

# Little Traverse Lake Association 2022 Lake Biologist & AIS Final Report

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## I. Aquatic Invasive Species and Plant/Algae Monitoring

### Task Description #1

#### *Drone High Altitude AIS Footage & Analysis*

*FWS Biologists will work in collaboration with Zero Gravity Aerial, LLC to map and analyze all aquatic gardens (“weed beds”) mid-summer. Ground-truthing of all major gardens will take place once drone footage has been obtained and analyzed. FWS Biologists will either snorkel or dive on all major aquatic gardens as identified by the high-altitude drone survey. All aquatic plants will be identified and generally quantified, with special attention directed towards discovering AIS.*

We conducted a complete drone imaging video survey of the entire littoral zone on 29-30 July. All video footage was archived on an external hard drive which is included with this report. All aquatic gardens identified by drone were surveyed using full SCUBA gear on 6 August. Each dive location was documented using an underwater GoPro video camera. Underwater video footage was archived on the same external hard drive included with this report.

This year, we provide you with a more robust map of your aquatic gardens. Included on the hard drive is a .kmz file of the plant survey. When you open this file in either Google Earth Pro or mymaps.google.com (both free programs), it will show you the locations of the aquatic gardens and all plant species identified. Each placemark (labelled 1-12) can be clicked on to open and show GPS coordinates for that site along with a list of plants found. The plants listed are those commonly found in our watershed. The plant species found at each particular site are numbered 1-4, with 4 being highly abundant and 1 being sparse (no number means that plant was not found at that site). With this map, you can get a visual snapshot of each site and where the most diverse sites are on the lake. The information is also shown in Table 1.

We continue to develop our skills by consulting with experts in the field. Last year we hired Dr. Rex Lowe, Bowling Green University, to spend time with us to verify microscopic algal species. This year we hired Dr. Jo Latimore, Michigan State University, who is an expert in aquatic vascular plant identification, to come to our lab and verify our identification of common aquatic plants in Leelanau County.

**The good news for Task #1 is that no invasive plant species (especially Eurasian watermilfoil) were identified in this comprehensive survey!**



Table 1: 2022 Aquatic Vascular Plants and Macroscopic Algae

2022 Plant Survey		Site											
Scientific Name	Common Name	1	2	3	4	5	6	7	8	9	10	11	12
<i>Chara contraria</i>	Common stonewort	4	2	2	1	4		4	4	4	4	1	
<i>Cladophora sp.</i>	Cladophora												
<i>Ludwigian polycarpa</i>	False Loosestrife												
<i>Myriophyllum verticillatum</i>	Whorled watermilfoil						4						4
<i>Najas flexilis</i>	Slender naiad	2	2	4				2	4	4	2	1	
<i>Najas marina</i>	Spiny Naiad												
<i>Nymphaea odorata</i>	White Water Lily												
<i>Potamogeton alpinus</i>	Alpine Pondweed												
<i>Potamogeton foliosus</i>	Leafy Pondweed												
<i>Potamogeton gramineus</i>	Variable Pondweed							2			2		
<i>Potamogeton natans</i>	Floating Pondweed												
<i>Potamogeton sp.</i>	Pondweed	1											
<i>Sagittaria cuneata</i>	Arum-leaved Arrowhead							2					
<i>Stuckenia pectinata</i>	Sago Pondweed	2	4					1					
<i>Vallisneria americana</i>	Water Celery	4	4								4	4	
<i>Nitella flexilis</i>	Slender Nitella	2	1	2		1		1			1	1	
<i>Tolypella intricata</i>	Bird's nest stonewort							1	1		1		
<i>Myriophyllum heterophyllum</i>	Variable Leaf Milfoil				4								
<i>Potamogeton illinoensis</i>	Illinois Pondweed										1		

## Task Description #2

### Shoreline/Shallow Water Emergent Plant Survey

The entire shoreline will be assessed and the presence of all emergent and floating aquatic vascular plants will be identified and documented to genus along with their relative abundance. The presence of invasive Purple Loosestrife (*Lythrum salicaria*) and Yellow Flag Iris (*Iris pseudacorus*) will be assessed, documented, and compared to 2020 and 2021. To gain more certainty of results in 2022, 2 surveys will be completed in May when Yellow Flag Iris is in bloom and 2 more surveys completed later in August when Purple Loosestrife is in bloom. This work will be in concert with all AIS eradication work LLA volunteers or others are involved in.

We conducted four (4) shoreline/shallow water emergent plant surveys in 2022, the first two on 11 June and 19 June looking specifically for Yellow-flag Iris (YFI), another on 19 July looking specifically for Purple Loosestrife (PL), and the last one on 15 August surveying all shoreline/shallow water plants, including PL. Data from both surveys were combined for this report. Once again, the only two invasive species we found (other than Narrow Leaf Cattail, which is invasive but not a species of current focus), were YFI and PL. Native shoreline/shallow water plants were documented but changed very little from 2021 and so were not reported. Diagrams #1 and #2 below show both 2021 and 2022 YFI and PL locations.

We took photographs of each site from the boat for documentation purposes and listed the property owner's name in the title for LTLA Board reference. These names were found on a phone app (HuntStand) and properties may have changed ownership, so we cannot verify property owners. The labeled pictures are also archived on the accompanying hard drive along with the .kmz files for all placemarks shown in Diagrams 1 and 2.

Diagram 1 shows a comparison of YFI sites found in 2021 (yellow) vs. 2022 (red).

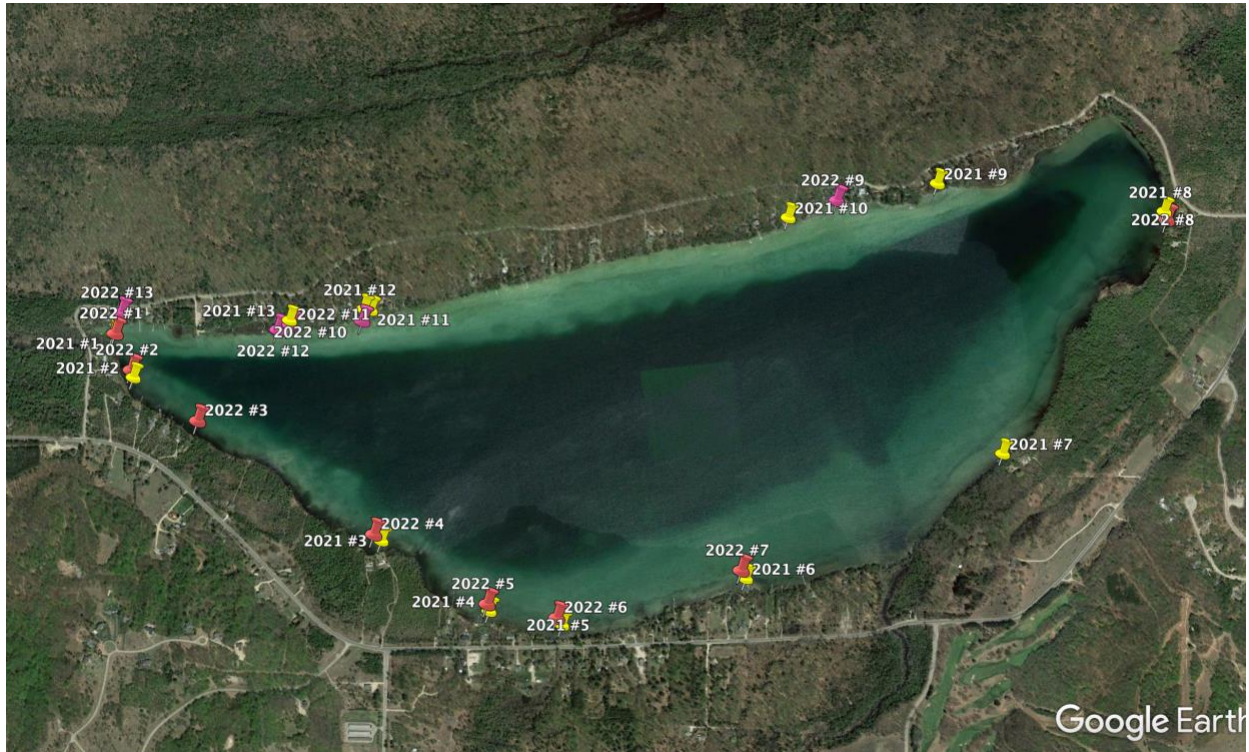


Diagram 2 shows a comparison of PL sites found in 2021 (yellow) vs. 2022 (red).





### Task Description #3

#### Microscopic Algal Community Survey

Four (4) plankton tows will be conducted, 3 horizontal surface pulls and one vertical deep water pull. Common microscopic phytoplankton and zooplankton will be identified and documented to genus along with their relative abundance. Results will be compared to 2020 and 2021 field work results to monitor and document changes.

Microscopic organisms, including algae, rotifers and arthropods are important organisms in a lake ecosystem. Algae, along with submergent plants and photosynthetic bacteria, are the base of most aquatic food webs and their presence ultimately allows birds, fish and other animals to live in and around the lake. Zooplankton and phytoplankton were collected on 1 August at the same locations sampled in 2020 and 2021 using the same collection protocol.

As you can see from Table 2, we observed many similarities and few differences from this three-year data set (numbers represent relative abundance from 1-5). No notable differences were seen as the species diversity seems to be staying consistent. This archived data can be used to observe trends in future years. Please refer to the 2020 Final Report for pictures of common plankton observed.

Table 2: 2020 - 2022 Plankton Tow Microscopic Algae Comparison

Type	Classification	Tow Date						
		Vertical 7/30/20	Tows 7/30/20	Tow 7/14/21	Tows 7/28/21	Vertical 7/28/21	Vertical 8/1/22	Tows 8/1/22
Aphanocapsa sp.	Algae - Blue Green			4	4	2	3	4
Merismopedia sp	Algae - Blue Green	2	3	2	1	2	3	2
Microcystis aeruginosa	Algae - Blue Green	4	3	4	3	2	3	4
Asterionella sp	Algae - Diatom	3						
Cyclotella sp	Algae - Diatom			1	1			
Cymbella sp	Algae - Diatom	1						2
Fragularia sp.	Algae- Diatom	2	3	4			1	
Gyrosigma sp.	Algae- Diatom						1	
Navicula sp	Algae - Diatom	1	1		1		1	
Pinnularia sp	Algae - Diatom				1			
Pleurosigma sp	Algae - Diatom	1						
Synedra nana	Algae - Diatom	3	2				2	1
Synedra capitata	Algae - Diatom	2						
Tabellaria sp	Algae - Diatom	1						1
Ceratium hirundinella	Algae - Dinoflagulate	3	4	2	2	1	3	3
Peridinium sp	Algae - Dinoflagulate	5	5	2	5	2	4	5
Chlorococcus sp	Algae - Green		3		1	1		1
Chroococcus sp	Algae - Green	3	2		3			
Cosmarium sp.	Algae - Green		1					
Euglena	algae- Green			1				
Mougeotia sp	Algae - Green		1	1				
Pediastrum simplex	Algae - Green	2	3	1	2	1	1	2
Scenedesmus sp	Algae- Green	2		1	1	1	1	1
Spirogyra sp	Algae - Green		1	1				
Zygnema sp	Algae - Green			1				
Chrysophaerella sp	Algae - Yellow Green			1		1		
Dinobryon cylindricum	Algae - Yellow Green	2	3			1	1	2
Ceriodaphnia sp	Arthropod - Crustacean	1	2					
Cyclops vernalis	Arthropod - Crustacean	1	3		1		1	
Kertella sp.	Arthropod - Crustacean						1	2
Polyantra sp.	Arthropod - Crustacean							1
Diffugia sp	Protozoan-amaeba				2	1	2	2



Diagram 3: Plankton Tow Locations



#### Task Description #4

##### **Miscellaneous consulting**

*FWS/UA biologists will be available throughout the year for consulting on biological issues found on LTL or within the Good Harbor Bay Watershed.*

We continue to work closely with LTLA board members to answer questions and give recommendations on all water-related issues. We made ourselves available for in-person and/or zoom meetings when requested. It continues to be a pleasure to work in collaboration with the Lime Lake Association, the Leelanau Conservancy, and the National Park Service to protect and preserve the water quality within the Good Harbor Bay Watershed.

## II. Water Quality/Misc. Tasks

#### Task Description #5

##### **Enteric Bacteria Monitoring Research**

*Details regarding this task will be presented in a separate document.*

#### Task Description #6

##### **Shetland Creek Testing (protocol provided by LTLA)**

*Sites and sample dates determined by LTLA in coordination with FWS.  
 8 tests total*



This task was not completed due to lack of identified sites and sample dates.

### Task Description #7

#### ***Discovery Boat III Cruises***

*FWS conducted the maiden voyage of Discovery Boat III (thanks to Captain Jeff Shutz!) in 2021. This endeavor, inspired by and modeled after the Discovery Boat cruises conducted by the Glen Lake Association, provides a unique opportunity for riparians to learn, first hand, about Little Traverse Lake and the projects the LTLA is involved in. Dates and times determined by LTLA in coordination with FWS.*

*2 cruises total*

We conducted 2 Discovery Boat cruises, along with Captain Jeff Shutz, on 29 July and 5 August. Jeff and his wife not only provided the use of their fully equipped pontoon boat, but also generously provided drinks and appetizers for all participants. This added touch made the cruises enjoyable for all. Thank you! The cruises seemed to be well received and beneficial to all who attended. It allowed us to showcase all that LTLA is doing to help preserve the waters of beautiful Little Traverse Lake and educate more people on how to better care for the lake.

### Task Description #8

#### ***Septic System Dye Testing***

*Four (4) septic systems will be dye tested by placing a tracer dye in the system and then sampling the lake surface water daily for up to two weeks. Water samples will be collected by LTLA volunteers (or likely the homeowner) and stored (refrigerated) until pickup or delivery. Alternately, FWS may use drone technology to fly the shoreline daily with sensors to identify the dye (in which case no water sampling required).*

This task was not completed due to a lack of volunteers identified by LTLA. The purchased dye will be stored and this task will be completed in 2023.

## General 2023 Recommendations

1. Due to our increasing involvement this year with the Lake Leelanau Lake Association and Grand Traverse Band of Ottawa and Chippewa Indians on their Eurasian Watermilfoil control efforts, we are even more keenly aware of the importance of constant and relentless surveillance of this highly invasive plant in our watershed. We recommend even more regular surveillance in 2023, and the establishment of a EWM eradication protocol, complete with the required expertise, equipment and personnel in place if (when?) EWM is discovered.
2. We recommend a concerted effort in 2023 to eradicate all Purple Loosestrife and Yellow-flag Iris from areas around Little Traverse Lake.
3. We recommend continuing the plant and algal surveys to develop and document trends and to find invasive species (besides EWM) in the earliest stages of infestation.



4. We recommend LTLA consider joining our newest 3-year initiative (2023-2025) involving eDNA sampling and metabarcoding. We believe this will provide unprecedented insight into the living community of Little Traverse Lake and could be tailored to continue answering questions about enteric bacteria/septic system influence.
5. We recommend conducting more Discovery Boat cruises if there is interest within the LTLA membership.