

APPENDIX J

Miramichi Lake Mussel Survey



**Brook Floater Survey of Miramichi Lake
(September 18th and 19th, 2019)**

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NSMDC Anqotum Resource Management

Anqotum obtained funding to conduct a freshwater mussel survey at Miramichi Lake. The survey was to be completed as part of the application to introduce rotenone into the lake to eradicate the invasive Small Mouth Bass present. We wanted to characterize the species make up in the lake to ensure that there were no species at risk present. To do this we chose to conduct a presence/absence survey.

Methodology

The lake was divided into five sites (figure 1) that were further broken down into subsections (figure 2) based on access and depth. After obtaining our section 52 permit, environmental services program technicians traveled to Miramichi Lake in early fall to perform the survey.

A total of three field technicians conducted the mussel surveys. They accessed each of the sites via canoe/kayak and conducted the surveys by wading in the water with viewing buckets.

Observations

Generally, the water was very clear and in some areas the substrate/specimens could be identified in approximately 2-3 feet of water depth. Visibility was highly variable from site to site. Even within subsections, there was a great amount of variability. Vegetation and depth were the common cause of inhibiting surveys. The dense growth of aquatic plants made it hard to walk in water just a couple feet deep, and masks were required to dive closer to the bottom to properly identify the species present.

Results

In total, seven different fresh water mussel species were identified as inhabiting the lake, including Brook floater. Four specimens were confirmed to be Brook floater (3 live specimens; 1 shell; 1 other potential shell could not be properly identified due to quality of shell). Figure 3 shows our results. Many different species of mussels were viewed and identified. The habitat is perfect for the wide range of species of freshwater mussels. The bed of this lake varies from sandy, to muddy, to mixed sediment, loaded with a wide variety of aquatic vegetation.

eDNA samples were collected and sent to Francis LeBlanc at the Department of Fisheries and Oceans for processing. The results were negative for the presence of Brook floater. There could be many reasons for this result such as it is unknown if the eDNA could be concentrated on the bottom because of the lack of water flow in the lake, and this could alter the results of the surface sampling design. The time of year could also affect the concentration of eDNA released into the water, as they are more active in the spring.

Because of the negative eDNA result, confirmation of visual identifications were completed. Collected shells were studied by Mary Sollows and Donald McAlpine at the New Brunswick

Museum for a second opinion. Upon review, it was confirmed that there was a positive identification for Brook floater. There is another shell that is presumed to be a Brook floater as well, but due to the missing ventral margin, identification could not be provided definitively.

Recommendations

Due to the time of year of the search, it is recommended that additional surveying is needed to get a more accurate depiction of the variety of species. As well, a distribution survey should also be completed as many areas were inaccessible due to the water depth but these could potentially be reached with a snorkel survey and boat. To properly conduct a distribution survey, additional survey days and a larger crew of survey technicians due to the size of the lake would be required. It is probable that, with a more in-depth survey, more species such as the Yellow Lamp mussel may be found, as their host fish is plentiful in this lake.



Figure 1- proposed search sites



Figure 2- sites searched.

Mussel shell collected identification								
	Site 1 A	Site 1 C	Site 2	Site 2A mouth of lake brook	Site 3	Site 4	Site 5	Site 5.1
Easter Floater	1				2	1	1	
CREEPER		2	2				1	
Easter elliptio	3			1	3			
Eastern Lampmussel	1			1			2	1
Alewife Floater				1	1	2	3	1
Brook Floater		(few live specimens)	(viewed a few live specimens)			1 (shell-confirmed)		live specimen
Triangle Floater		12	4			3		
Site details :	Boat launch: Rocky (small) at the entrance and gradually gets sandier. Less mussels by the shore, they increase as you go to the left & right & further out into the lake.	BEACH- VERY SANDY!!! To the right it is very grassy. Lilly pads everywhere, cannot see bottom of lake bed.	Small rocks, lots of sand. Great mussel habitat.	Bigger rocks in the brook, sandy substrate still. Flow is quick.	lots of grass!	lots of vegetation in the water, soft sandy bottom.	lots of vegetation, substrate sandy. Little rocks. To the side you have tons of vegetation (hard to walk through water)	Very light mud, you sink in an get suctioned to the substrate. Perfect habitat for the floaters.

Figure 3- Details of Shells collected for identification.

EDNA Sample Location				
Site	Taken by	Sample Time	Substrate type	Coordinates
2A	Kayla	11:10 AM	Rocks, Sand and cobble mixture	46°27'49.1"N 66°57'53.8"W
1c	----	----	sandy, lots of aquatic vegetation	46°27'26.8"N 66°57'27.2"W
1b			ALL Sand	46°27'15.8"N 66°57'24.4"W
1a	Kayla	1:49 PM	Rocks at the entrance, and turns sandy as you move further away from shore.	46°27'02.2"N 66°57'35.3"W
3	----	----	Covered in aquatic vegetation	46°27'51.9"N 66°58'52.7"W
4	----	----	lots of aquatic vegetation, sandy/small rocks	46°27'46.1"N 66°59'25.1"W
5.1	----	----	Light mud area, suctions your boots as you walk. Perfect for floaters mussels	46°27'27.7"N 66°59'05.5"W
5	----	----	mixed substrate, lots of lilly pads to the right .	46°27'26.0"N 66°58'48.3"W

Figure 4- GPS coordinates of surveyed locations.

2019 Site 4:
Alasmidonta varicosa (2 valves)

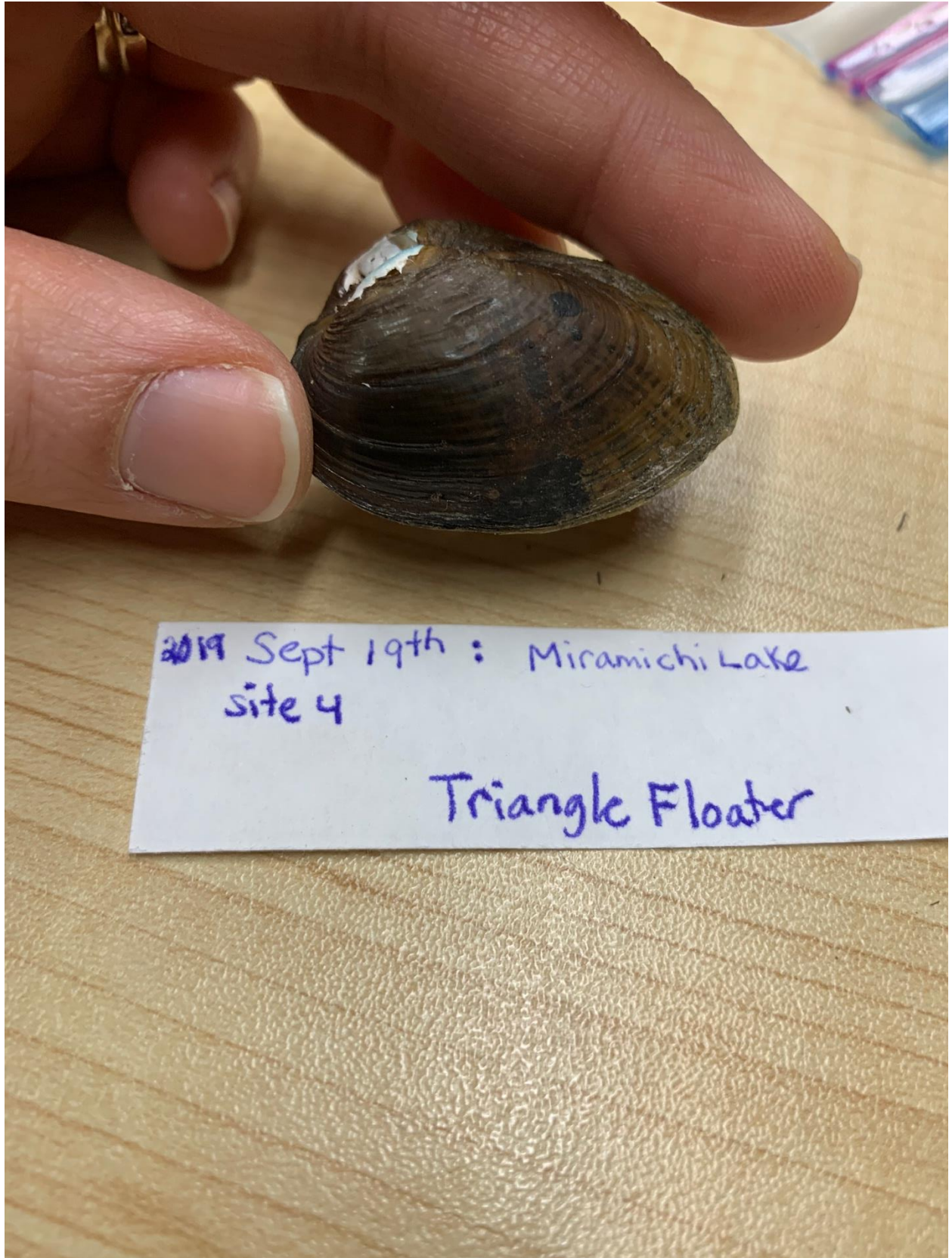




2019 Site 1c:
Strophitus undulatus

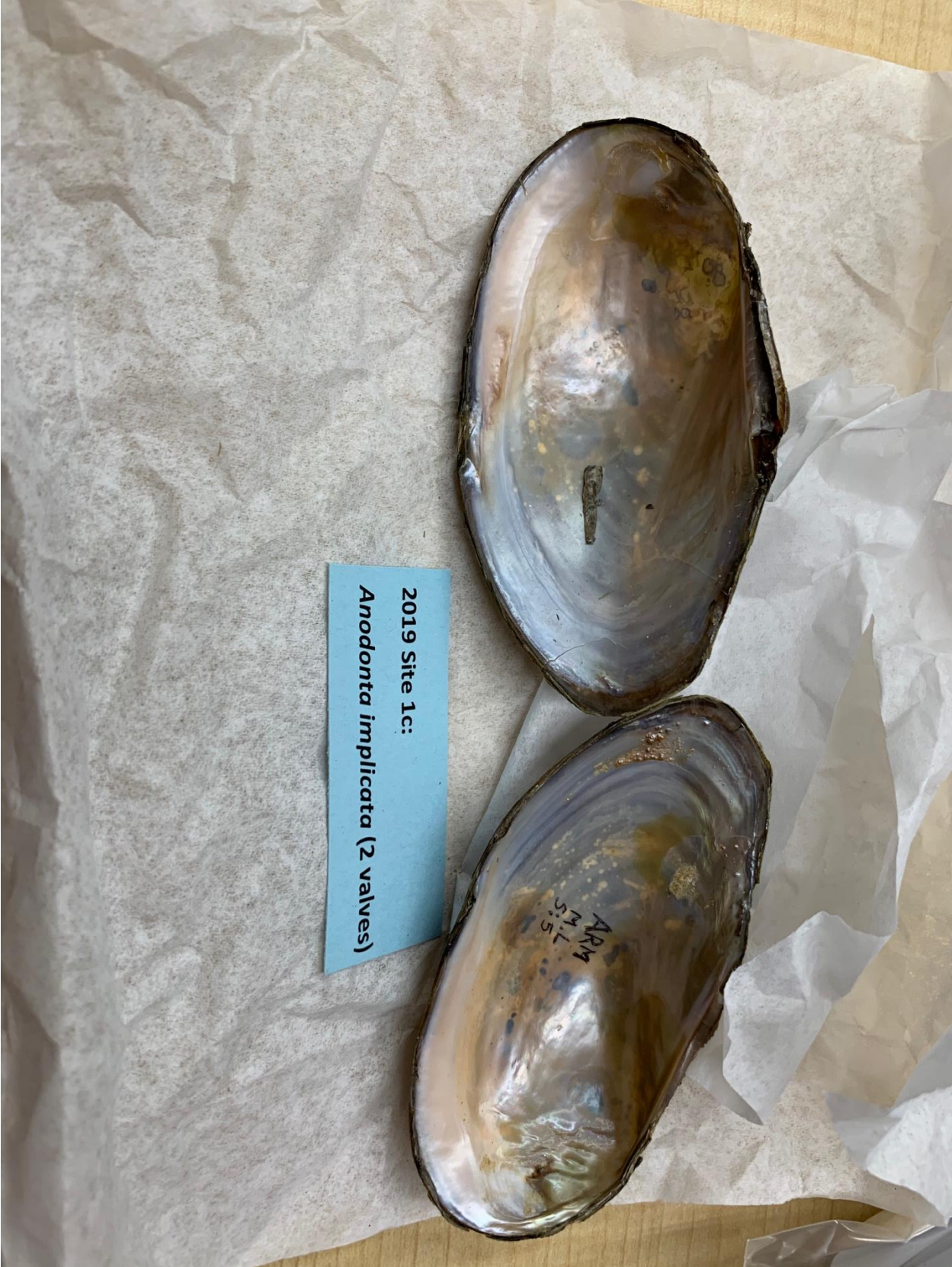
2019 Site 2a: (behind fence)
Lampsilis radiata (2 valves)





2019 Sept 19th : Miramichi Lake
site 4

Triangle Floater



2019 Site 1c:
Anodonta implicata (2 valves)

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