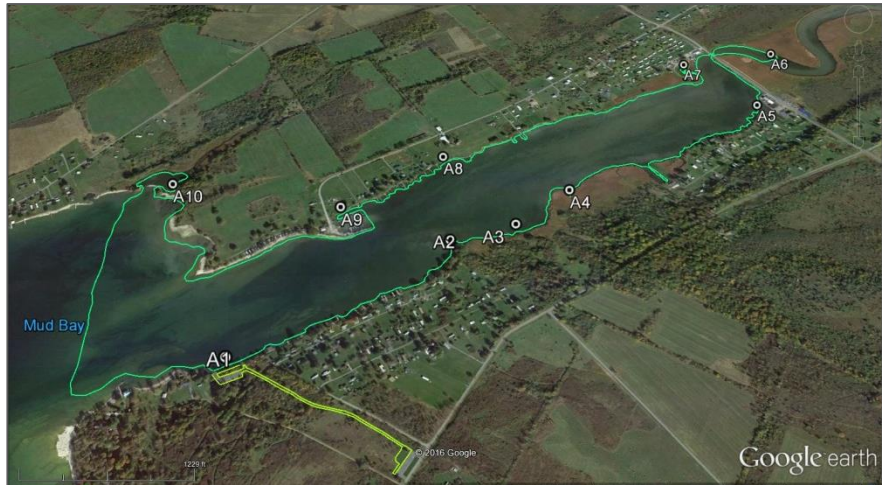




## Survey Methods and Observations

In July of 2016, the SLELO Early Detection team surveyed Mud Bay for both aquatic and terrestrial invasive species. This was accomplished by means of the rake toss technique, for aquatic species, as well as visual observations. The rake toss method of aquatic plant surveying involves tossing a weighted double-sided rake off either side of one's vessel and using it to uproot vegetation for species identification. Attached to the rake is a rope marked in increments of feet, which is used to calculate water depth during each toss. Visual observations involve scanning both aquatic and terrestrial surroundings for noticeable, defining attributes of target and watch-list species for visual identification.



**Figure 3.** Aquatic HPAs and canoe path.

Areas where these survey methods were employed in Mud Bay are known as HPAs, or Highly Probable Areas. HPAs are environments where invasive species are likely to be found as a result of certain characteristics, including: high rates of human activity, still water, shallow photic zones. New HPAs for the 2016 survey were selected using these characteristics to supplement those HPA locations chosen for prior surveys of Mud Bay in 2012 and 2014 (**Figures 3 and 4**). HPAs and other locations of interest were marked using a Garmin handheld GPSMAP® 62.



**Figure 4.** Terrestrial HPAs and walking path.



**No Prevention “Watch-list” species were found in the 2016 survey.**

Target species determined to be at Mud Bay during this field survey include Eurasian water-milfoil, curly-leaf pondweed, European frog-bit, and pale swallow-wort (**Figures 5 - 8**).

Eurasian water-milfoil was found at all the Aquatic HPAs. Curly-leaf pondweed was found at Aquatic HPAs 1, 2, 4, and 6-9. European frog-bit was found at Aquatic HPA 4 (**Table 1**). Pale swallow-wort was found at Terrestrial HPA 7 (**Table 2**). Previously, pale swallow-wort populations were treated upon detection, either by hand-pulling or foliar spraying. The SLELO Rapid Response team visited this location for foliar spraying on July 22<sup>nd</sup>, 2016.



**Figures 5 - 8.** (From left to right) Eurasian water-milfoil; Curly-leaf pondweed; European frog-bit; Pale swallow-wort.

In addition to those target species, the subsequent general species of concern were found at Mud Bay: zebra mussel, yellow iris, and garlic mustard (**Figures 9 – 11**). These species were found at the following HPAs and GPS waypoints (WPs): Zebra mussel was found at Aquatic WP 2 (**Table 3**). Yellow iris was found at Aquatic WP 1. Garlic mustard was found at Terrestrial WP 2. Additionally, pale swallow-wort was found at Terrestrial WP 2 (**Table 4**).



**Figures 9 - 11.** (From left to right) Zebra mussel; Yellow iris (fruit); Garlic mustard.

Various native species were also determined to be present using the rake toss and visual observation methods. These species include: filamentous green algae, elodea, eelgrass, slender pondweed, clasping-leaf pondweed, water starwort, variable pondweed, stonewort, fragrant waterlily, yellow pond lily, cattail, water buttercup, bladderwort, coontail, water-shield, Northern snail-seed pondweed, and native water-milfoil.

**Table 1.** Aquatic HPAs at Mud Bay.

<i>HPAs</i>	<i>Description</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Toss</i>	<i>Depth (ft)</i>	<i># Spp.</i>	<i>#Inv.</i>	<i>Invasives</i>	<i>Visuals</i>
1	End of Rd Near Launch	44.07042	-76.3306	1	6	2	1	EW	
				2	6	3	1	CP	
2	Cove Along Shoreline	44.07381	-76.32393	1	3	4	0		EW, CP
				2	2.9	2	1	EW	
3	Corner Near Marsh	44.07436	-76.32165	1	2.2	5	0		EW
				2	2.4	8	1	EW	
4	Marshy Inlet	44.07559	-76.3196	1	2	5	1	EW	EW, CP, FB
				2	2.1	3	1	EW	
5	Corner Near Marina	44.07921	-76.3114	1	2.5	2	0		EW
				2	3	3	0		
6	Upstream of Bridge	44.08187	-76.3097	1	1.9	5	0		EW, CP
				2	2	2	0		
7	Quiet Cove Near Boats	44.08127	-76.3137	1	2	5	0		EW, CP
				2	2.1	4	1	CP	
8	Near Houses	44.07496	-76.3278	1	2.5	4	1	EW	EW, CP
				2	2.1	4	1	EW	
9	Near Marina	44.07581	-76.33404	1	1.6	3	0		EW, CP
				2	1.7	3	0		
10	Quiet Area Near Houses	44.0769	-76.32418	1	2.8	5	1	EW	
				2	3	2	1	EW	

**Key:** EW = Eurasian water-milfoil CP = Curly-leaf pondweed FB = European frog-bit

**Table 2.** Terrestrial HPAs at Mud Bay.

<i>HPAs</i>	<i>Description</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Invasives</i>
1	NE Corner of 2nd Parking Lot	44.070142	-76.329983	0
2	Along Rd	44.069477	-76.328005	0
3	Along Rd	44.06944	-76.327641	0
4	Along Rd	44.069464	-76.327873	0
5	Along Rd	44.069581	-76.328225	0
6	In 2nd Parking Lot	44.070003	-76.330517	0
7	Close to Launch	44.070142	-76.330807	SW, GM

**Key:** SW = Pale swallow-wort GM = Garlic mustard

**Table 3.** Additional Aquatic Observations/Waypoints at Mud Bay.

<i>WPs</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Species</i>
1	44.08212	-76.30931	YI
2	44.07892	-76.31922	ZM

**Key:** YI = Yellow iris ZM = Zebra mussel

**Table 4.** Additional Terrestrial Observations/Waypoints at Mud Bay.

<i>WPs</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Species</i>	<i>Notes</i>
1	44.07003	-76.32857	GM	Footpath off of Road
2	44.06994	-76.33061	SW	One plant

**Key:** SW = Pale swallow-wort GM = Garlic mustard