

# FINAL REPORT

## Integrated Management of Eurasian Watermilfoil Town of Alexandria, NY

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## 1.0 BACKGROUND AND PROBLEM DEFINITION

Invasive species impact local and regional economies in New York's Great Lakes Basin and affect local ecosystems, burden communities, and impact local and regional economies. In 2020, damages and losses associated with invasive species were estimated at \$21 billion dollars nationally (Fantle-Lepczyk et al., 2022). Invasive species such as the aquatic Eurasian watermilfoil (*Myriophyllum spicatum*) are exceptionally hardy and have traits that give them a competitive edge over native species, leading them to outcompete and monopolize environments (Gettys et al., 2014). The spread of Eurasian watermilfoil has had severe negative ecological and economic implications across the Great Lakes Region, including the Town of Alexandria in the Thousand Island region of northern New York State. With its canopy at the water surface and high growth rate, Eurasian watermilfoil reduces the light available for native vegetation and causes oxygen depletion in waterways. This results in decreased biodiversity, reduced fish spawning areas, and diminished fish growth. Eurasian watermilfoil also has negative impacts on outdoor recreation and tourism; the dense floating mats created by Eurasian watermilfoil are intimidating for swimmers and impede boaters and other water-based recreationists due to the plant's "stringy" qualities and long stems that get tangled in equipment.

This project is relevant to the needs and priorities of the Great Lakes Restoration Initiative (GLRI) Action Plan II, specifically the objective of *Controlling Invasive Species in the Great Lakes Basin*. According to the New York State Department of Environmental Conservation (NYS DEC), Eurasian watermilfoil is the most common and widely distributed aquatic invasive plant in New York State. It can be found in all watersheds within NYS (Paul Smith's College Adirondack Watershed Institute, 2022). Within the Town of Alexandria, NY, the spread of Eurasian watermilfoil has been particularly notable in Goose Bay (due to its public boat launch) and in Mud Lake (due to the location of its municipal wastewater treatment facility). Locally, there are several groups that have been catalyzed by the need for Eurasian watermilfoil removal efforts, including the Goose Bay Reclamation Corporation and the Mud Lake Association. In 2017, in partnership with these local lake and river associations, the town applied for and was awarded this grant through the GLRI to utilize a variety of Eurasian watermilfoil control and removal methods, including chemical treatment, mechanical removal, and hand pulling efforts.

## 2.0 PROJECT SUMMARY

Water milfoil from known locations throughout Goose Bay and Mud Lake is targeted by this GLRI grant for removal using an integrated management approach of chemical and mechanical techniques. This project was developed by a multi-stakeholder group called the Alexandria Milfoil Task Force (AMTF), consisting of Town staff, Goose Bay Reclamation Corporation, and Mud Lake Association. Consultants were hired to advise the group on proper evaluation and chemical treatment procedures (Riveredge Environmental Inc.), as well as project management and permit writing services (EDR). This project resulted in decreases of Eurasian watermilfoil populations after treatment. The goal of the project was to treat 215 acres in Goose Bay and 95 acres in Mud lake over the two-year duration of the grant using chemical and mechanical methods. The Quality Assurance Project Plan and Project Work Plan (QAPP) drafted at the onset of the project set a conservative removal goal of 50% or more of the milfoil occurring in the treatment areas.

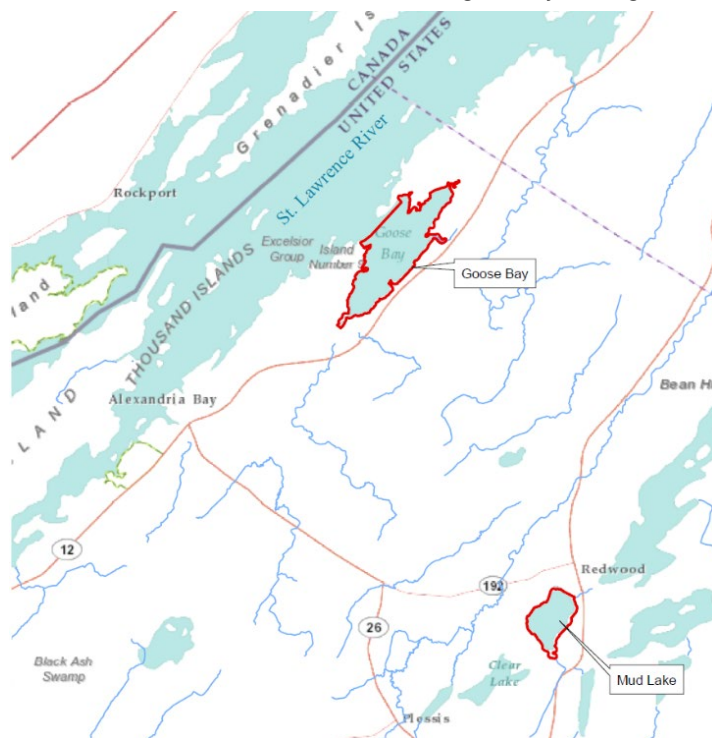
### 3.0 PROJECT ACHIEVEMENTS BY TASK

Project tasks consisted of herbicide treatment and mechanical treatment. The primary objective for these tasks was the removal of Eurasian watermilfoil from the project area in compliance with NYS DEC regulations and to determine the effectiveness of treatment efforts. Originally hand pulling was a third technique to be utilized by the grant, but that method was eliminated due to injuries sustained by a member of the project team who was to be the point person for hand pulling efforts.

*Table 1. Site locations, method of removal, biomass removed, and quantification of control methods for the proposed water milfoil removal in the NYS Great Lakes Basin.*

SITE LOCATION	PROPOSED TREATMENT	ACTUAL TREATMENT
Goose Bay	215 acres to be removed via a combined effort of chemical treatment, mechanical harvesting, and hand pulling	302 acres treated via a chemical treatment + 78.25 acres via mechanical harvesting
Mud Lake	95 acres to be removed via a combined effort of chemical treatment, mechanical harvesting, and hand pulling	70 acres treated via a chemical treatment + 29.75 acres via mechanical harvesting
<b>Total</b>	<b>310 acres</b>	<b>372 acres via chemical treatment + 108 acres via mechanical treatment = 480 acres total</b>

*Figure 1. Waterbodies within the Town of Alexandria, NY targeted by GLRI grant*



### 3.1 Herbicide Treatment

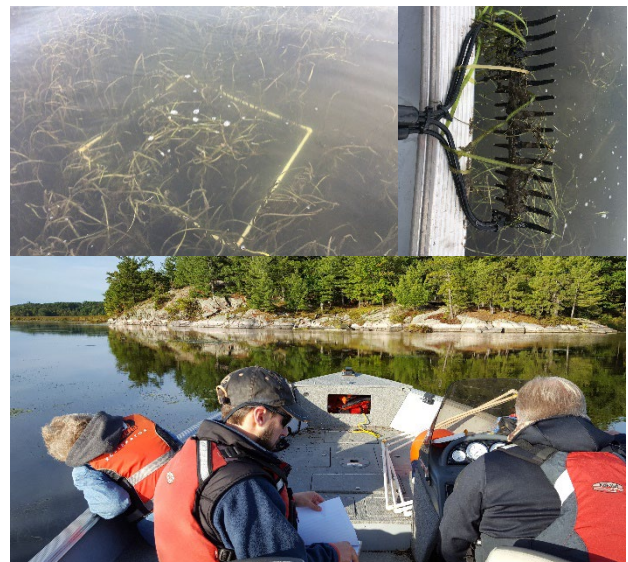
Chemical treatment was undertaken by Lee Harper, certified herbicide applicator of Riveredge Environmental Inc. following NYS and federal permitting requirements. Strategic treatment locations within the two waterbodies were identified by local representatives from the lake associations based on observations. The Task Force, coordinated by the Project and Quality Assurance Manager (Erica Tauzer of EDR), drafted all required permit applications for chemical removal. Signage and notifications were distributed to shoreline homeowners to comply with NYSDEC permit requirements. Finally, aquatic herbicide application reports were sent to the NYSDEC after chemical treatment and effectiveness studies were conducted on herbicide treatment areas. The total actual acres of herbicide treatment across all years (372 acres) alone exceeded the total acreage of treatment originally proposed for the GLRI project (310 acres). Vegetation surveys demonstrated that chemical treatment of watermilfoil was highly effective at both removing Eurasian watermilfoil and promoting a greater degree of native species diversity.

#### 3.1.1 2018 Herbicide Treatment

In the spring of 2018, permits were prepared to conduct aquatic herbicide treatment for both Mud Lake and Goose Bay. Renovate OTF was the pesticide applied in pellet form with 14% active Triclopyr at 2.0 ppm. Swimming was prohibited for 3 hours after the application. Locations within both waterbodies were strategically identified for milfoil removal as well as sampling locations for pre- and post-treatment rake toss aquatic vegetation surveys and post-treatment water quality testing. Details about the herbicide treatment for each waterbody are as follows:

- Goose Bay (see Figures 2 and 3): Herbicide treatment was applied to a total of 210 acres over three sub-areas within Goose Bay, one with 50 acres of surface area in the southern portion of the bay, one with 100 acres, and the last with 60 acres. One application was done over 2-3 days between May 21<sup>st</sup> and June 30<sup>th</sup> at a total of 24,300 lbs. from a boat mounted seeder by Lee Harper (Certified Applicator). An aquatic herbicide application permit through the NYSDEC was acquired, along with state and 3-year federal wetlands permits through the NYSDEC and US Army Corps of Engineers due to proximity to wetlands within the waterbody, along with a federal consistency assessment from the New York State Department of State (NYS DOS).

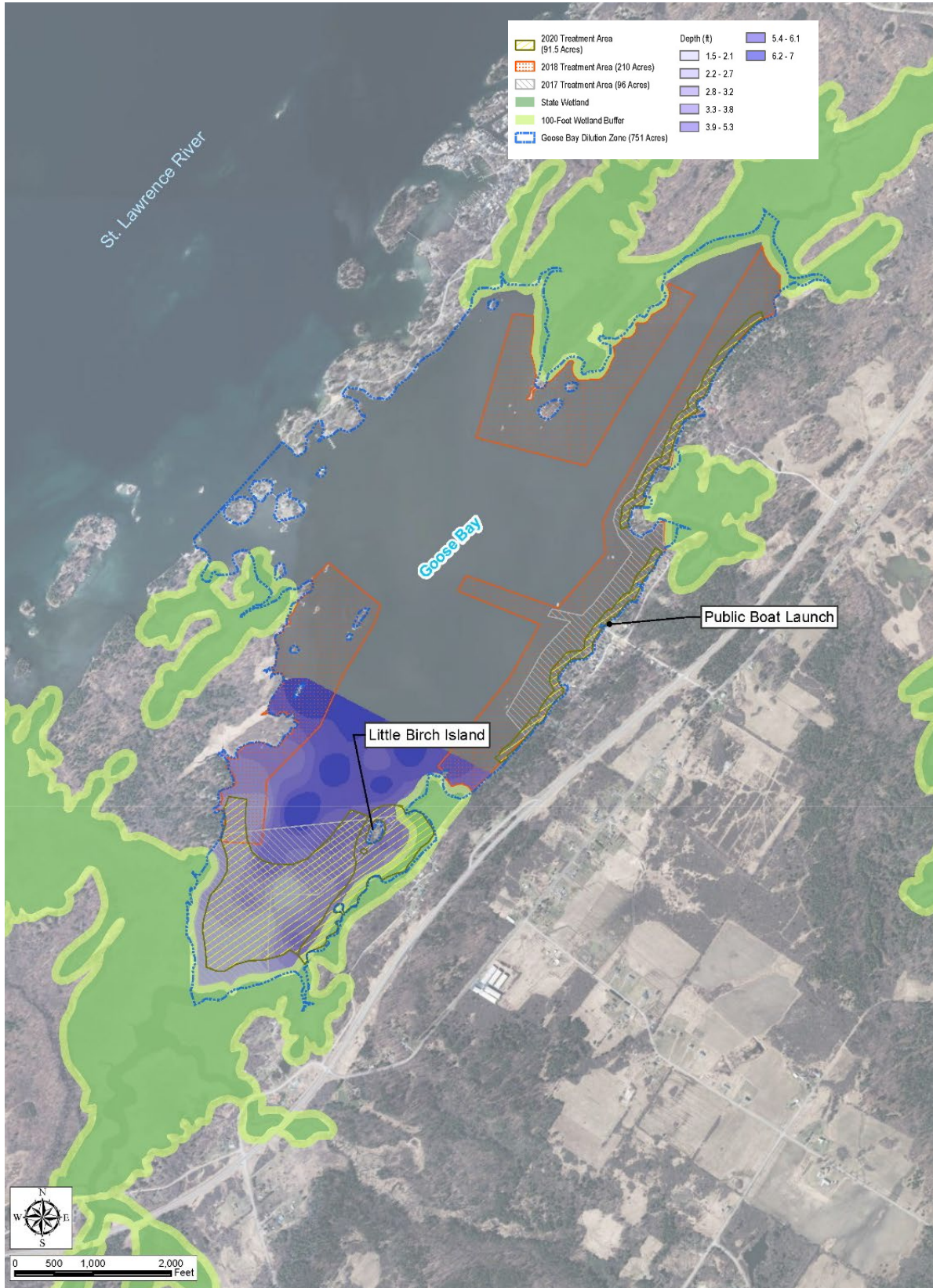
*Figure 2. Vegetation sampling methods use for Goose Bay 2018 Herbicide Treatment*



*Quadrant sampling required by vegetation study related to wetland permit to determine impact on native vegetation and the rake-toss surveys required by QAPP and NYSDEC Aquatic Vegetation herbicide permit to determine the effectiveness on Eurasian watermilfoil. Both types of surveys were required for the 2018 Goose Bay herbicide treatment. Source: EDR*

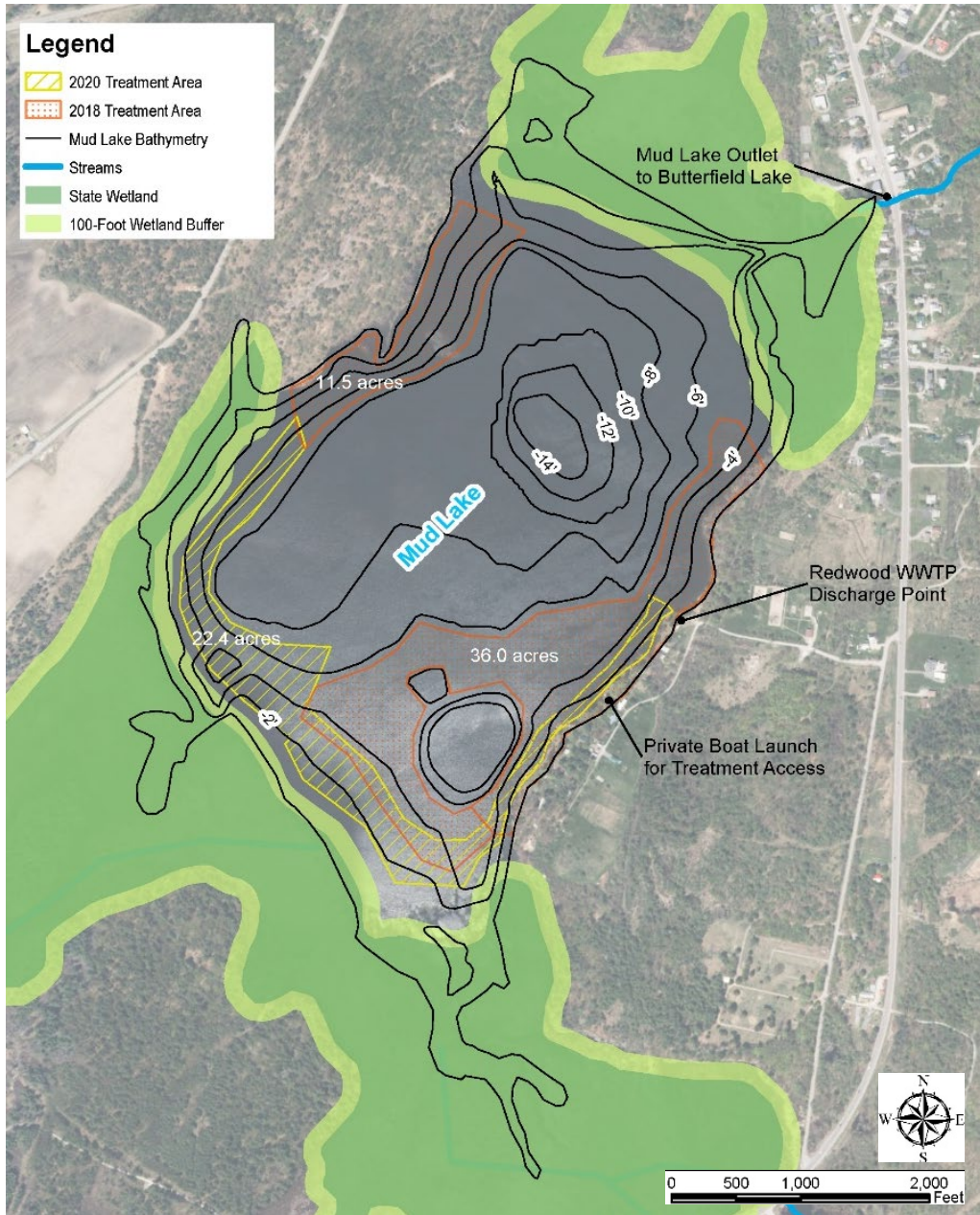


Figure 3. 2017 (prior to GLRI grant), 2018, and 2020 herbicide treatment on Goose Bay



- Mud Lake (see Figure 4): Herbicide treatment was applied to a total of 47.5 acres in two areas with a focus on nearshore waters with an average depth of three feet. One area was located on the east shore and the second was located on the west shore of Mud Lake. One application was done over 2-3 days between June 22<sup>nd</sup> and July 7<sup>th</sup> at a total of 7695 lbs. from a boat mounted seeder by Lee Harper (Certified Applicator). An aquatic herbicide application permit through the NYSDEC was acquired.

Figure 4. 2018 and 2020 herbicide treatment on Mud Lake





### 3.1.2 2019 Herbicide Treatment (Cancelled)

In the first half of 2019, annual permits were prepared to conduct aquatic herbicide treatment for Mud Lake. Renovate OTF in pellet form was to be the herbicide applied, with 14% active Triclopyr at 2.0 ppm. Two areas totaling 17.4 acres within the waterbody were strategically identified for milfoil removal and surveys for pre- and post-treatment aquatic vegetation and post-treatment water quality testing. These two proposed treatment areas were in the southwestern and northeastern shallow portions of Mud Lake outside of the wetlands and their 100' buffers (i.e., check zones). However, due to an unusually high levels of precipitation and extremely high-water levels in 2019 for the area<sup>1</sup>, the herbicide treatment was called off in mid-June 2019. The unusually high-water levels would have required a large downstream notification area and would have diluted the herbicide, making it less cost-effective. No treatment had been planned or conducted for Goose Bay in 2019 since non-GLRI funds for herbicide treatment had been originally anticipated for the second year of the grant before it was delayed in 2016 (these funds were used in 2017, prior to the initiation of the GLRI grant).

### 3.1.3 2020 Herbicide Treatment

In 2020, annual permits were prepared to conduct aquatic herbicide treatments for Goose Bay and Mud Lake with a new herbicide that had recently been released: ProcellaCOR EC with 2.7% active Florpyrauxifen-benzyl. This herbicide was available in a liquid form injected under the surface of the water through tubes, allowing for it to be applied more locally to watermilfoil patches (at a range of 3.82-5.73 ppm). Locations within both waterbodies were strategically identified for milfoil removal as well as sampling locations for pre- and post-treatment rake toss aquatic vegetation surveys and post-treatment water quality testing. Details about the herbicide treatment for each waterbody are as follows:

- Goose Bay (see Figure 3): Herbicide treatment was applied to a total of 91.5 acres in four areas by Lee Harper (Certified Applicator). Areas 1 (20 acres) and 2 (55 acres) were in the southern end of Goose Bay and Areas 3 (8.5 acres) and 4 (8 acres) were located along the eastern shoreline cottage docks. The treatment was conducted on August 13<sup>th</sup>, 2020. An aquatic herbicide application permit through the NYSDEC was acquired prior to treatment.
- Mud Lake (see Figure 4): Herbicide treatment was applied to a total of 22.4 acres in one contiguous area of nearshore waters. These areas were located on the southwestern and southeastern shallow areas of Mud Lake. The treatment was conducted on July 29, 2020. An aquatic herbicide application permit through the NYSDEC was acquired prior to treatment.

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<sup>1</sup> New York Upstate.com. May 14, 2019. A foot of rain has fallen in Upstate NY in six weeks. Available at <https://www.newyorkupstate.com/weather/2019/05/a-foot-of-rain-has-fallen-in-upstate-ny-in-six-weeks-see-whos-wettest.html> (accessed August 2022).



### 3.2 Mechanical Removal Techniques

In addition to the herbicide treatment, methods proposed in the QAPP included the use of a mechanical harvester/conveyor belt system and hand removal techniques. Both techniques were intended to supplement the herbicide removal, and this was a new technique used in the region. Therefore, the QAPP did not specify acreage goals for mechanical removal tasks. The overall objective for the mechanical techniques was to determine the effectiveness of treatment efforts in comparison to the chemical treatment.

The mechanical harvester and conveyor belt system was purchased in 2020. The purchase of the harvester and determination of compliance protocols with NYSDEC took place in 2020, but due to supply chain delays related to the COVID-19 pandemic, the harvester did not arrive until late 2020 and its use was postponed until summer 2021. The harvester was used during the summers of 2021 and 2022. Mechanical removal equipment purchased by the grant included the 2020 model of the Eco-Harvester (SM 301), a customized transport trailer; a customized heavy duty intake conveyor; three spare chains; a spare hydraulic cylinder; gas tank; lithium grease; license for trailer; a GPS; and gasoline. Removed Eurasian watermilfoil was loaded into a dump truck daily and transported into two different open fields away from waterbodies where it dried and decomposed back into the soil.



Demonstration of the harvester use on Mud Lake in July 2021. Source: Bill Hay, Dynamic Construction of Northern New York LLC

### *3.2.1 2021 Mechanical Harvester/Conveyor Use*

Use of the mechanical harvester and conveyor belt in 2021 occurred between July 6<sup>th</sup> and August 18<sup>th</sup>, first on Mud Lake and then Goose Bay. Three employees from Dynamic Construction of Northern New York LLC were hired to operate the harvester to remove Eurasian milfoil from Mud Lake and Goose Bay. A gravel boat ramp was constructed at a private residence of Mud Lake to allow for harvester access to the waterbody. Removal occurred until there was no need for further treatment in Mud Bay and in Goose Bay until the milfoil became too weak to handle due to the seasonal changes. Removal occurred in Mud Lake and Goose Bay for approximately 17 days of operation (4 in Mud Lake and 13 in Goose Bay). Each day of treatment averaged approximately 7.5 loads. Mechanical harvesting in 2021 totaled approximately 32 acres of removal.

### *3.2.2 2022 Mechanical Harvester/Conveyor Use*

Use of the mechanical harvester and conveyor belt in 2022 occurred between July 11<sup>th</sup> and August 12<sup>th</sup>, first on Mud Lake and then Goose Bay. Two employees from Dynamic Construction of Northern New York LLC were hired to operate the harvester to remove Eurasian milfoil from Mud Lake and Goose Bay and staffing was supplemented by a Town employee. Removal occurred in Mud Lake and Goose Bay for approximately 6.5 days of operation each, until grant funds were fully spent. Each day of treatment averaged 7.5 loads. Mechanical harvesting in 2022 totaled approximately 23 acres of removal.

### *3.2.3 Hand Removal*

Although originally planned in the QAPP, hand removal using rake hauls was eliminated from the project plan after a member of the Project Team who was originally going to oversee that aspect of the project was injured in an unrelated incident.

## **4.0 OUTCOMES AND LESSONS LEARNED**

### **4.1 Comparison of Eurasian Watermilfoil Control Techniques**

Herbicide treatment was the more cost-effective method and was the method used to treat the greatest acreage for each waterbody. Herbicide treatment over the course of three years in both Goose Bay and Mud Lake removed 372 acres of milfoil, costing approximately \$1,124 per acre, and approximately \$418,033 total. According to local lake association members, herbicide treatment generally lasted one to two years, depending on the annual water depths and type of herbicide used (the pellet form was effective for two years, while the liquid form was effective only one year). This treatment technique was quite costly upfront (timewise, financially, and politically) due to flow models required by NYSDEC permits, which impacted the amount of treatment permitted and the upfront time required to order the herbicide and notify downstream property owners amidst annually changing water levels.

Mechanical removal was a method used in both Goose Bay and Mud Lake in the years following the herbicide treatment in both waterbodies. This method of removal had multiple costs associated with technical requirements as well as labor costs. Ultimately, the mechanical removal covered approximately 55

acres, costing approximately \$2,918 per acre, and approximately \$160,467 total. Mechanical techniques were highly visible due to the harvester needing to be used over multiple days during the season, and therefore, were quite popular with the local community. The Town received many requests for the harvester to be used after the completion of this project for other waterbodies. Unfortunately, the mechanical process was much slower than the herbicide treatment. Therefore, the treatment area was much smaller. It was also discovered through the course of this project that there were other harvesters operating in the area that used mowers and did not haul out the mown milfoil from the waterbody. These mowers exacerbated the problem by spreading Eurasian watermilfoil through the clippings that float and transplant themselves in other areas. When discussing the use of mechanical efforts to remove Eurasian watermilfoil, a clear distinction should be made between equipment that properly disposes the Eurasian milfoil by removing harvested plants from the waterbody compared to other types of machinery (e.g., mowers), which can counteract attempts to control Eurasian watermilfoil populations.

*Table 2. Comparison of herbicide and mechanical methods for the Eurasian watermilfoil removal*

<b>Metrics</b>	<b>Herbicide</b>	<b>Mechanical</b>
Acres Treated	372 acres	Approximately 55 acres (32 ac. in 2021 and 23 ac. in 2022)
Total Cost of Treatment	\$418,033 (includes expenses for permits, coordination, and treatment)	\$160,467 (includes expenses for equipment, consultation with state permitting agencies, coordination, and treatment)
Cost Per Acre	\$1,124/acre	\$2,918/acre
Strengths	More acreage treated per season; more cost effective; less staff time required	Less permitting time; cost per acre would presumably decrease over time until harvester needs major repairs or replacement (large upstart costs to purchase equipment; much lower costs to maintain and operate it)
Weaknesses	Costly permitting requirements (timewise, financially, and politically); sensitive to annual water level changes	Limited staffing and equipment resulted in less overall treatment area per season

## 4.2 Local Capacity Requirements

For the total removal of Eurasian watermilfoil from Goose Bay and Mud Lake, there continues to be a need for local champions as well as the necessary staffing resources. This process would not have been possible without the dedication and commitment of passionate community members who care deeply about their water and their communities.

### 4.3 Synthesis and Looking Ahead

Future efforts to control Eurasian watermilfoil in Alexandria, NY will likely require a mix of herbicide and mechanical techniques. The Alexandria Milfoil Task Force has continued interest in herbicide treatment as a tool due to its ability to treat large areas of waterbodies more effectively than the harvester techniques. While more is known about the long-term effectiveness of the herbicide treatments conducted in the early portion of the grant, mechanical harvesting offers promise for the area due to its flexibility to treat smaller areas and its likelihood to become more affordable as the use of it continues. Composting may also be a viable use of Eurasian watermilfoil, if done with caution to not unintentionally spread the plant (for a helpful summary of best management practices for Eurasian watermilfoil, see the publication from King County, WA referenced in bibliography). The Town of Alexandria has committed local funds to using the harvester to remove Eurasian watermilfoil in other waterbodies for the upcoming year. Other local representatives including other lake associations in Alexandria and the Jefferson County Soil and Water Conservation have expressed interest in potentially being partners in future harvesting operations. Continued treatment of Goose Bay and Mud Lake will be necessary and using both techniques will likely provide most effective treatment overall. The scale of cost for these techniques to control this one aquatic invasive species continues to exceed local resources. Furthermore, there are other known aquatic invasive species appearing in the region (e.g., water chestnut). External support will be necessary to effectively address Eurasian watermilfoil and other aquatic invasive species issues in the area.

### 5.0 BIBLIOGRAPHY

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