Fish Community Assessment of Waseosa Lake

2015

File Report

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Waseosa Lake is a small lake (155 ha), of intermediate depth (Z_{max}: 20 m, Z_{mean}: 8 m) located in Chaffey Township, within the Town of Huntsville in MNRF's Parry Sound district (Figure 1). It is oligotrophic, having moderately low fertility (Spring P: 8.9 ug/l), but is only moderately clear (Secchi depth: 2.9 m DMM 2015). The shoreline is heavily developed with over 130 shoreline properties and a youth camp as well as considerable back lot and local rural development around the community of Melissa (LWRA 2011). Public access is available from South Waseosa Lake Road but it is suitable for canoe or small boat and winter access only; there is no boat launch.

A 1931 Lake Report Card indicated that the lake supported brook trout. As the first stocking record for the species is from 1938 it could be assumed that the species was native. The report recommended that lake trout and smallmouth bass be stocked. Based on correspondence in 1932, it appears that smallmouth bass were stocked in 1932, despite recognition of the negative impact on bass on native trout. White Sucker, Yellow Perch, Cisco, Pumpkinseed and several species of minnows were also reported.

Between 1932 and 1971, when the first formal survey of the lake was conducted, extensive stocking of Rainbow Trout, Brook Trout and Lake Trout occurred (Table 1). The 1971 survey reported the capture of or observation of all three trout species. Burbot and Golden Shiner were added to the list of species known to occur as well.

Table 1 Summary of fish stocking history, Waseosa Lake, 1939-2015.

Species	Range of Years Stocked
Rainbow Trout	1938-1965, 1987-2013
Brook Trout	1939-1961, 1985
Lake Trout	1951-1975
Splake	1985, 2014

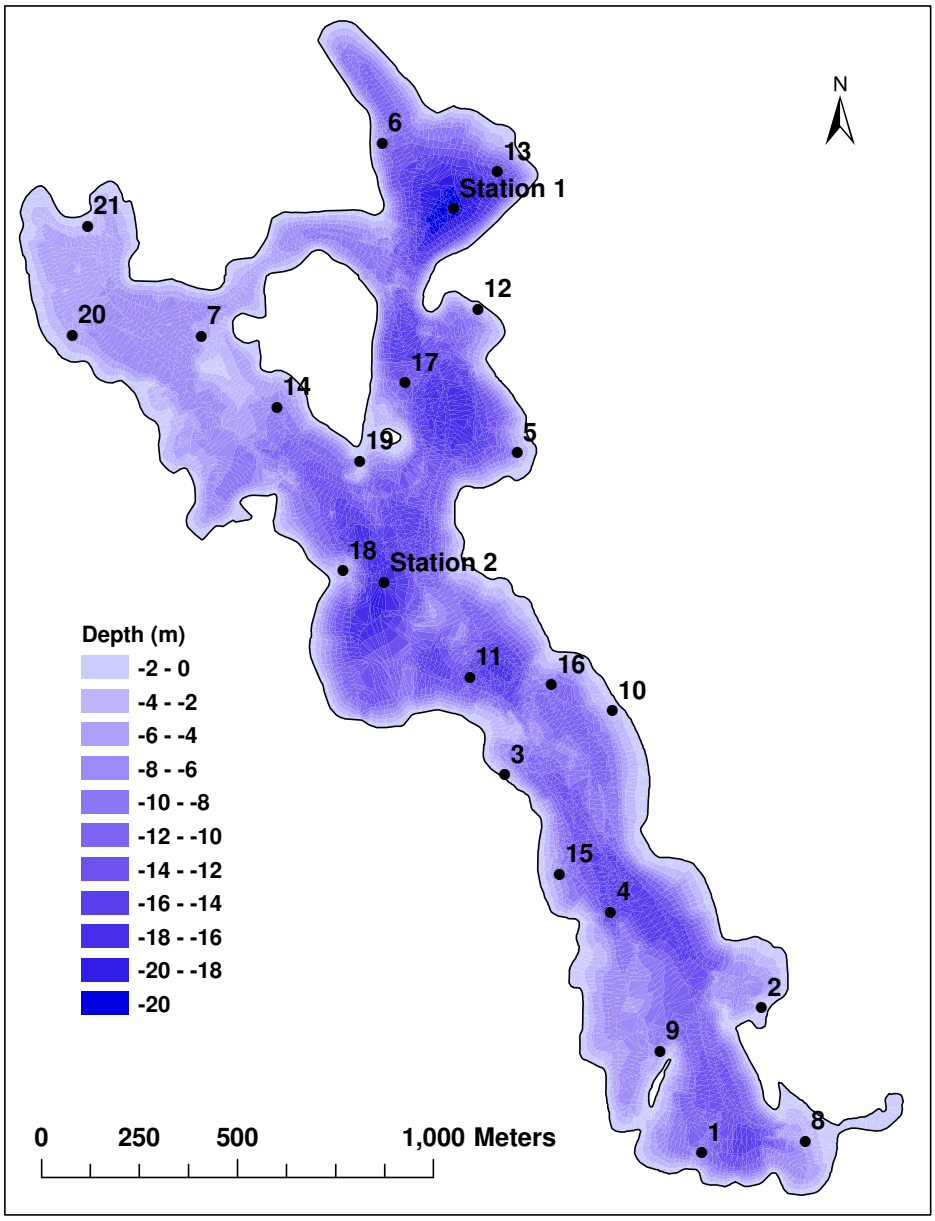
In 1976, a netting assessment specifically targeting lake trout was conducted (MacIntosh and Eckersley 1976). Seven Lake Trout were caught, all were large individuals and at least four were of hatchery origin, as indicated by fin clips. Not all Lake Trout that had been stocked were fin clipped so it was not possible to determine if the other four were stocked or the result of natural reproduction. Based on the absence of small fish in the catch it was speculated that that there was little or no natural reproduction. It was recommended that Lake Trout stocking be discontinued due to the poor return of hatchery fish and marginal habitat. The survey also caught 10 brook trout, despite no stocking having occurred since 1961, indicating that a substantial reproducing population was present. Two more species, not previously documented were also caught: Brown Bullhead and Trout-perch.

A second Lake Trout assessment was done in 1983 (Chapple 1983). Similar to 1976, a small number (6) of Lake Trout were caught, all of which were large, old individuals, two of which had fin clips. Again, management for Lake Trout was not recommended; instead it was suggested that Splake stocking be attempted. Of note, one Brook Trout was also caught, indicating that the species continued to persist in the lake in low numbers.

Subsequently, Splake were stocked in 1985. A follow up assessment in 1986 caught three trout, of three different species, Lake Trout, Splake and Brook Trout. The low catch and apparently low return to the fishery resulted in no further stocking of Splake. In the intervening almost 30 years since 1986, Rainbow Trout have been stocked on a regular basis. However, there has been very little information collected on the fishery. The sub-optimal public access, inconsistent size of fish when stocked (and associated variable survival) and lack of angler reports suggest that the Rainbow Trout stocking has been of limited

value. In recent years, there has been some speculation as to the persistence of Lake Trout in the lake, possibly fueled by the desire for a mechanism to control development on the lake. Currently, Lake Trout lakes with mean end-of- summer hypolimnetic oxygen levels of less than 7 ppm are recommended to be considered at-capacity for further development in order to protect lake trout habitat.

Figure 1 Map of Waseosa Lake showing bathymetry and water chemistry and net set locations, BsM, 2015.



In recent years, Splake have been stocked in the fall in a number of lakes in the District. Stocking in the fall at a much larger size than the fish are in the spring has produced some very good results in lakes that had suffered from chronically poor survival, in particular lakes that also have bass populations. In the fall of 2014 the hatchery system had a surplus of Splake. Following contact with the cottage association, 2,500 Splake were stocked into Waseosa Lake on a trial basis.

A survey was completed in 2015 to obtain current information on the composition of the fish community, in particular the potential occurrence of lake trout and to assess the survival of recently stocked Splake.

Methods

The Broad-scale Monitoring (BsM) protocol was used (Sandstrom et al. 2010). Gear consisted of large mesh (LMG) and small mesh (SMG) gill nets. The large mesh gill nets target fish larger than 20cm in length, typically the size range of interest to anglers and are intended to estimate the abundance of major sport fish species. The net gang has a length of 24.8 m consisting of 8 panels which are 1.8 m high. Two gangs are generally attached to one another to form one strap. The mesh sizes, in inches, are 1.5", 2.0", 2.5", 3.0", 3.5", 4.0", 4.5" and 5.0". The small mesh gill nets target smaller fish and are intended to detect the presence of other species in the lake. They have a length of 12.5 m, consisting of 5 panels that are 1.8 m high. Mesh sizes, also in inches, are 0.50", 0.75", 1.00", 1.25" and 1.50".

The lake was divided into depth strata, with the number of sets of each gear to occur in each stratum prescribed in the protocol based on the size of the lake and its' maximum depth. The depth strata were 1-3, 3-6, 6-12 and 12-20 m. Nets were set overnight for approximately 20 hr. Nets were set perpendicular to shore when possible, but due to the steep nature of the bottom in many areas, some sets were set obliquely or parallel to shore.

The catch was enumerated, by species. Game fish species caught in large-mesh nets were detail sampled including length, weight, gender, maturity and collection of calcified structures for age determination. Other species caught in either gear and fish caught in small mesh nets were generally measured for fork length only.

A temperature and dissolved oxygen profile was measured in the deepest two basins and updated bathymetric data were also collected using a Garmin GPSMAP depth sounder.

Project data are archived in the provincial FISHNET3 database as PSD_BS15_WASEOSA.

Results

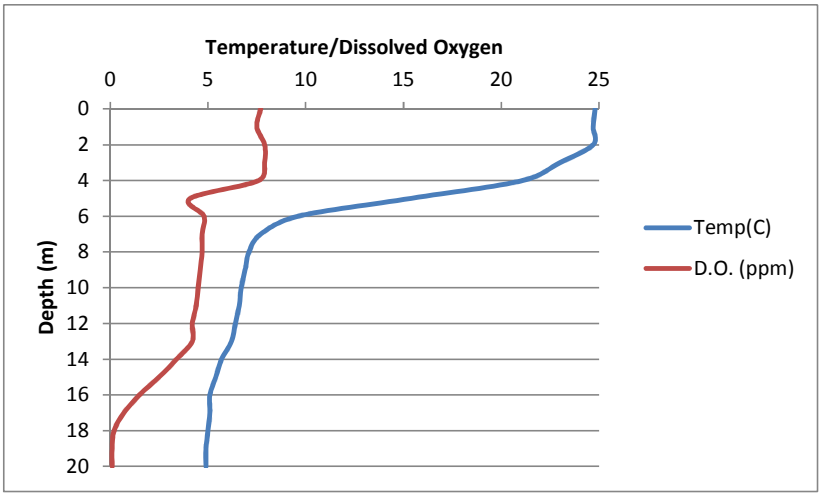
Field operations occurred from August 18-21, 2015. New bathymetric data provided a more detailed and precise map of the lake bottom than the map produced in the original lake survey. While the calculated overall areas and volumes in different depth strata did not vary a lot, the newer data revealed much more variability in the lake bottom (Figure 1).

The lake was thermally stratified with surface water temperatures in the mid 20's (Table 2). The thermocline occurred from approximately 4 to 7 m deep. Dissolved oxygen declined to 4.1 ppm in the thermocline but recovered somewhat to remain above 4 ppm (lower preferred level for trout) from 6 to 13 m deep, below which there a gradual decline to near anoxia at the bottom.

A total of 21 nets were set, 11 large mesh and 10 small mesh (Table 3). All sets employed two gang straps. Of the large mesh nets, 3 were set in each of the 1-3, 3-6 and 6-12 m strata and 2 were set in the 12-20 m stratum. Three small mesh nets were set in the 1-3 and 3-6 m strata and two nets in the 6-12 and 12-20 m depths.

Table 2 Water temperature and dissolved oxygen profile for Station 1 (UTM location: 17-635017-5030395), Waseosa Lake, August 18, 2015.

Depth (m)	Temp. (°C)	D.O. (ppm)
0	24.8	7.7
1	24.7	7.5
2	24.7	7.9
3	23.0	7.9
4	21.1	7.6
5	15.4	4.1
6	9.6	4.8
7	7.7	4.7
8	7.1	4.7
9	6.9	4.6
10	6.7	4.5
11	6.6	4.4
12	6.4	4.2
13	6.2	4.2
14	5.7	3.4
15	5.4	2.5
16	5.1	1.5
17	5.1	0.7
18	5.0	0.2
19	4.9	0.1
20	4.9	0.1



A total of 238 fish of six different species were caught (Table 4). No species not previously documented in the lake were caught (Largemouth Bass, not mentioned in the introduction, had been anecdotally reported in 1993). Thirteen Splake were caught, 7 in large mesh nets and 6 in small. Most were caught in the 6-12 m stratum. They ranged in size from 230 to 284 mm fork length and 100 to 200 g in weight (Table 5 and 6). Invertebrates were observed in the stomachs of two and a fishing bait in one other.

The other cold water species, cisco, was the most numerous species caught. A total of 150 were caught, of which 104 were in the large mesh nets. Most were caught in the 6-12 and 12-20 m strata. They were of a narrow range of sizes, all being in the 201-300 mm length classes.

Smallmouth and Largemouth Bass were the two warm water sport fish species caught. Large mesh nets caught only 7 Smallmouth and 3 Largemouth Bass. The small mesh nets caught 2 Smallmouth but 32 Largemouth; however, most (22) of the Largemouth came from a single net and were small individuals (<150 mm).

White Sucker and Yellow Perch were the only other species caught. All 17 suckers were caught in the large mesh nets, being large individuals. All but one of the perch was caught in the small mesh nets.

Table 3 Net set summary Waseosa Lake, BsM, 2015.

Sample	Depth Stratum	Gear	East	North	Lift Date	Effort Duration (hr)	Min. Depth (m)	Max. Depth (m)
1	6	LMG	635648	5027988	2015/08/19	19.4	6	11
2	1	SMG	635799	5028359	2015/08/19	19.6	1	3
3	1	LMG	635146	5028951	2015/08/19	19.6	2.5	2
4	12	LMG	635415	5028603	2015/08/19	19.8	13	15
5	3	LMG	635176	5029773	2015/08/19	19.8	3	5
6	6	SMG	634832	5030563	2015/08/19	19.8	7	11
7	3	SMG	634370	5030071	2015/08/19	19.8	3	6
8	3	SMG	635912	5028016	2015/08/20	20.0	3	6
9	3	LMG	635541	5028247	2015/08/20	20.2	6	5
10	1	SMG	635419	5029115	2015/08/20	20.6	2	2.5
11	12	SMG	635056	5029200	2015/08/20	20.5	12	14
12	1	LMG	635077	5030139	2015/08/20	20.8	3	3
13	12	LMG	635127	5030490	2015/08/20	21.3	12	16
14	6	LMG	634564	5029891	2015/08/20	21.8	6	8
15	6	SMG	635286	5028700	2015/08/21	20.3	6	10
16	6	LMG	635265	5029183	2015/08/21	20.6	6	11
17	12	SMG	634890	5029952	2015/08/21	21.0	12	14
18	3	SMG	634732	5029472	2015/08/21	21.1	3	6
19	1	LMG	634776	5029751	2015/08/21	21.1	1	3
20	3	LMG	634042	5030074	2015/08/21	21.0	3	6
21	1	SMG	634081	5030353	2015/08/21	21.4	1.5	3

Table 4 Catch summary (number), sorted by depth strata and gear type, Waseosa Lake, BsM, 2015.

Sample	Gear	Depth Stratum	Splake	Cisco	White Sucker	Small-mouth Bass	Large-mouth Bass	Yellow Perch	Total
3	LMG	1	0	0	0	0	1	1	2
12	LMG	1	0	0	0	4	1	0	5
19	LMG	1	0	0	0	0	0	0	0
5	LMG	3	0	2	3	1	0	0	6
9	LMG	3	0	4	5	0	1	0	10
20	LMG	3	0	9	2	1	0	0	12
1	LMG	6	2	17	4	0	0	0	23
14	LMG	6	1	20	0	0	0	0	21
16	LMG	6	1	28	2	1	0	0	32
4	LMG	12	0	6	0	0	0	0	6
13	LMG	12	3	18	1	0	0	0	22
2	SMG	1	0	1	0	0	3	0	4
10	SMG	1	0	0	0	1	1	2	4
21	SMG	1	0	0	0	0	0	1	1
7	SMG	3	0	3	0	0	0	0	3
8	SMG	3	0	3	0	0	22	10	35
18	SMG	3	0	0	0	0	6	0	6
6	SMG	6	3	8	0	1	0	0	12
15	SMG	6	2	8	0	0	0	0	10
11	SMG	12	1	12	0	0	0	0	13
17	SMG	12	0	11	0	0	0	0	11
Total			13	150	17	9	35	14	238

Table 5 Size distribution (fork length), by species, large mesh and small mesh gear combined, Waseosa Lake, 2015.

FL (mm)	Splake	Cisco	White Sucker	Smallmouth Bass	Largemouth Bass	Yellow Perch
1-50					3	
51-100					9	1
101-150				1	22	2
151-200						5
201-250	6	113			1	2
251-300	6	38		3	1	2
301-350				2	1	
351-400			2	1		
401-450			8	1	1	
451-500			4	1		
501-550			3			

Table 6 Biological attributes of Splake, Waseosa Lake, 2015.

Sample	Fish	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex	Maturity
1	22	284	296	200	male	imm,
1	23	239	247	110	female	imm,
6	2	230	242	100	male	imm,
6	3	250	266	140	male	imm,
11	1	245	260	150	male	imm,
13	2	255	270	100	male	imm,
13	3	276	290	170	male	imm,
13	4	263	276	160	male	imm,
14	1	253	275	130	male	imm,
15	9	250	267	130	male	imm,
15	10	259	276	150	female	imm,
16	32	249	265	120	female	imm,
Min.		230	242	100		
Max.		284	296	200		
Mean		254	269	138		
S.D.		15	15	30		

The abundance of fish in the catch was expressed as the area-weighted catch-per-unit-effort. This is the average number of fish caught in each large mesh net, weighted by the proportion of lake area in each of the depth strata. For comparison, provisional data from Cycle 1 (2008-2012) of the provincial Broad-scale Monitoring program in FMZ 15 were available for all species with the exception of Splake (stocked lakes are not generally included in the provincial program). The provincial program samples a set of randomly selected lakes of a variety of sizes.

The catch rate for Splake was 0.4/net (Table 7). The Cisco catch rate of 6/net was very high; greater than the maximum recorded in FMZ 15. The catch rates of both Smallmouth (0.2/net) and Largemouth Bass (0.1/net) were well below the Zone average. The White Sucker catch (0.8/net) was about average and the Yellow Perch catch (<0.1) was very low.

Table 7 Area weighted catch-per-unit-effort (number), by species, for large mesh nets, Waseosa Lake, 2015. For comparison, minimum, maximum and mean catch rate from FMZ 15 Cycle 1 Broad-scale Monitoring program data (provisional data) are provided.

	Splake	Cisco	White Sucker	Smallmouth Bass	Largemouth Bass	Yellow Perch
Waseosa Lake	0.44	6.09	0.76	0.25	0.09	0.03
Min. (FMZ 15)		0.01	0.01	0.03	0.02	0.01
Max. (FMZ 15)		3.46	7.69	3.39	1.37	6.43
Mean (FMZ 15)		1.16	1.18	0.80	0.28	1.37

Discussion

The BsM sampling protocol is designed for statistical analysis of multiple lakes at the FMZ scale. The number of nets set in individual lakes is relatively small, therefore estimates of abundance are subject to high variability and comparisons of individual lake results should be used with caution. Nevertheless, the amount of effort used in this survey was deemed to be adequate to describe the general characteristics of the fish community for management purposes.

No new species were documented in this survey. The unauthorized stocking of non-native fish species such as Northern Pike, Walleye and Black Crappie is widespread and virtually impossible to control. Though presumably well-intentioned some of these introductions can have unintended impacts on native biodiversity and the quality of the fishery for existing species. In a small lake like Waseosa, the amount and variety of habitats is limited, therefore any introduced species is more likely to have an impact on the existing community.

No Rainbow Trout were caught despite regular stocking occurring up to 2013. Rainbow Trout are notoriously difficult to capture in standard gill net sets, presumably due their pelagic behaviour. It is likely that some occur in the lake, but their abundance will quickly decline with the cessation of stocking. Casual observations and reports of open water and winter fishing activity indicate that there has been a low level of fishing effort and catch of Rainbow Trout and continued stocking is difficult to justify.

This assessment was the first in which no brook trout was captured. It is possible that they still persist in the lake in low numbers, possibly supported by immigration from Jessop's Creek, a well-known cold water stream. The introduction of Largemouth Bass since the last assessment in 1986 would have put additional stress on the Brook Trout population through increased competition and possibly direct depredation as well.

No Lake Trout were caught. Like Brook Trout, it is possible that they persist in the lake in very low numbers. The limited amount of well oxygenated deep water habitat precludes the lake from supporting a productive Lake Trout population, even when supported by stocking, a conclusion supported by previous assessments.

Notwithstanding the differences in netting protocol used between years, it is apparent that the fall stocking of large Splake has resulted in better survival than the previous stocking attempt in 1985. In 1985 the mean size of stocked fish was only 10 g, whereas it was 70 g in 2014, a significant head start, especially in the presence of bass. As no indices of Splake abundance were available from the BsM program, values for Lake Trout were used for comparison. Zone-wide, Lake Trout catches averaged about 0.3/net

in the BsM program, compared to a catch rate of 0.4 Splake in this project, which suggests that there is a reasonable density of Splake in Waseosa Lake, especially considering that Splake were stocked only one time.

Since being stocked in the fall, the Splake grew from an average of 70 g to 138 g. In Clear Lake, Perry Township, Splake stocked in the fall at 90 g had reached an average length of 287 mm and weight of 230 g by mid- September (Scholten 2014). In Louie Lake in 2015, they had reached 262 mm and 213 g in late July (unpublished MNR data). These comparisons suggest that the growth rate in Waseosa Lake was relatively slow. This may be due to competition with the high abundance cisco population, a species not present in the other two lakes. Nevertheless, considerable growth would probably have still occurred during the 2015 growing season, especially in the fall, and they would probably reach a reasonable catchable size for the winter fishing season. It is difficult to determine the extent to which continued slow growth would contribute to higher mortality through time but it would be factor, as smaller fish would be more vulnerable to depredation from a variety of sources. Eventually, Splake that survive should attain a size whereby they could feed on Cisco at which point growth should improve greatly, but, unfortunately being an abundant food source, the Cisco may also result in it being more difficult to catch the Splake. Combined, higher mortality associated with slow early growth and possible lower catchability at larger sizes may limit the quality of the fishery compared to lakes that do not have these limitations.

We intended to conduct regular checks for ice anglers during the winter of 2015-2016; however, for much of the winter ice conditions were poor. Only one check was done and no anglers were observed. A second planting of surplus Splake was done in the fall of 2015. It will be crucial to follow up with angler checks to determine if continued stocking is justified. Support of the Lake Waseosa Ratepayers Association should be sought to solicit angler reports.

The bass catch rates were relatively low, compared to other lakes sampled in FMZ 15. The low abundance may be largely a product of the habitat availability in the lake. The littoral zone in much of the lake is quite narrow, with a steep drop off, resulting in large areas of the lake being too deep to support bass and resulting in a low lake-wide density. However, given the intensity of shoreline development the bass population is probably heavily exploited and extensive shoreline habitat alteration was noted during field operations which would contribute to the observed low abundance.

In summary, Waseosa has been stocked for over 70 years with four different species of trout in order to create a fishery supported by the available cold water habitat. Unfortunately, the natural limitations of the amount and quality of habitat, presence of a high density population of native cisco, the introduction of two species of bass and inadequate public access in combination have resulted in a failure to create a significant fishery. If the most recent variation, stocking fall yearling Splake, fails to produce a tangible improvement, no further stocking should be considered.

Acknowledgements

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