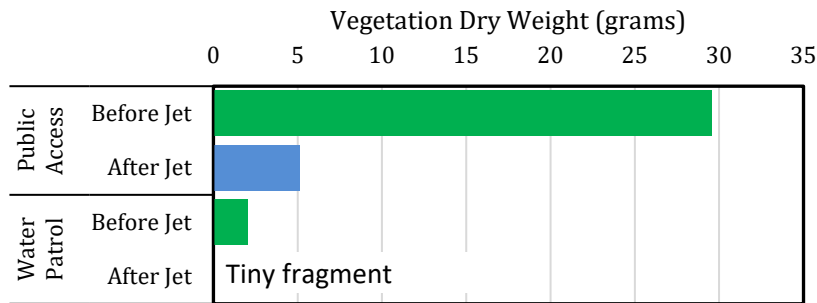
Vegetation collected from trailer at Sheriff's Water Patrol access before (left) & after (right) jet use

The table below lists the dry weights for each of the samples collected along with identified vegetation. Note that the "after" sample for the Sheriff's Water Patrol access had only a tiny plant fragment and was recorded as zero weight. The graph provides a visual representation of the difference in vegetation amounts. There was 5.8 times more vegetation by weight in the before (without jet) versus after (with jet) sample at the public access (83% reduction) and a ~100% reduction in vegetation at the Sheriff's Patrol access, indicating the submersed jets were successful at reducing the amount of vegetation that ends up on trailers at the access, potentially minimizing the spread of invasive species.

Aquatic vegetation dry weight and species collected at the Spring Park boat access (University of Minnesota)

Sample	Dry Weight (g) 9/12/2022	Plant species observed
Public Access "Before"	29.58	wild celery, Eurasian watermilfoil, coontail, bushy pondweed, star duckweed, and 4 pondweed species
Public Access "After"	5.13	wild celery, coontail, and narrow-leaf pondweed
Sheriff's Patrol "Before"	2.02	wild celery (with snails), coontail, narrow-leaf pondweed
Sheriff's Patrol "After"	0	tiny fragment of coontail

Spring Park Boat Access-Vegetation before and after submersed jet operation



This simple visual and semi-quantitative experiment showed that submersed jets can reduce the quantity of vegetation that ends up on trailers pulled through the floating vegetation as the boat is being launched or loaded. More rigorous research is needed to better understand and quantify the effectiveness of submersed jets in preventing vegetation from being caught on trailers and boats during launching and loading, and potentially spreading aquatic invasive species.