



Invasive Macrophyte Survey Pilot 2015

2015 Macrophyte Survey Results

COMPLETED WITH SUPPORT FROM:



Acknowledgments

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AQUATIC INVASIVE MACROPHYTES INTRODUCTION (AIS):



Figure 1 – Flowering Rush (*Butomus umbellatus*)

Invasive species are plants, animals, or even pathogens that are non-native to Alberta and pose a significant threat to the environment, economy, or human health. Aquatic invasive plants have become a topic of concern as they can drastically alter the conditions of waterways. Many jurisdictions outside of Canada have had to spend large sums of money to control and manage aquatic invasive plant infestations. These plants can be introduced in several ways: some are planted in ornamental ponds and escape by seed spread or during flood, others are transferred from one waterway to another by transporting fragments of the invasive plant via vehicles, and some may find their way into waterways due to the improper disposal of unwanted aquariums.

In Alberta, there are four major aquatic invasive plants of concern: Flowering Rush (*Butomus umbellatus*), Eurasian Water-milfoil (*Myriophyllum spicatum*), Curly-leaf Pondweed (*Potamogeton crispus*), and Hydrilla (*Hydrilla verticillata*). Of these species, only Flowering Rush has been confirmed in Alberta, known in at least seven areas of the province. Flowering Rush fills shallow lakes, transforming them into something that resembles marshland and can spread four different ways:, by seed, by rhizome fragments, from root bulbs, and, in some varieties, from bulbils found at the base of the inflorescence. Eurasain Water-milfoil is the most widespread invasive macrophyte. It is found across the United States, in British Columbia and the Great Lakes. It forms dense mats that form along the surface of the lake, preventing light from reaching any of the native macrophytes below.



Figure 2 - Eurasian Water-milfoil (*Myriophyllum spicatum*)



Figure 3 – Hydrilla (*Hydrilla verticillata*)

Eurasian water-milfoil can hybridize with native Northern Water-milfoil (*Myriophyllum sibiricum*) and can establish a new plant from a small plant fragment. Hydrilla is quite similar to Eurasian water-milfoil in that it forms dense surface mats and reproduces by fragmentation, but can also produce new plants by its winter buds. Both species have rapid growth rates and grow up to a metre a day. Curly-leaf Pondweed is another mat forming invasive macrophyte that establishes from its winter-buds just after ice melt. The early establishment of this plant leaves native plants little chance at establishing, and thus quickly takes over the ecosystem.

Legislation passed in March of 2015 has made it illegal to own, purchase, sell, or transport sixteen aquatic plants known to have invasive properties in North America¹.

PURPOSE:

The purpose of the invasive macrophyte (aquatic plant) program was to survey some of Alberta's major recreational lakes in order to detect the presence of invasive macrophytes. This program utilized four methods in an attempt to cover as much area as possible: high-risk area surveys, bio-blitz, shoreline surveys, and systematic surveys of the littoral zone. The ultimate goal of these surveys is to detect occurrences of invasive macrophytes in recreational lakes.

While detection of aquatic invasive species is the primary goal of this program, the survey protocols allow for the ability to catalogue the native macrophyte community in Alberta's lakes, and keep them in permanent record at the University of Alberta Vascular Plant Herbarium (ALTA-VP). Most species lists generated for some of Alberta's lakes were generated prior the 1980s and have not been updated until this time.



Figure 4 – Curly-leaf Pondweed (*Potamogeton crispus*)

¹ Fisheries (Alberta) Act, Alberta Queen's Printer, 2015. Schedule - Section 1 (1)(j.4) and 11.02(2)(c) and 11.03(b)

SITE INFORMATION:

There were four lakes surveyed during the summer of 2015: Lac la Nonne, Lac Ste. Anne (West Basin), Pine Lake, and Lacombe Lake:

LAC LA NONNE:

Lac la Nonne is a large hypereutrophic lake split between the counties of Barrhead and Lac Ste. Anne 90 km northwest of Edmonton. While the lake has the Summer Village of Birch Cove, several RV camping areas, and small subdivisions along the south and east sides of the lake, large areas of shoreline remain undeveloped. Lac la Nonne receives its inflow from Majeau Creek and its outflow feeds MacDonald Creek, which ultimately leads to the Pembina River².

LAC STE. ANNE:

Lac Ste. Anne is a large lake, divided into 2 basins found 80 km west of Edmonton. The west basin is smaller, and less populated than the eastern basin. To the north of the lake is Alexis Reserve 133, to the south is West Cove Summer Village, and in the center is Farming Island. The Sturgeon River flows from Lake Isle to the west basin of Lac Ste. Anne. Lake Isle has recently been identified as the body of water with the worst Flowering Rush infestation in Alberta. Concerns about the Lake Isle Flowering Rush prompted an inquiry to determine whether the Flowering Rush had made its way into the open waters of the west basin of Lac Ste. Anne. Lac Ste. Anne is considered highly productive, hypereutrophic and often experiences cyanobacterial blooms.

PINE LAKE:

Pine Lake is a long narrow lake located 35 km southeast of Red Deer. The shoreline is largely developed with private dwellings and RV camping areas. Pine Lake is eutrophic and often experiences dense cyanobacteria blooms. The nuisance blooms and actions of local stewardship groups resulted in the installation of a hypolimnetic withdrawal system in 1998². Pine Lake is fed by many small streams and is thought to be significantly impacted by groundwater. Ghostspine Creek is the outflow of the lake, which ultimately joins the Red Deer River².

LACOMBE LAKE:

Lacombe Lake is a pothole lake located between the city of Lacombe and the town of Blackfalds. The majority of the land around the lake is dedicated to public land, private farms, homesteads and the nearby Lacombe Research Center operated by Agriculture and Agri-Food Canada. In the 1960s, a weir was constructed on Whelp Creek to control and direct the flow into the north end of Lacombe Lake during periods of high flow. In the years previous to 2008, residents noticed that the water quality of Lacombe Lake was starting to deteriorate, and eventually the diversion was stopped³.

² *Atlas of Alberta Lakes, University of Alberta, Department of Biological Sciences* (2005) retrieved from <http://sunsite.ualberta.ca/Projects/Alberta-Lakes/>

³ *Golder Associates Ltd.* 2013. Lacombe Lake Water Quality Assessment -Alberta

Table 1.0. Comparison of the physical and chemical characteristics of the four lakes surveyed in 2015.

Attribute	Lac Ste. Anne (W)	Pine Lake	Lac la Nonne	Lacombe Lake
Maximum depth (m)	9	12	19.8	2.9
Shoreline length (km)	15.8	19.9	25.9	9^
Trophic Status	Hypereutrophic	Eutrophic	Hypereutrophic	Mesotrophic
Chlorophyll-a ($\mu\text{g/L}$)*	45.2**	17.82	62.75	7.68
Total Phosphorous ($\mu\text{g/L}$)*	129.2**	72.8	219	22.05
Average Secchi Depth (m)	1.68*	1.63	2.43	1.53*
Watershed size (km^2)	619	150	299	-

* - indicates historical data

** - indicates whole lake data

^ - indicates estimated value

SAMPLING PROCEDURE:

SYSTEMATIC SURVEYS:

A systematic sampling plan for each lake was created based on data collected from sampling trials in 2014. In 2014, it required approximately five hours of sampling time to conduct a survey of 80 sample sites. As a five hour survey was deemed the maximum realistic time for a volunteer survey, 80 samples sites were chosen for each lake by distributing the points evenly along the length of the shoreline. A GPS was utilized to find the approximate sampling locations along the littoral zone of the lake. At each sampling location a double-sided rake was released off the side of a boat and sample depth was recorded. At each sampling point all macrophytes collected by rake were recorded and voucher samples were preserved for each species on each trip.

BIOBLITZ:

At Lacombe Lake a bioblitz model was used to survey the lake. Instead of a single boat conducting the sampling, four groups (three canoes and one group of waders) covered four areas of the lake with the densest macrophyte growth. Each canoe had a 2.1 km leg, and took 21 sampling points, resulting in samples being taken approximately every 100 m. The wading group covered approximately 210 m, taking a sample every 10 m. GPS locations of each sample point were estimated using this sampling plan. At each sampling location all plants collected by the rake were put into a single bag. The species in each bag were catalogued and vouchers were selected in the lab after sampling.

Table 2.0. Sampling details for each lake

Attribute	Lac Ste. Anne (W)	Pine Lake	Lac la Nonne	Lacombe Lake
Shoreline length (km)	15.8	19.9	25.9	9 [^]
Distance between sampling points (m)	200	250	300	100
Number of planned sampling points	78	76	80	80
June	77	75	78	-
Number of points sampled in	July	70	92	80
August	60	60	80	-

[^] - indicates estimated value

RESULTS:

LAC STE. ANNE:

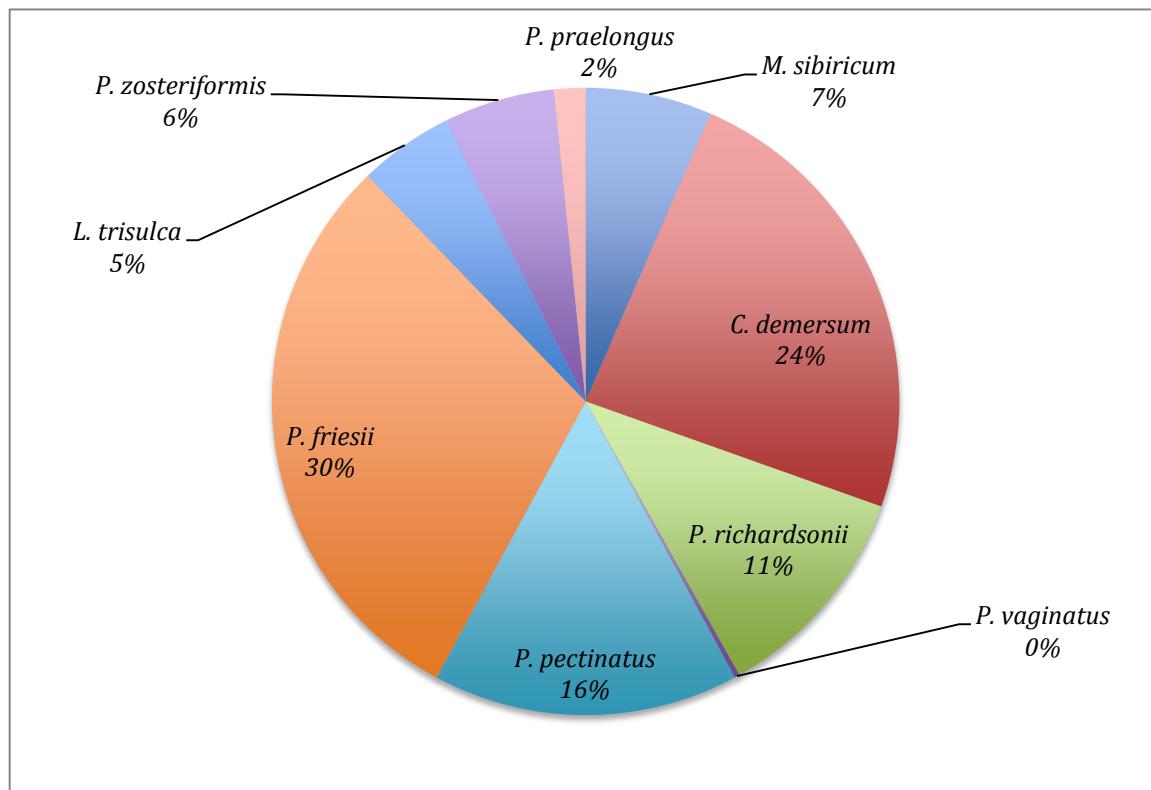


Figure 5 - Macrophyte species composition of Lac Ste. Anne West Basin based on 211 sampling points in 2015.

The west basin of Lac Ste Anne is fairly shallow. Sampling depths ranged from 0.5 m to 6.5 m. In some cases vegetation was found growing at depths greater than 4 m. The littoral zone closest to the shoreline was often too shallow for the boat, resulting in some species being missed altogether. Arrowhead (*Sagittaria cuneata*) and Yellow Pond Lily (*Nuphar variegata*) were observed but not sampled. In August, White-Stemmed Pondweed was observed but not retrieved.

In June, nine different species were retrieved, in July, eight different species were retrieved, and in August, seven species were retrieved. Dominant species in the west basin of Lac Ste Anne include: *Potamogeton friesii* (Flat-stalked Pondweed), *Ceratophyllum demersum* (Coontail), and *Potamogeton pectinatus* (Sago Pondweed). The eastern shoreline of the west basin was densest in Northern Water-milfoil (*Myriophyllum sibiricum*). There were no invasive species found in the west basin of Lac Ste. Anne.

PINE LAKE:

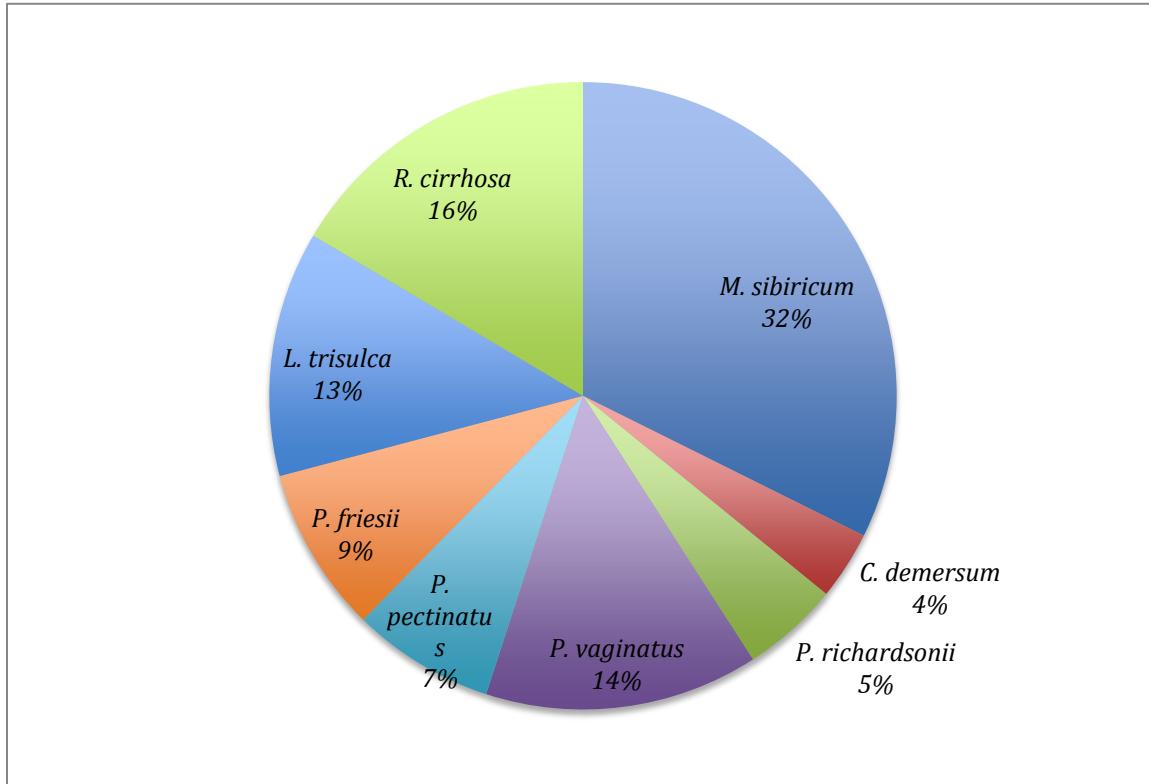


Figure 6 - Macrophyte species composition of Pine Lake based on 205 sampling points in 2015.

In Pine Lake, macrophytes were detected at depths up to four metres. Some of the bays along the east and the far south were too shallow for the pontoon boat used for sampling. In all three sampling trips eight macrophyte species were retrieved. The dominant species included: Northern Water-milfoil (*Myriophyllum sibiricum*), Ditchgrass (*Ruppia cirrhosa*), and Sheathing pondweed (*Potamogeton vaginatus*). There were no invasive species found in Pine Lake.

LAC LA NONNE:

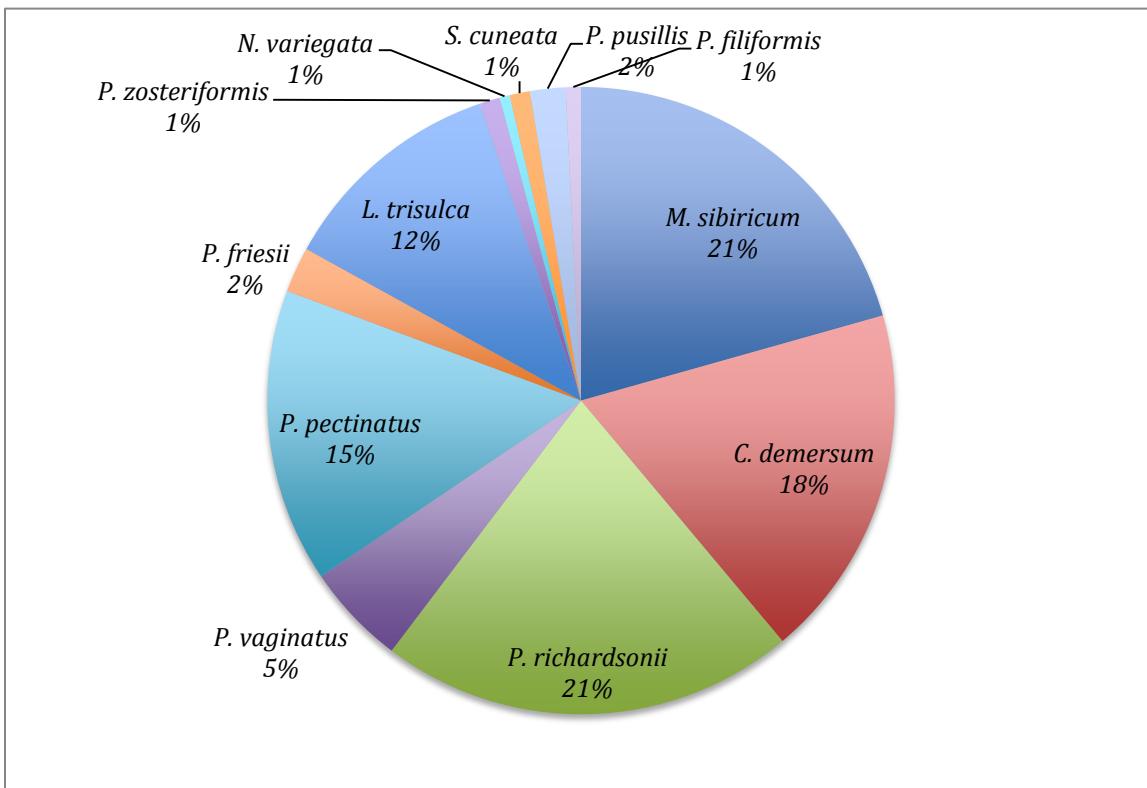


Figure 7 - Macrophyte species composition Lac la Nonne based on 250 sampling points in 2015.

The shoreline of Lac la Nonne is meandering on the east side of the lake and linear on the west side of the lake. The south and west sides of the lake reach deeper depths more gradually than the west and north shores of the lake. On the south and west sides of the lake pondweeds were more dominant, whereas in the north and east portions of the lake Northern Water-milfoil dominated. Macrophytes could be detected at depths up to three metres. In June, eight species were retrieved, in July, twelve species were retrieved, and in August, nine species were retrieved. The dominant species include: Clasping-leaf Pondweed (*Potamogeton richardsonii*), Coontail (*Ceratophyllum demersum*), and Northern Water-milfoil (*Myriophyllum sibiricum*). There were no invasive species found in Lac la Nonne.

LACOMBE LAKE:

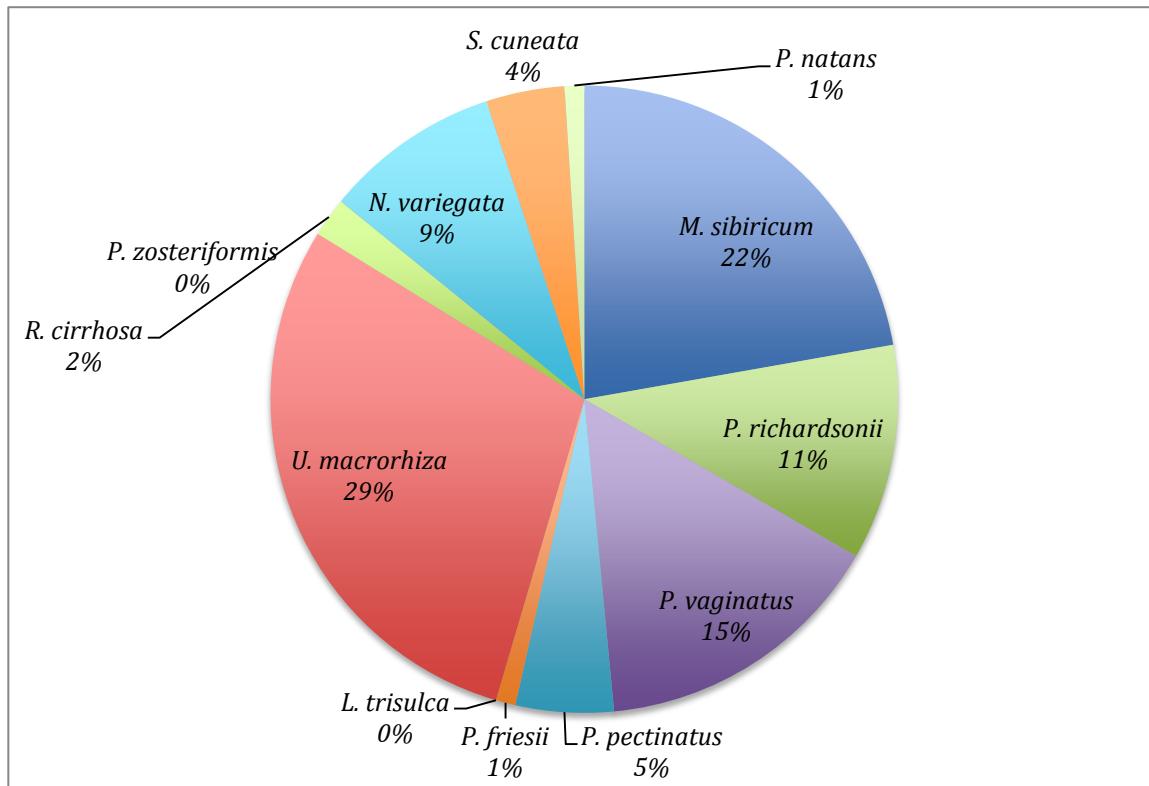


Figure 8 - Macrophyte species composition for Lacombe Lake based on 80 sampling points in 2015.

Lacombe Lake is very shallow (less than three metres) and has dense macrophyte growth. Some species were more dominant in some areas than others: the southeast bay was dominated by *Utricularia macrorhiza*, with instances of *Myriophyllum sibiricum* and *Nuphar variegata*, the south shoreline was dominated by *Myriophyllum sibiricum* with instances of *Utricularia macrorhiza* and various pondweeds (*Potamogeton* spp.), the north shoreline was dominated by *Nuphar variegata*, with various pondweeds (*Potamogeton* spp.), and the eastern shoreline had a variety of species. *Chara* spp. was plentiful throughout the lake - at times the macroalgae beds would extend beyond the water's surface. *Chara* spp. is not included in the collection data as it is a macroalgae – not a macrophyte. No invasive species were found in Lacombe Lake.

2015 LAKE COMPARISON:

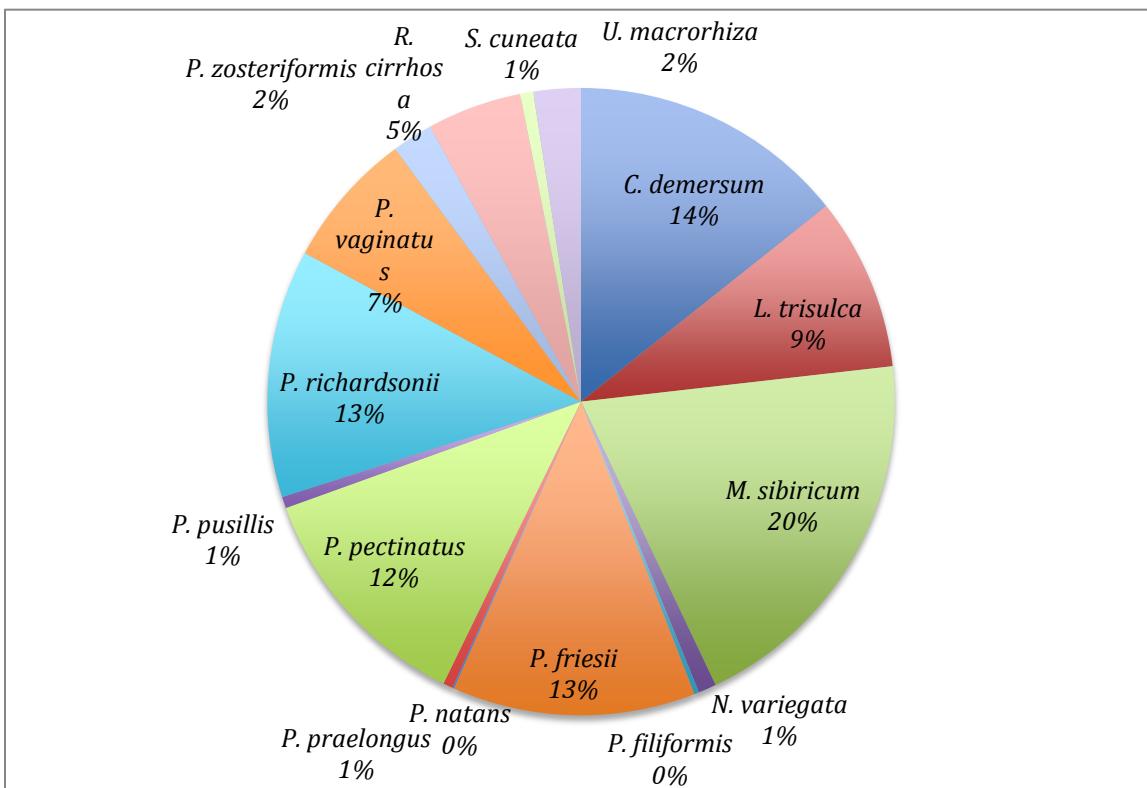


Figure 9 - Macrophyte species composition for Lac la Nonne, Pine Lake, Lac Ste. Anne, and Lacombe Lake as sampled in 2015.

Northern Water-milfoil (*Myriophyllum sibiricum*) was found in each lake sampled in 2015. Various species of pondweed were also common to all lakes sampled including: *Potamogeton richardsonii*, *Potamogeton vaginatus*, *Potamogeton pectinatus* and *Potamogeton friesii*. Some species discovered were unique to one of the four lakes sampled, for instance: *Potamogeton praelongus* was only retrieved in Lac Ste. Anne West, *Potamogeton pusillus* and *Potamogeton filiformis* were only retrieved from Lac la Nonne, and *Utricularia macrorhiza* was found only in Lacombe Lake.

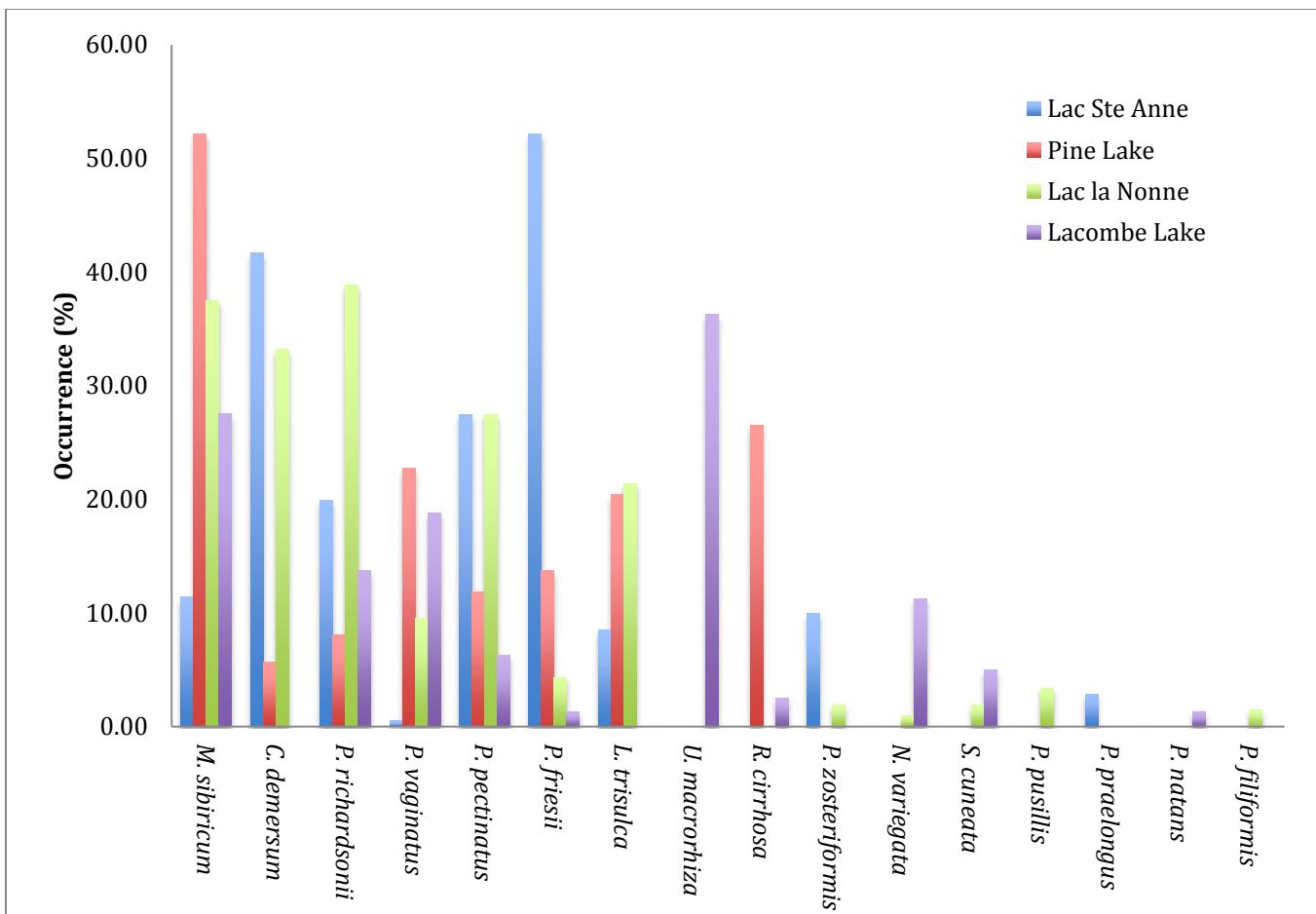


Figure 10 – Rate of retrieval of individual species from Lac la Nonne, Lac Ste. Anne, Pine Lake, and Lacombe Lake in 2015.

In some lakes there appeared to be an association between species. For example, in Lac Ste. Anne west basin, it was common to find Clasping-leaf Pondweed (*Potamogeton richardsonii*) growing near or within stands of Northern Water-milfoil (*Myriophyllum sibiricum*). This trend also occurred in some areas of Lac la Nonne. Star Duckweed (*Lemna trisulca*) was often found tangled in Coontail (*Ceratophyllum demersum*) or filamentous green algae - it was rarely found when only Pondweeds were retrieved. Star Duckweed and Coontail were the species found most commonly in water greater than three metres deep. In order to understand the associations between macrophytes and their habitat associations, more research and sampling would be required.

There was no obvious relationship between lake trophic status and number of species. Lac la Nonne is the most nutrient rich lake sampled and had the largest diversity of macrophytes. Lacombe Lake was the least nutrient rich and had the second largest diversity of macrophytes. In order to make connections with species diversity and species composition with water quality, more rigorous sampling would be required in a greater number of lakes.

CONCLUSION:

No invasive macrophytes were found in Pine Lake, Lac la Nonne, Lac Ste. Anne West Basin, or Lacombe Lake. There were five macrophyte species found in all four lakes (Northern water-milfoil, Clasping-leaf pondweed, Sheathing Pondweed, Sago Pondweed, and Flat-stalked Pondweed). Each lake presented between 8 and 12 different species across the area of the littoral zone that was sampled. It is possible that in some lakes species were missed due to lack of access to shallow water while sampling from a boat, or due to the spacing in the tines on the sampling rake. Thus it is possible that the species lists comprised by this project are not complete. It also should be noted that major emergent vegetation was avoided during surveys (e.g. cattails, bulrushes and bur-reeds). While no invasive species were found in 2015, it is important to remember that invasive species can be introduced at any time, monitoring must continue in some manner in order to ensure these species are not transported into lakes, or if so, are identified early to increase the options available for management of the infestation.

Appendix:

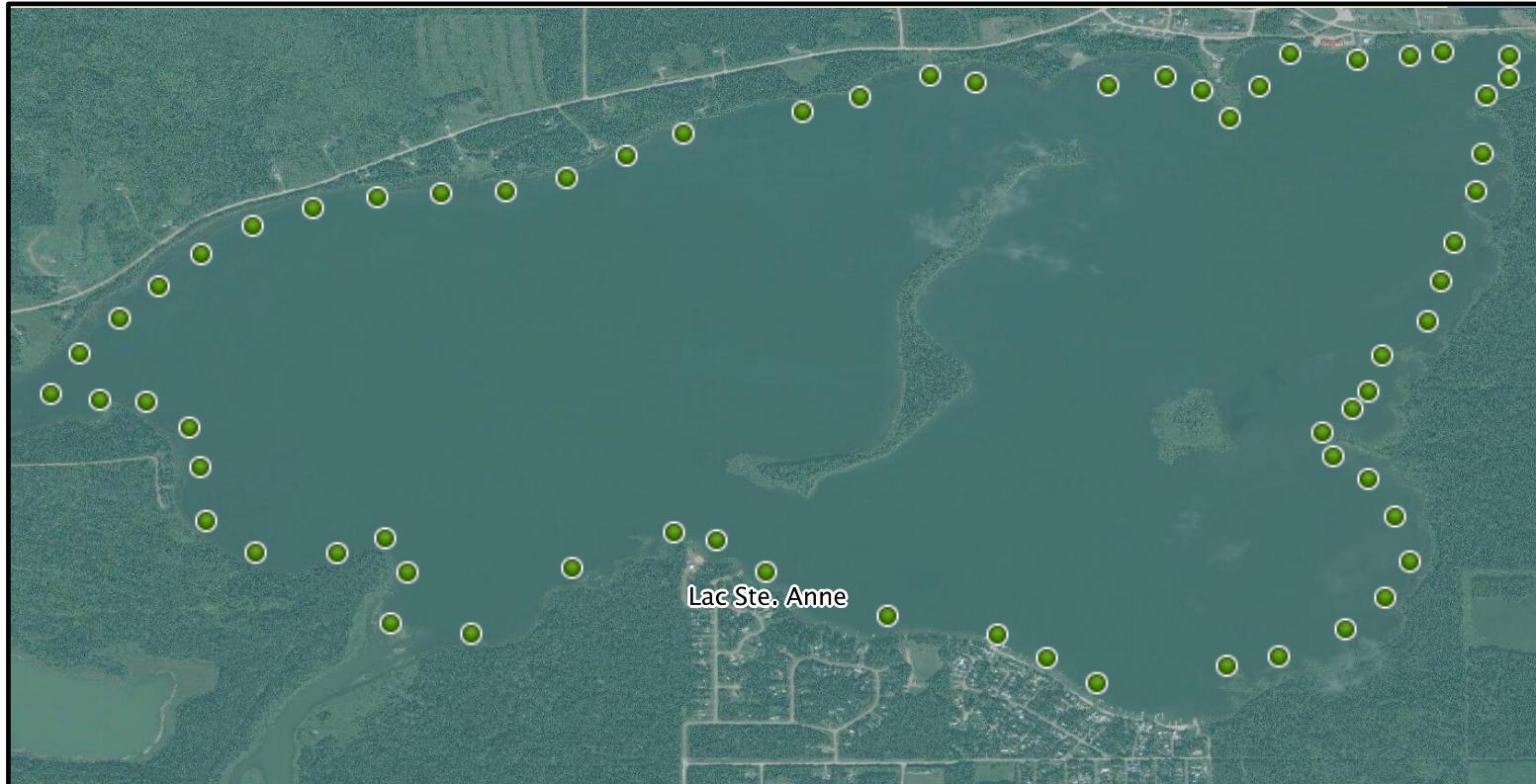


Figure A.0. Locations on Lac Ste. Anne west basin with presence of macrophytes in July 2015

Table A.1. Species list for macrophytes retrieved from the west basin of Lac Ste. Anne in June 2015. Gray colouration indicates lack of macrophytes.

Lac Ste. Anne West June 2015				
Location sampled	Species present			
11 U 666230 5956063	<i>Potamogeton friesii</i>			
11 U 666137 5956056	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 665982 5956017	<i>Potamogeton friesii</i>	<i>Ceratophyllum demersum</i>		
11 U 665812 5955985	<i>Potamogeton friesii</i>	<i>Ceratophyllum demersum</i>		
11 U 665602 5955975	<i>Potamogeton friesii</i>			
11 U 665580 5955775	<i>Potamogeton friesii</i>	<i>Ceratophyllum demersum</i>		
11 U 665459 5955759				
11 U 665410 5955881	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>	<i>Potamogeton richardsonii</i>
11 U 665220 5955892	<i>Potamogeton friesii</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	
11 U 665035 5955870	<i>Potamogeton friesii</i>	<i>Lemna trisulca</i>		
11 U 664940 5955829	<i>Potamogeton friesii</i>	<i>Myriophyllum sibiricum</i>	<i>Lemna trisulca</i>	<i>Ceratophyllum demersum</i>
11 U 664797 5955842				
11 U 664660 5955875	<i>Potamogeton friesii</i>			
11 U 664469 5955856	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 664297 5955759	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 664236 5955717	<i>Potamogeton richardsonii</i>			
11 U 664095 5955705	<i>Potamogeton friesii</i>			
11 U 663894 5955636	<i>Potamogeton friesii</i>			
11 U 663727 5955546	<i>Myriophyllum sibiricum</i>			
11 U 663546 5955439	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>
11 U 663366 5955369	<i>Potamogeton friesii</i>			
11 U 663192 5955321	<i>Potamogeton friesii</i>			
11 U 662976 5955309	<i>Potamogeton friesii</i>			
11 U 662780 5955286	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>		
11 U 662572 5955181	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton friesii</i>	
11 U 662406 5955092	<i>Potamogeton friesii</i>			

11 U 662258 5954952	<i>Potamogeton friesii</i>		
11 U 662139 5954813	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 662030 5954652	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 661898 5954534	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 661885 5954456	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 661921 5954366	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton friesii</i>
11 U 662098 5954413	<i>Ceratophyllum demersum</i>	<i>Potamogeton vaginatus</i>	
11 U 662280 5954368	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 662366 5954200	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 662359 5954002	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton friesii</i>
11 U 662473 5953819	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 662670 5953739			
11 U 662889 5953823			
11 U 662971 5953836			
11 U 663017 5953766			
11 U 663001 5953585	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 663107 5953399	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>
11 U 663379 5953500	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton zosteriformis</i>
11 U 663449 5953621			
11 U 663596 5953757			
11 U 663724 5953882		<i>Potamogeton richardsonii</i>	
11 U 663916 5953904			
11 U 664065 5953795			
11 U 664204 5953672		<i>Potamogeton friesii</i>	
11 U 664438 5953550		<i>Potamogeton friesii</i>	
11 U 664596 5953526		<i>Potamogeton richardsonii</i>	
11 U 664804 5953516		<i>Potamogeton richardsonii</i>	
11 U 664959 5953434		<i>Potamogeton richardsonii</i>	
11 U 665133 5953355		<i>Potamogeton friesii</i>	
11 U 665339 5953263		<i>Potamogeton friesii</i>	
11 U 665516 5953294		<i>Potamogeton friesii</i>	

11 U 665651 5953404	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>
11 U 665842 5953472	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 666000 5953611	<i>Potamogeton richardsonii</i>	<i>Potamogeton pectinatus</i>
11 U 666107 5953724	<i>Potamogeton richardsonii</i>	<i>Potamogeton pectinatus</i>
11 U 666132 5953936	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 666068 5954112	<i>Potamogeton friesii</i>	
11 U 665958 5954258	<i>Potamogeton friesii</i>	
11 U 665851 5954350	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 665873 5954413	<i>Potamogeton friesii</i>	
11 U 665957 5954458	<i>Potamogeton friesii</i>	
11 U 666024 5954590	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 666037 5954785	<i>Potamogeton richardsonii</i>	
11 U 666233 5954936	<i>Lemna trisulca</i>	
11 U 666192 5955127	<i>Potamogeton richardsonii</i>	
11 U 666264 5955312	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 666284 5955539	<i>Potamogeton friesii</i>	<i>Potamogeton zosteriformis</i>
11 U 666299 5955662	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 666281 5955829	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
11 U 666344 5955880	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>
11 U 666425 5955969	<i>Potamogeton pectinatus</i>	<i>Potamogeton friesii</i>

Table A.2. Species list for macrophytes retrieved from the west basin of Lac Ste. Anne in July 2015. Gray colouration indicates lack of macrophytes.

Lac Ste. Anne West July 2015			
Location sampled	Species present		
11 U 666091 5956252	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 665987 5956233	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 665826 5956209	<i>Ceratophyllum demersum</i>		
11 U 665616 5956227	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	
11 U 665523 5956084	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 665437 5955944	<i>Potamogeton zosteriformis</i>		
11 U 665345 5956060	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
11 U 665230 5956116	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton zosteriformis</i>
11 U 665053 5956072	<i>Ceratophyllum demersum</i>		
11 U 664916 5956022			
11 U 664776 5956045			
11 U 664641 5956068	<i>Ceratophyllum demersum</i>		
11 U 664497 5956095	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 664282 5955995	<i>Potamogeton friesii</i>		
11 U 664105 5955926	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 663910 5955890			
11 U 663738 5955819	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>	
11 U 663563 5955716	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>
11 U 663381 5955615	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	
11 U 663193 5955550	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 662992 5955536	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>
11 U 662794 5955511	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>
11 U 662595 5955457	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton pectinatus</i>
11 U 662410 5955373	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton friesii</i>
11 U 662255 5955248	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>

11 U 662128 5955105	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 662010 5954963	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
11 U 661890 5954807	<i>Ceratophyllum demersum</i>	<i>Potamogeton praelongus</i>	<i>Potamogeton richardsonii</i>	
11 U 661808 5954632	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 661960 5954611	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 662105 5954607	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 662244 5954502	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	
11 U 662282 5954332	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>		
11 U 662310 5954101	<i>Potamogeton friesii</i>			
11 U 662468 5953971	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 662723 5953978	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 662870 5954047	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 662944 5953902	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>		
11 U 662899 5953682	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	
11 U 663153 5953645	<i>Potamogeton friesii</i>			
11 U 663326 5953793				
11 U 663457 5953938	<i>Ceratophyllum demersum</i>			
11 U 663605 5954057				
11 U 663769 5954104	<i>Ceratophyllum demersum</i>			
11 U 663903 5954074	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 664061 5953944	<i>Potamogeton friesii</i>			
11 U 664240 5953831				
11 U 664447 5953767	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>		
11 U 664648 5953735				
11 U 664790 5953699	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 664950 5953603	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	
11 U 665108 5953501	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 665356 5953413				
11 U 665510 5953591	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>
11 U 665671 5953636	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 665874 5953759	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		

11 U 665993 5953899	<i>Potamogeton pectinatus</i>			
11 U 666064 5954058	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 666012 5954251	<i>Potamogeton pectinatus</i>			
11 U 665923 5954409	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>
11 U 665810 5954504	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
11 U 665773 5954602	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	
11 U 665862 5954710	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	
11 U 665909 5954785	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	
11 U 665948 5954940	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 666083 5955093	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 666119 5955265	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 666154 5955435	<i>Potamogeton pectinatus</i>			
11 U 666216 5955657	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 666229 5955820	<i>Potamogeton friesii</i>			
11 U 666178 5955983				
11 U 666233 5956071	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 666298 5956150	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
11 U 666297 5956244	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		

Table A.3. Species list for macrophytes retrieved from the west basin of Lac Ste. Anne in August 2015. Gray colouration indicates lack of macrophytes.

Lac Ste. Anne West August 2015			
Location sampled	Species present		
11 U 666117 5956280	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>
11 U 665913 5956236	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>
11 U 665713 5956210	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	
11 U 665508 5956157	<i>Potamogeton friesii</i>		
11 U 665480 5955934			
11 U 665344 5956071	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	
11 U 665144 5956084	<i>Myriophyllum sibiricum</i>	<i>Potamogeton zosteriformis</i>	
11 U 664875 5956017			
11 U 664668 5956054			
11 U 664471 5956093	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>
11 U 664263 5955983	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>
11 U 664041 5955920	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 663844 5955867	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 663654 5955770	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	
11 U 663469 5955646	<i>Myriophyllum sibiricum</i>		
11 U 663252 5955569	<i>Potamogeton pectinatus</i>		
11 U 663053 5955523			
11 U 662831 5955514	<i>Ceratophyllum demersum</i>		
11 U 662591 5955479	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>
11 U 662400 5955364	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton pectinatus</i>
11 U 662223 5955221	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	
11 U 662052 5955039	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 661917 5954843	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 661779 5954715	<i>Ceratophyllum demersum</i>		

11 U 661867 5954553	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 662056 5954632	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 662260 5954487	<i>Potamogeton richardsonii</i>			
11 U 662273 5954240	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>	
11 U 662402 5954024	<i>Ceratophyllum demersum</i>			
11 U 662668 5953969				
11 U 662892 5954042	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton zosteriformis</i>	
11 U 662951 5953841	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
11 U 662889 5953670	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton zosteriformis</i>	
11 U 663136 5953643	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 663342 5953769	<i>Ceratophyllum demersum</i>	<i>Potamogeton richardsonii</i>		
11 U 663494 5953968	<i>Ceratophyllum demersum</i>			
11 U 663708 5954124				
11 U 663948 5954036	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 664155 5953893	<i>Potamogeton richardsonii</i>			
11 U 664428 5953786				
11 U 664688 5953736	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 664947 5953616	<i>Potamogeton richardsonii</i>			
11 U 665166 5953493	<i>Potamogeton pectinatus</i>			
11 U 665440 5953509	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 665634 5953612				
11 U 665844 5953719	<i>Potamogeton pectinatus</i>			
11 U 666002 5953901				
11 U 666097 5954105	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 666041 5954354	<i>Ceratophyllum demersum</i>			
11 U 665911 5954490	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
11 U 665833 5954640	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 665950 5954736	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>		
11 U 665962 5955000	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>	
11 U 666132 5955176	<i>Potamogeton pectinatus</i>			
11 U 666137 5955394				

11 U 666213 5955627	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
11 U 666267 5955860	<i>Potamogeton zosteriformis</i>	
11 U 666185 5956021	<i>Ceratophyllum demersum</i>	<i>Potamogeton richardsonii</i>
11 U 666324 5956139	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>
11 U 666303 5956233	<i>Myriophyllum sibiricum</i>	

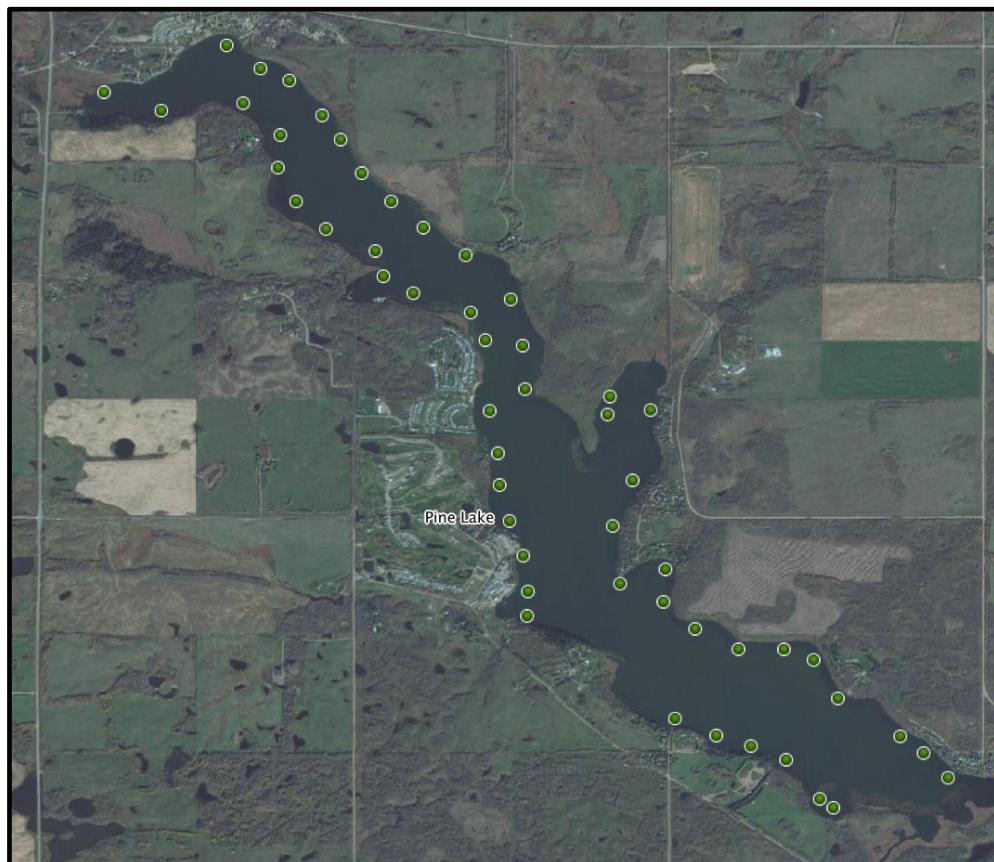


Figure B.0. Locations on Pine Lake with presence of macrophytes in July 2015

Table B.1. Species list for macrophytes retrieved from Pine Lake in June of 2015. Gray colouration indicates lack of macrophytes.

Pine Lake June 2015			
Location sampled	Species present		
12 U 334815 5771184	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	
12 U 334643 5771337	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>	
12 U 334496 5771515	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	
12 U 334319 5771723	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
12 U 334119 5771884	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>	
12 U 334046 5772109	<i>Myriophyllum sibiricum</i>		
12 U 334849 5772143	<i>Ruppia cirrhosa</i>		
12 U 333612 5772234	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	
12 U 333315 5772312	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>
12 U 333225 5772548	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	
12 U 333225 5773673			
12 U 333059 5772635	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>
12 U 333071 5772875	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	
12 U 333116 5773142	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
12 U 333249 5773371	<i>Ruppia cirrhosa</i>		
12 U 333259 5773607	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>
12 U 333289 5773853	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>
12 U 333307 5774019	<i>Myriophyllum sibiricum</i>		
12 U 333099 5773893	<i>Potamogeton pectinatus</i>	<i>Potamogeton vaginatus</i>	
12 U 333015 5773702	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	
12 U 333010 5773448	<i>Lemna trisulca</i>	<i>Ruppia cirrhosa</i>	
12 U 332877 5773663	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
12 U 332702 5773847	<i>Potamogeton vaginatus</i>		
12 U 332686 5774082	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
12 U 332671 5774379	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
12 U 332602 5774602	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>
12 U 332479 5774828	<i>Potamogeton vaginatus</i>		<i>Potamogeton vaginatus</i>

12 U 332268 5774936	<i>Myriophyllum sibiricum</i>			
12 U 332139 5775125	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	
12 U 331935 5775315	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 331797 5775538	<i>Potamogeton friesii</i>			
12 U 331722 5775761	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
12 U 331591 5775890	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>		
12 U 331434 5776205	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>		
12 U 331239 5776302	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>
12 U 331018 5776343	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>		
12 U 330896 5776188	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Ruppia cirrhosa</i>	
12 U 330658 5776096				
12 U 330518 5776045				
12 U 330672 5775943				
12 U 330975 5775947	<i>Potamogeton vaginatus</i>			
12 U 331167 5776009	<i>Ruppia cirrhosa</i>			
12 U 331323 5775851	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton vaginatus</i>
12 U 331391 5775631	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 331387 5775340	<i>Myriophyllum sibiricum</i>			
12 U 331547 5775170	<i>Myriophyllum sibiricum</i>			
12 U 331745 5775002	<i>Potamogeton vaginatus</i>			
12 U 331936 5774836	<i>Lemna trisulca</i>			
12 U 331777 5774646	<i>Lemna trisulca</i>			
12 U 332028 5774629				
12 U 332147 5774564	<i>Potamogeton vaginatus</i>			
12 U 332374 5774395	<i>Potamogeton friesii</i>			
12 U 332456 5774123	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>		
12 U 332438 5773833	<i>Lemna trisulca</i>	<i>Ruppia cirrhosa</i>		
12 U 332422 5773670	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	<i>Ruppia cirrhosa</i>
12 U 332454 5773402	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	
12 U 332456 5773106	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>		
12 U 332602 5772900	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	

12 U 332577 5772682	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>
12 U 332459 5772447	<i>Myriophyllum sibiricum</i>	
12 U 332658 5772337	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>
12 U 332933 5772222	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>
12 U 333300 5772050		
12 U 333059 5771916	<i>Myriophyllum sibiricum</i>	
12 U 333191 5771714	<i>Lemna trisulca</i>	
12 U 333452 5771574	<i>Ruppia cirrhosa</i>	
12 U 333626 5771466	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>
12 U 333771 5771420	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
12 U 333938 5771262	<i>Potamogeton pectinatus</i>	
12 U 334374 5771064		
12 U 334168 5771040	<i>Lemna trisulca</i>	
12 U 334199 5771146		
12 U 334428 5771071	<i>Potamogeton vaginatus</i>	
12 U 334622 5771021	<i>Ruppia cirrhosa</i>	
12 U 334732 5770961	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>

Table B.2. Species list for macrophytes retrieved from Pine Lake in July of 2015. Gray colouration indicates lack of macrophytes.

Pine Lake July 2015

Location sampled	Species present			
12 U 334428 5771716	<i>Myriophyllum sibiricum</i>			
12 U 334335 5771820				
12 U 334114 5771987	<i>Lemna trisulca</i>	<i>Ruppia cirrhosa</i>		
12 U 333997 5772256	<i>Myriophyllum sibiricum</i>			
12 U 333846 5772334	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 333610 5772343	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	
12 U 333391 5772490	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>
12 U 333233 5772681	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 333251 5772905	<i>Myriophyllum sibiricum</i>			
12 U 333013 5772814	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>
12 U 332988 5773212	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 333101 5773522	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 333211 5774002	<i>Potamogeton friesii</i>			
12 U 333061 5774144				
12 U 332987 5773979	<i>Lemna trisulca</i>			
12 U 333004 5774102	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>		
12 U 332772 5773660				
12 U 332729 5773973				
12 U 332566 5774168	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	<i>Potamogeton vaginatus</i>	
12 U 332564 5774468	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>	
12 U 332513 5774787	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>		
12 U 332290 5775099	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 332077 5775296	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	
12 U 331917 5775482	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>		
12 U 331771 5775682	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 331670 5775916	<i>Myriophyllum sibiricum</i>			
12 U 331580 5776086	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		

12 U 331418 5776331	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
12 U 331272 5776418	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	
12 U 331102 5776584	<i>Lemna trisulca</i>			
12 U 330901 5776504				
12 U 330739 5776349				
12 U 330457 5776283	<i>Ceratophyllum demersum</i>			
12 U 330749 5776147	<i>Potamogeton vaginatus</i>			
12 U 330991 5776223				
12 U 331174 5776184	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	
12 U 331359 5775958	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	
12 U 331339 5775734	<i>Potamogeton richardsonii</i>			
12 U 331425 5775499	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 331573 5775304	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 331824 5775144	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>	
12 U 331859 5774969	<i>Lemna trisulca</i>			
12 U 331735 5774869				
12 U 332010 5774848	<i>Myriophyllum sibiricum</i>			
12 U 332303 5774704	<i>Potamogeton pectinatus</i>			
12 U 332372 5774512	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
12 U 332413 5774228				
12 U 332378 5774025	<i>Lemna trisulca</i>	<i>Ruppia cirrhosa</i>		
12 U 332411 5773732	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>		
12 U 332412 5773513	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton vaginatus</i>	
12 U 332455 5773264	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton vaginatus</i>	
12 U 332518 5773023	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Ruppia cirrhosa</i>	
12 U 332534 5772776	<i>Myriophyllum sibiricum</i>			
12 U 332524 5772608	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
12 U 332769 5772499				
12 U 332906 5772410				
12 U 333046 5772211				
12 U 333120 5772030				

12 U 333266 5771877	<i>Potamogeton vaginatus</i>		
12 U 333476 5771753	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>
12 U 333653 5771675	<i>Myriophyllum sibiricum</i>		
12 U 333832 5771574	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
12 U 333945 5771397			
12 U 333997 5771299	<i>Potamogeton friesii</i>	<i>Ruppia cirrhosa</i>	
12 U 334065 5771236	<i>Lemna trisulca</i>		
12 U 334258 5771335			
12 U 334480 5771284			
12 U 334574 5771313			
12 U 334666 5771423	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>
12 U 334545 5771597	<i>Ruppia cirrhosa</i>	<i>Ruppia cirrhosa</i>	

Table B.3. Species list for macrophytes retrieved from Pine Lake in August of 2015. Gray colouration indicates lack of macrophytes.

Pine Lake August 2015

Location sampled	Species present			
12 U 334337 5771810	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	
12 U 334089 5771993	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Ruppia cirrhosa</i>
12 U 333927 5772311	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
12 U 333624 5772327	<i>Myriophyllum sibiricum</i>		<i>Ruppia cirrhosa</i>	
12 U 333407 5772485	<i>Myriophyllum sibiricum</i>			
12 U 333220 5772632	<i>Myriophyllum sibiricum</i>			
12 U 333145 5772871	<i>Myriophyllum sibiricum</i>			
12 U 332960 5772903	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Ruppia cirrhosa</i>	
12 U 332978 5773214	<i>Myriophyllum sibiricum</i>			
12 U 333076 5773466	<i>Myriophyllum sibiricum</i>		<i>Ruppia cirrhosa</i>	
12 U 333189 5773714	<i>Myriophyllum sibiricum</i>			
12 U 333176 5773961	<i>Myriophyllum sibiricum</i>		<i>Ruppia cirrhosa</i>	
12 U 333016 5773988	<i>Myriophyllum sibiricum</i>			
12 U 332993 5773785	<i>Ruppia cirrhosa</i>			
12 U 332759 5773652	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Ruppia cirrhosa</i>	
12 U 332761 5773923	<i>Myriophyllum sibiricum</i>			
12 U 332569 5774088	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	
12 U 332593 5774355	<i>Potamogeton pectinatus</i>			
12 U 332548 5774668	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>		
12 U 332475 5774899	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	
12 U 332278 5775047	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 332081 5775305	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 331840 5775557	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton vaginatus</i>	
12 U 331690 5775871	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 331488 5776237	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
12 U 331188 5776482	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Ruppia cirrhosa</i>
12 U 330950 5776496	<i>Ceratophyllum demersum</i>			

12 U 330799 5776376				
12 U 330612 5776304				
12 U 330462 5776278				
12 U 330674 5776153	<i>Myriophyllum sibiricum</i>			
12 U 331068 5776235	<i>Myriophyllum sibiricum</i>			
12 U 331386 5775926	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
12 U 331396 5775571	<i>Ceratophyllum demersum</i>			
12 U 331589 5775315	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 331926 5775000				
12 U 332087 5774867	<i>Myriophyllum sibiricum</i>			
12 U 332283 5774752	<i>Myriophyllum sibiricum</i>			
12 U 332405 5774476	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>		
12 U 332419 5774158	<i>Myriophyllum sibiricum</i>			
12 U 332386 5773899	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 332446 5773552	<i>Potamogeton pectinatus</i>			
12 U 332440 5773303	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Ruppia cirrhosa</i>
12 U 332529 5773024	<i>Potamogeton vaginatus</i>			
12 U 332542 5772784	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
12 U 332469 5772641	<i>Myriophyllum sibiricum</i>			
12 U 332730 5772513	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Ruppia cirrhosa</i>	
12 U 333004 5772334	<i>Myriophyllum sibiricum</i>			
12 U 333022 5772080	<i>Myriophyllum sibiricum</i>			
12 U 333232 5771895	<i>Lemna trisulca</i>			
12 U 333480 5771727	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 333831 5771585	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>	
12 U 333962 5771356	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
12 U 334101 5771260	<i>Potamogeton vaginatus</i>			
12 U 334386 5771322				
12 U 334591 5771262	<i>Ruppia cirrhosa</i>			
12 U 334630 5771465	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Ruppia cirrhosa</i>
12 U 334567 5771571	<i>Potamogeton vaginatus</i>	<i>Ruppia cirrhosa</i>		

12 U 334532 5771639

Lemna trisulca

Potamogeton vaginatus

12 U 334489 5771670

Myriophyllum sibiricum

Potamogeton vaginatus

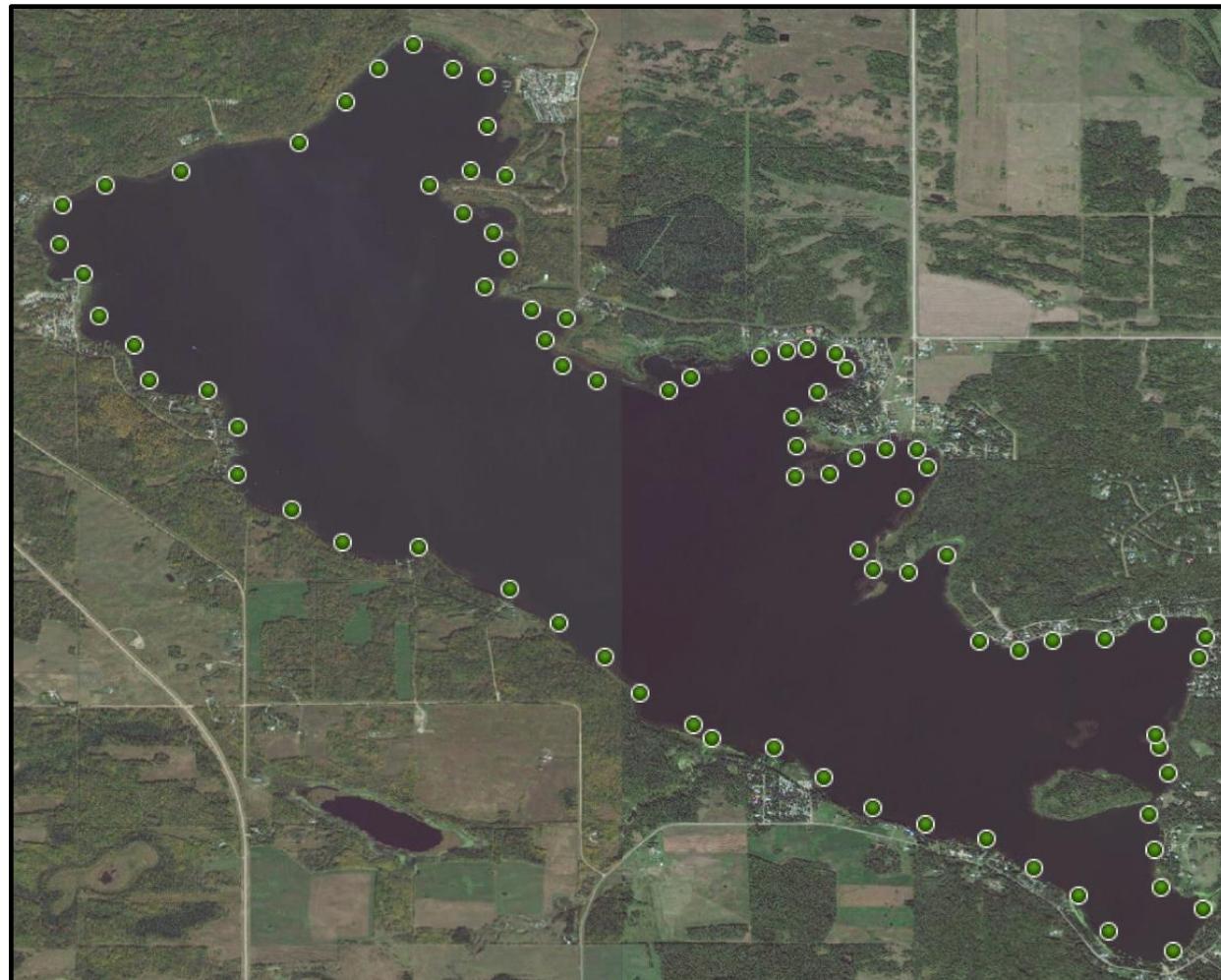


Figure C.0. Locations on Lac la Nonne with presence of macrophytes in July 2015

Table C.1. Species list for macrophytes retrieved from Lac la Nonne in June of 2015. Gray colouration indicates lack of macrophytes.

Lac la Nonne June 2015				
Location sampled	Species present			
11 U 678627 5979141				
11 U 678380 5979010				
11 U 678067 5978982				
11 U 677755 5978891				
11 U 677478 5979162				
11 U 677471 5979459	<i>Lemna trisulca</i>			
11 U 677214 5979264				
11 U 677011 5979414				
11 U 677176 5979766	<i>Potamogeton richardsonii</i>			
11 U 677335 5980003	<i>Lemna trisulca</i>			
11 U 677298 5980256	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>
11 U 677003 5980177	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 676804 5980001	<i>Potamogeton richardsonii</i>			
11 U 676717 5980047	<i>Potamogeton richardsonii</i>			
11 U 676699 5980375	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>		
11 U 676869 5980618				
11 U 676978 5980800				
11 U 676887 5980868				
11 U 676685 5980881	<i>Potamogeton pectinatus</i>			
11 U 676459 5980779	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>	
11 U 676099 5980654	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
11 U 675789 5980626	<i>Potamogeton richardsonii</i>			
11 U 675541 5980767	<i>Myriophyllum sibiricum</i>			
11 U 675581 5981006	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 675323 5981124	<i>Myriophyllum sibiricum</i>			

11 U 675286 5981397	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
11 U 674964 5981757	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 674938 5981994	<i>Ceratophyllum demersum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton zosteriformis</i>
11 U 675170 5982003				
11 U 675174 5982326	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		<i>Myriophyllum sibiricum</i>
11 U 675192 5982649	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 674719 5982831	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 674486 5982531	<i>Lemna trisulca</i>			
	<i>Potamogeton</i>			
11 U 674379 5982324	<i>richardsonii</i>			
	<i>Potamogeton</i>			
11 U 674197 5982161	<i>richardsonii</i>			
	<i>Potamogeton</i>			
11 U 673872 5982114	<i>richardsonii</i>			
11 U 673641 5981926				
11 U 673393 5981884				
	<i>Potamogeton</i>			
11 U 673157 5981720	<i>richardsonii</i>			
11 U 673077 5981435				
	<i>Potamogeton vaginatus</i>			
11 U 673275 5981232	<i>Potamogeton</i>			
	<i>richardsonii</i>			
11 U 673322 5980956				
11 U 673306 5980940	<i>Potamogeton friesii</i>			
11 U 673420 5980810	<i>Potamogeton pectinatus</i>			
11 U 673539 5980579				
11 U 673850 5980486	<i>Potamogeton friesii</i>			
11 U 673995 5980266	<i>Potamogeton vaginatus</i>			
11 U 674024 5980024				
11 U 674247 5979735	<i>Potamogeton</i>			
	<i>richardsonii</i>			
11 U 674477 5979554	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 674764 5979411				

11 U 674974 5979508				
11 U 675126 5979376	<i>Myriophyllum sibiricum</i>			
11 U 675368 5979201	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	
11 U 675565 5979044	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 675754 5978799	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
11 U 676017 5978624	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
	<i>Potamogeton</i>			
11 U 676224 5978380	<i>richardsonii</i>			
11 U 676360 5978268	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 676475 5978249	<i>Potamogeton pectinatus</i>			
11 U 676695 5978170				
11 U 676978 5977937	<i>Potamogeton friesii</i>	<i>Potamogeton pectinatus</i>		
	<i>Potamogeton</i>			
11 U 677216 5977782	<i>richardsonii</i>	<i>Potamogeton vaginatus</i>		
11 U 677473 5977663				
11 U 677782 5977600				
11 U 678000 5977422	<i>Potamogeton pusillus</i>			
11 U 678228 5977219	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 678372 5976964	<i>Potamogeton pusillus</i>			
11 U 678633 5976887				
11 U 678830 5977164	<i>Ceratophyllum demersum</i>	<i>Nuphar variegata</i>		
11 U 678625 5977318				
11 U 678572 5977666				
	<i>Potamogeton</i>			
11 U 678554 5977929	<i>richardsonii</i>			
11 U 678580 5978192		<i>Potamogeton</i>		
11 U 678531 5978360	<i>richardsonii</i>			
11 U 678639 5978506				
11 U 678683 5978806				
11 U 678740 5979011	<i>Myriophyllum sibiricum</i>			

Table C.2. Species list for macrophytes retrieved from Lac la Nonne in July of 2015. Gray colouration indicates lack of macrophytes.

Lac la Nonne July 2015		
Location sampled	Species present	
11 U 678445 5979316	<i>Ceratophyllum demersum</i>	
11 U 678325 5979220		
11 U 678194 5979202	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
11 U 677941 5979181	<i>Ceratophyllum demersum</i>	
11 U 677781 5979109	<i>Lemna trisulca</i>	
11 U 677586 5979162	<i>Potamogeton richardsonii</i>	
11 U 677458 5979273		
11 U 677372 5979557		
11 U 677406 5979735	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 677224 5979613	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
11 U 677052 5979625	<i>Potamogeton filiformis</i>	<i>Potamogeton richardsonii</i>
11 U 676978 5979750	<i>Potamogeton richardsonii</i>	
11 U 677043 5979912		
11 U 677187 5980114	<i>Ceratophyllum demersum</i>	
11 U 677290 5980322	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
11 U 677234 5980438	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
11 U 677083 5980435	<i>Potamogeton pectinatus</i>	<i>Potamogeton pectinatus</i>
11 U 676941 5980371	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
11 U 676816 5980258	<i>Ceratophyllum demersum</i>	<i>Potamogeton richardsonii</i>
11 U 676650 5980234	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 676650 5980438	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 676623 5980634	<i>Potamogeton richardsonii</i>	
11 U 676738 5980804	<i>Myriophyllum sibiricum</i>	
11 U 676870 5980969	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>
11 U 676816 5981066	<i>Lemna trisulca</i>	
11 U 676675 5981095	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>

11 U 676578 5981075	<i>Lemna trisulca</i>	<i>Potamogeton richardsonii</i>		
11 U 676452 5981032	<i>Potamogeton pectinatus</i>			
11 U 676287 5980906				
11 U 676119 5980880	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	
11 U 676015 5980789	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 675834 5980786				
11 U 675665 5980840	<i>Potamogeton richardsonii</i>			
11 U 675494 5980936	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 675404 5981104	<i>Potamogeton vaginatus</i>			
11 U 675501 5981253	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
11 U 675330 5981306	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 675097 5981451	<i>Myriophyllum sibiricum</i>	<i>Myriophyllum sibiricum</i>		
11 U 675205 5981646	<i>Ceratophyllum demersum</i>			
11 U 675124 5981816	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 674974 5981940	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>		
11 U 674803 5982123	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 675000 5982229	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton zosteriformis</i>	
11 U 675171 5982200	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 675069 5982530	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	
11 U 675053 5982864	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 674888 5982906	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>		
11 U 674690 5983065	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 674527 5982896	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 674377 5982666	<i>Myriophyllum sibiricum</i>			
11 U 674160 5982384	<i>Ceratophyllum demersum</i>	<i>Potamogeton richardsonii</i>		
11 U 673902 5982323				
11 U 673596 5982170	<i>Myriophyllum sibiricum</i>			
11 U 673233 5982064	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
11 U 673030 5981923	<i>Potamogeton pectinatus</i>	<i>Sagittaria cuneata</i>		
11 U 673025 5981659	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
11 U 673149 5981463	<i>Ceratophyllum demersum</i>			

11 U 673235 5981185	<i>Myriophyllum sibiricum</i>			
11 U 673413 5980996	<i>Potamogeton richardsonii</i>			
11 U 673494 5980763	<i>Lemna trisulca</i>			
11 U 673781 5980705	<i>Potamogeton richardsonii</i>	<i>Sagittaria cuneata</i>		
11 U 673935 5980464	<i>Ceratophyllum demersum</i>			
11 U 673945 5980146	<i>Potamogeton pectinatus</i>			
11 U 674218 5979920	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton vaginatus</i>	
11 U 674472 5979710	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
11 U 674842 5979691	<i>Myriophyllum sibiricum</i>			
11 U 674994 5979615				
11 U 675295 5979427	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	
11 U 675542 5979207	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 675773 5978989	<i>Ceratophyllum demersum</i>			
11 U 675953 5978752	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>		
11 U 676221 5978549	<i>Potamogeton pectinatus</i>	<i>Potamogeton vaginatus</i>		
11 U 676313 5978461	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	
11 U 676617 5978410	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 676866 5978220	<i>Potamogeton pectinatus</i>			
11 U 677111 5978024	<i>Potamogeton pusillus</i>	<i>Potamogeton richardsonii</i>		
11 U 677371 5977924	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 677671 5977838	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 677908 5977650	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>
	<i>Potamogeton pusillus</i>	<i>Potamogeton richardsonii</i>		
11 U 678132 5977474	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	
11 U 678287 5977239	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
11 U 678605 5977119	<i>Potamogeton friesii</i>	<i>Potamogeton pusillus</i>	<i>Potamogeton zosteriformis</i>	
11 U 678739 5977407	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Nuphar variegata</i>	<i>Potamogeton zosteriformis</i>
11 U 678530 5977544	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
11 U 678489 5977795	<i>Potamogeton richardsonii</i>			
11 U 678452 5978032	<i>Lemna trisulca</i>			
11 U 678535 5978312	<i>Ceratophyllum demersum</i>			

11 U 678485 5978486	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	
11 U 678464 5978566	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	
11 U 678571 5978838			
11 U 678654 5979093	<i>Ceratophyllum demersum</i>		
11 U 678682 5979232	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Sagittaria cuneata</i>

Table C.3. Species list for macrophytes retrieved from Lac la Nonne in August of 2015. Gray colouration indicates lack of macrophytes.

Lac la Nonne August 2015			
Location sampled	Species present		
11 U 678654 5979333	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	
11 U 678375 5979289		<i>Lemna trisulca</i>	
11 U 678149 5979217			
11 U 677768 5979100			
11 U 677622 5979152			
11 U 677440 5979337			
11 U 677405 5979635	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>
11 U 677430 5979778	<i>Ceratophyllum demersum</i>		
11 U 677175 5979599	<i>Potamogeton richardsonii</i>		
11 U 677010 5979659	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 677091 5979936	<i>Potamogeton richardsonii</i>		
11 U 677227 5980134	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 677315 5980333	<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
11 U 677061 5980451	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>
11 U 676881 5980319	<i>Potamogeton richardsonii</i>		<i>Potamogeton pectinatus</i>
11 U 676741 5980210	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	
11 U 676637 5980303	<i>Potamogeton richardsonii</i>		
11 U 676618 5980576	<i>Potamogeton richardsonii</i>		
11 U 676748 5980795	<i>Myriophyllum sibiricum</i>		

11 U 676895 5980962	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	
11 U 676855 5981060	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	
11 U 676597 5981083	<i>Sagittaria cuneata</i>		
11 U 676363 5980962	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	
11 U 676090 5980891	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 676052 5980713	<i>Myriophyllum sibiricum</i>		
11 U 675738 5980831	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 675532 5980922	<i>Myriophyllum sibiricum</i>		
11 U 675454 5981156	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 675360 5981300	<i>Myriophyllum sibiricum</i>		
11 U 675086 5981487	<i>Myriophyllum sibiricum</i>		
11 U 675172 5981745	<i>Myriophyllum sibiricum</i>		
11 U 674918 5981943	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 674818 5982182	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 675100 5982216	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
11 U 675101 5982454	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 675116 5982782	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	
11 U 674860 5982912	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>
11 U 674683 5983053	<i>Ceratophyllum demersum</i>	<i>Potamogeton filiformis</i>	<i>Potamogeton pectinatus</i>
11 U 674499 5982880	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>
11 U 674327 5982598	<i>Ceratophyllum demersum</i>		<i>Potamogeton pectinatus</i>
11 U 674150 5982380	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 673854 5982331	<i>Potamogeton richardsonii</i>		
11 U 673589 5982172			
11 U 673289 5982086	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	
11 U 673071 5981936	<i>Ceratophyllum demersum</i>	<i>Potamogeton richardsonii</i>	
11 U 672991 5981661	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>	
11 U 673173 5981441	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>
11 U 673231 5981180	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton richardsonii</i>
11 U 673341 5981022	<i>Ceratophyllum demersum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>
11 U 673462 5980815	<i>Myriophyllum sibiricum</i>		

11 U 673747 5980703	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	
11 U 673920 5980485	<i>Ceratophyllum demersum</i>			
11 U 673950 5980182	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
11 U 674240 5979921				
11 U 674438 5979745	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 674747 5979644				
11 U 674901 5979730				
11 U 675066 5979577	<i>Myriophyllum sibiricum</i>			
11 U 675337 5979371	<i>Potamogeton pusillus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>	
11 U 675510 5979258	<i>Potamogeton pectinatus</i>			
11 U 675709 5979012	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
11 U 675951 5978823	<i>Ceratophyllum demersum</i>	<i>Myriophyllum sibiricum</i>		
11 U 676070 5978595	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>		
11 U 676381 5978495	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 676592 5978420	<i>Potamogeton richardsonii</i>			
11 U 676891 5978188	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 677137 5977995	<i>Potamogeton filiformis</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
11 U 677468 5977881	<i>Potamogeton pectinatus</i>			
11 U 677723 5977810	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>	
11 U 677972 5977593	<i>Potamogeton pectinatus</i>	<i>Potamogeton richardsonii</i>		
11 U 678179 5977406	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
11 U 678303 5977186	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	
	<i>Potamogeton pectinatus</i>	<i>Potamogeton pusillus</i>		
11 U 678523 5977078	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>		
11 U 678692 5977270	<i>Ceratophyllum demersum</i>			
11 U 678556 5977528				
11 U 678483 5977795				
11 U 678500 5978183	<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>
11 U 678503 5978392	<i>Ceratophyllum demersum</i>	<i>Potamogeton vaginatus</i>		
11 U 678487 5978591				
11 U 678599 5979027				



Figure D.0. Locations on Lacombe Lake sampled for macrophytes in July 2015. Each colour indicates a different group of individuals sampling for macrophytes. Areas not indicated by a particular colour were not sampled.

Table D.1. Species list for macrophytes retrieved from Lacombe Lake in summer of 2015 (July only). Gray colouration indicates lack of macrophytes.

Lacombe Lake 2015		
Location sampled	Species present	
12 U 309829 5811807	<i>Potamogeton richardsonii</i>	<i>Utricularia macrorhiza</i>
12 U 309800 5811711	<i>Nuphar variegata</i>	<i>Potamogeton richardsonii</i>
12 U 309773 5811614	<i>Potamogeton vaginatus</i>	
12 U 309788 5811528		
12 U 309871 5811588	<i>Sagittaria cuneata</i>	
12 U 309951 5811648	<i>Utricularia macrorhiza</i>	
12 U 309985 5811742	<i>Potamogeton natans</i>	<i>Utricularia macrorhiza</i>
12 U 310053 5811816	<i>Nuphar variegata</i>	<i>Utricularia macrorhiza</i>
12 U 310135 5811835	<i>Utricularia macrorhiza</i>	
12 U 310157 5811738	<i>Potamogeton vaginatus</i>	
12 U 310140 5811639	<i>Utricularia macrorhiza</i>	
12 U 310087 5811554	<i>Utricularia macrorhiza</i>	
12 U 310035 5811469	<i>Potamogeton vaginatus</i>	
12 U 309982 5811383	<i>Utricularia macrorhiza</i>	
12 U 309989 5811292	<i>Myriophyllum sibiricum</i>	
12 U 309890 5811304	<i>Utricularia macrorhiza</i>	
12 U 309836 5811386	<i>Nuphar variegata</i>	<i>Utricularia macrorhiza</i>
12 U 309806 5811480		
12 U 309745 5811504	<i>Potamogeton richardsonii</i>	
12 U 309690 5811420	<i>Utricularia macrorhiza</i>	
12 U 309610 5811366	<i>Utricularia macrorhiza</i>	
12 U 309497 5811224	<i>Myriophyllum sibiricum</i>	
12 U 309574 5811158	<i>Potamogeton pectinatus</i>	<i>Utricularia macrorhiza</i>
12 U 309651 5811094	<i>Myriophyllum sibiricum</i>	
12 U 309677 5810997	<i>Myriophyllum sibiricum</i>	<i>Utricularia macrorhiza</i>
12 U 309608 5810924		
12 U 309536 5810856	<i>Potamogeton vaginatus</i>	

12 U 309450 5810906				
12 U 309381 5810839	<i>Myriophyllum sibiricum</i>			
12 U 309350 5810935				
12 U 309295 5811018	<i>Utricularia macrorhiza</i>			
12 U 309311 5811116	<i>Potamogeton richardsonii</i>			
12 U 309276 5811212				
12 U 309284 5811312	<i>Myriophyllum sibiricum</i>			
12 U 309326 5811404	<i>Myriophyllum sibiricum</i>			
12 U 309387 5811483	<i>Myriophyllum sibiricum</i>	<i>Potamogeton richardsonii</i>		
12 U 309444 5811565	<i>Potamogeton pectinatus</i>			
12 U 309495 5811651	<i>Potamogeton vaginatus</i>			
12 U 309545 5811738	<i>Myriophyllum sibiricum</i>	<i>Ruppia cirrhosa</i>	<i>Utricularia macrorhiza</i>	
12 U 309579 5811832	<i>Potamogeton vaginatus</i>	<i>Utricularia macrorhiza</i>		
12 U 309609 5811928	<i>Myriophyllum sibiricum</i>	<i>Potamogeton pectinatus</i>		
12 U 310107 5812914	<i>Potamogeton richardsonii</i>			
12 U 310153 5813006				
12 U 310121 5813102				
12 U 310075 5813191	<i>Potamogeton vaginatus</i>			
12 U 310074 5813292	<i>Nuphar variegata</i>	<i>Potamogeton pectinatus</i>		
12 U 310083 5813392	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>	<i>Sagittaria cuneata</i>	
12 U 310106 5813489	<i>Myriophyllum sibiricum</i>	<i>Nuphar variegata</i>	<i>Potamogeton richardsonii</i>	<i>Potamogeton vaginatus</i>
12 U 310142 5813582	<i>Potamogeton pectinatus</i>			
12 U 309999 5813592	<i>Utricularia macrorhiza</i>			
12 U 309899 5813592	<i>Myriophyllum sibiricum</i>	<i>Utricularia macrorhiza</i>		
12 U 309810 5813545	<i>Myriophyllum sibiricum</i>	<i>Utricularia macrorhiza</i>		
12 U 309729 5813486	<i>Myriophyllum sibiricum</i>	<i>Potamogeton friesii</i>	<i>Potamogeton richardsonii</i>	<i>Utricularia macrorhiza</i>
12 U 309660 5813414	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 309607 5813328				
12 U 309558 5813241				
12 U 309511 5813152	<i>Nuphar variegata</i>	<i>Potamogeton vaginatus</i>		
12 U 309503 5813052	<i>Myriophyllum sibiricum</i>	<i>Nuphar variegata</i>	<i>Potamogeton richardsonii</i>	<i>Sagittaria cuneata</i>

12 U 309569 5812976	<i>Ruppia cirrhosa</i>			
12 U 309983 5812481	<i>Utricularia macrorhiza</i>			
12 U 309987 5812485				
12 U 309993 5812489	<i>Potamogeton richardsonii</i>	<i>Utricularia macrorhiza</i>		
12 U 309998 5812494	<i>Potamogeton richardsonii</i>	<i>Utricularia macrorhiza</i>		
12 U 310003 5812498	<i>Myriophyllum sibiricum</i>	<i>Nuphar variegata</i>	<i>Potamogeton vaginatus</i>	
12 U 310006 5812506	<i>Sagittaria cuneata</i>			
12 U 310009 5812516				
12 U 310009 5812524				
12 U 310009 5812530				
12 U 310009 5812536				
12 U 310007 5812544	<i>Myriophyllum sibiricum</i>	<i>Utricularia macrorhiza</i>		
12 U 310005 5812550				
12 U 310000 5812555	<i>Potamogeton vaginatus</i>	<i>Utricularia macrorhiza</i>		
12 U 309994 5812554	<i>Nuphar variegata</i>	<i>Potamogeton vaginatus</i>	<i>Utricularia macrorhiza</i>	
12 U 309989 5812557	<i>Myriophyllum sibiricum</i>			
12 U 309981 5812557	<i>Myriophyllum sibiricum</i>	<i>Potamogeton vaginatus</i>		
12 U 309975 5812556		<i>Utricularia macrorhiza</i>		
12 U 309967 5812557				
12 U 309960 5812560	<i>Myriophyllum sibiricum</i>			
12 U 309954 5812562				
12 U 309950 5812567		<i>Utricularia macrorhiza</i>		