The Fish Communities of Dotty Lake and Oxbow Lake

File Report

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Dotty Lake and Oxbow Lake are two similar, adjoining lakes located in Finlayson Township within the municipality of the Township of Lake of Bays, in MNRF's Parry Sound District. They are moderately-sized lakes in terms of both surface area and depth (Table 1, Figure 1). The lakes are directly connected by a non–navigable, but fish-passable stream; Dotty Lake flows directly into Oxbow Lake.

Table 1 Selected physical and chemical properties of Dotty Lake and Oxbow Lake.

	Dotty L.	Oxbow L.
Surface Area (ha)	159	170
Depth (max.) (m)	27	34
Depth (mean) (m)	6	10
Watershed (km^2)	22.3	31.4
Secchi Depth (m)*	3.1	4.3
TP (ug/l)*	6.4	5.9
MVWHDO (mg/l)	5.2	5.4
Useable Lake Trout Habitat (10^4 m^3)$^+$	464 (36%)	793 (46%)
Optimal Lake Trout Habitat (10^4 m^3)$^\#$	158 (12%)	297 (17%)

*source: DMM 2013; $^+$ < 10°C and > 6 ppm dissolved oxygen; $^\#$: <15°C and > 4 ppm dissolved oxygen

Both lakes are designated for management for Lake Trout on a put-grow-take basis (OMNR 2006); the lakes are stocked on a regular basis with Lake Trout to create artificial fisheries and no natural reproduction is expected, though it may occur. The angling season for Lake Trout is open all year.

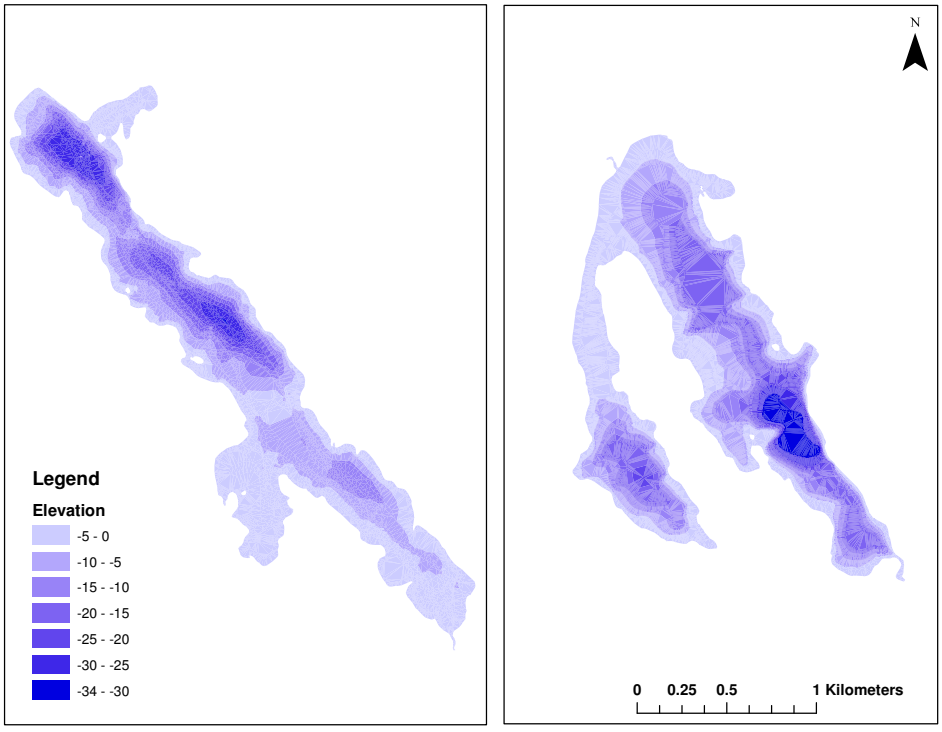


Figure 1 Maps showing bathymetry of Dotty Lake (left) and Oxbow Lake (right). Lakes are drawn to the same scale. Depth in metres.

The native fish communities of both lakes were dominated by cold water species including Lake Trout, Brook Trout, Lake Whitefish, Round Whitefish and Burbot. A succession of introductions has occurred which have altered the fish community and impacted the lakes' abilities to support native coldwater species.

The lakes have had several inventory and monitoring projects completed on one or both of them. A variety of sampling protocols has been used due to the evolution of sampling techniques over time and differing purposes of the surveys. The results of many have not been previously reported; however, the data for all surveys since 1997 is archived in standard MNRF databases and earlier data resides in paper files in the Bracebridge office. This report presents an overview of the results of many of these surveys and concludes with management recommendations for the future.

Methods

A summary of inventory and monitoring activities completed on the lakes is presented in Table 2 (including the acronyms for the standard protocols that have been employed and are used in the text). The table includes brief descriptions of the sampling methods. Detailed descriptions can be found in the associated manuals, where they exist, which are listed in the reference section. The presentation of the detailed results of each individual survey is beyond the scope of this report. Instead, selected results from various surveys are presented to describe the status or changes that have occurred over time.

In addition to formal sampling projects, volunteer-submitted angling data was available for Dotty Lake for 2012 to 2014, which greatly increased the sample size of Lake Trout biological attributes (size, age and origin).

Results and Discussion

Fish Community Composition

The native fish community of both lakes was dominated by cold water species. Lake Trout were native to both lakes but supplemental stocking to increase the populations for anglers began in the 1940's and has continued to the present (Table 3). The status of and changes that have occurred to the Lake Trout population will be discussed further in a separate section.

Brook Trout have been consistently caught in small numbers in Dotty Lake, but never in Oxbow Lake. It is apparent that a self-sustaining population is present. Given the short life span of brook trout, even the earliest records were probably of naturally reproduced fish as stocking was discontinued seven years before the first netting survey. Despite the absence of any catches in netting surveys, it is likely that brook trout occur in Oxbow Lake incidentally in very low numbers.

Table 2 Summary of inventory and assessment projects completed on Dotty Lake and Oxbow Lake, 1972-2014.

	Dotty L.	Oxbow L.	Description
Aquatic Habitat Inventory Survey (AHI)	1972	1972	Standardized gill nets set over night in non-random fashion to detect as many different species as possible; basic water chemistry and physical feature mapping
Lake Trout Population Assessment		1978	Non-standard gill nets set overnight to estimate abundance and population characteristics of Lake Trout population
Spring Littoral Index Netting (SLIN)	1999	1997	Standardized gill nets set for 1.5 hour periods, during the spring, to obtain an index of Lake Trout abundance and population characteristics
Summer Profundal Index Netting (SPIN)	2005	2014	Standardized gill nets set for 2 hour periods, during the summer, to obtain an index of Lake Trout abundance and population characteristics; has largely replaced SLIN
Winter Creel Survey	2013	2013	Counts and interviews of anglers to estimate fishing effort and harvest
Broad-scale Monitoring (BsM)	2011	2014[1]	Standardized gill nets set over night in random fashion to obtain index of complete fish community
Volunteer Submitted Fish Samples	2012-2014		Self-reporting of fishing effort, catch and fish size and fin clip occurrence
Water Quality Monitoring	Every 3-5 years	Every 3-5 years	Measure deep water Lake Trout habitat amount and quality

[1] small mesh component only

Table 3 Summary of years in which stocking has occurred (Brook Trout and Lake Trout) and year of first documentation of introduced species, Dotty Lake and Oxbow Lake. Brook trout and Lake Trout are stocked by OMNRF. The origin of all other species is unknown.

	Dotty L.	Oxbow L.
Years Stocked		
Brook Trout	1940-1964	1941-1965
Lake Trout	1949-present	1949-present
Year of First Detection		
Smallmouth Bass	1965	1962
Rock Bass	2011	2011
Rainbow Smelt	1999	1997
Northern Pike		2015

Three species of Coregonid (Whitefish sub-family) have been documented in both lakes; however the species that are actually present is in doubt as different species were identified in different surveys

(Table 4). The initial lake inventory, 1978 Lake Trout survey in Oxbow Lake and 2005 SPIN in Dotty Lake recorded only Cisco, whereas both SLIN and BsM surveys documented Lake Whitefish, but no Cisco. Further, Round Whitefish were recorded only in the SLIN surveys. It appears that mis-identification of these similar species has occurred. Knowledge of the competency of the samplers and the increased awareness of the possible presence of more than one species in recent years suggests that Lake Whitefish are the dominant Coregonid species, that Round Whitefish occur in small numbers and Cisco are absent.

Table 4 Total catch, by species, for gill net projects conducted on Dotty Lake and Oxbow Lake, 1972-2014. Netting gear and effort varied between years.

	Dotty L.					Oxbow L.				
	1972	1999	2005	2011	2011	1972	1978	1997	2014	2014
	AHI	SLIN	SPIN	BsM large mesh	BsM small mesh	AHI		SLIN	SPIN	BsM small mesh
Brook Trout	2	4	1	2	2					
Lake Trout	2	16	13	7	2	1	8	23	9	2
Lake Whitefish		82		8				12	8	3
Cisco	6		45			23	143			
Round Whitefish		12						8		
Lake Whitefish		1			44			6		5
Burbot	21	5		10	1		19			
White Sucker	60	42	4	59	38	50	130	6	34	1
Golden Shiner	1				44					
Common Shiner					6					
Bluntnose Minnow					2					
Brown Bullhead				6						
Rock Bass				9	19					
Pumpkinseed					8					
Smallmouth Bass	1			24	34	1	1	3	8	
Yellow Perch	20	8		6	216	1	20			

notes: small fish collections (eg. minnow traps, seine nets) not included; 2014 BsM in Oxbow Lake did not sample 1-3 m and 3-6 m depth strata where most small fish species are captured

Burbot have been caught in relatively large numbers in surveys that employed a netting method to which they are vulnerable; namely over-night sets with large-mesh gill nets. The low catchability and general lack of interest in them by anglers makes it difficult to determine their population status. Burbot are primarily nocturnal and therefore can do well in waters with low clarity, more so than lake trout. The netting data indicate that Burbot are abundant in Dotty Lake and are probably also common Oxbow Lake as well. Burbot are a predator that share habitat with other cold water species and therefore probably impact their populations through depredation and competition.

Four non-native species have been documented, all of which are capable of having major impacts on the native fish community. Smallmouth Bass, Rock Bass and Northern Pike are cool/warm water species that live primarily in the shallower nearshore areas of the lakes. Smallmouth Bass were introduced first (documented in the 1960's but reported to occur as early as the 1940's). When first introduced they

would have had a major impact on the native brook trout and small fish communities and lesser, but significant, impact on Lake Trout and Coregonids. As a large-bodied predator able to sustain high population densities in small lakes, Smallmouth Bass will heavily depredate the populations of small-bodied species and the young of other species with which they overlap in habitat. The reduction in available prey can indirectly impact species with which they don't greatly overlap in habitat (eg. Lake Trout). The introduction of bass has resulted in a permanent reduction in the ability of both lakes to support Brook Trout and Lake Trout.

The successive introduction of Rock Bass and, recently, Northern Pike has/will have incrementally smaller impacts on native species due to the pre-existing dominance of Smallmouth Bass, but they will impact each other as they compete for available habitat and food. The persistence of small numbers of native Brook Trout in Dotty Lake suggests that prior to the introduction of bass the Brook Trout population was probably much more abundant. Critical spawning and nursery habitat of Brook Trout in Dotty Lake has not been identified, but it is likely that cold water tributary streams are important refugia that permit survival of small trout in the presence of bass. Identifying these streams so that they can be protected may help ensure the continued existence of Brook Trout in Dotty Lake but it is unlikely that it will ever be more than a remnant population.

The other introduced species, Rainbow Smelt, is a cold water species, which, for much of the year, inhabits similar habitat as Lake Trout and Coregonids. They play a dual role as prey for large predators such as Lake Trout (and bass and pike seasonally) but, more importantly, are themselves predators of small fish. In some cases, Rainbow Smelt have been implicated in reproductive failure of Lake Trout, Lake Whitefish and Walleye (Kerr and Grant 2000). The lack of rigorous assessment data before and after smelt introduction and the confounding influences of ongoing stocking and mis-identification of Coregonid species make it impossible to make any conclusive observations on the impact of smelt. Examples from published literature and experience from other lakes in the District lead to the inclination that Lake Trout and Coregonid reproduction has probably been impaired. Given other limitations to Lake Trout habitat, it may not be realistic to expect that significant Lake Trout reproduction will occur as long as smelt are present.

Lake Trout Habitat

A critical measure of the ability of a lake to support Lake Trout, either naturally or through stocking, is the amount (area or volume) of well oxygenated, deep water habitat. This can be expressed in different ways, including the percentage of lake volume that is useable ($<15^{o}C$ and > 4 mg/l oxygen) or optimal ($<10^{o}C$ and >6 mg/l oxygen) for Lake Trout or the mean volume-weighted hypolimnetic dissolved oxygen (MVWHDO) concentration. All three are measured in late summer when annual values are typically at their lowest.

Typical late summer temperature and dissolved oxygen profiles are shown in Figure 2. The thermocline (temperature transition layer) in both lakes extends from about 6 m to 10 m deep. In Dotty Lake there is a decrease in dissolved oxygen in the thermocline because the lower water clarity does not allow enough light penetration to allow sufficient photosynthesis to prevent oxygen depletion. This decrease

is observed in all years that profiles have been done. In contrast, an oxygen decrease has never been observed in the thermocline in Oxbow Lake and in some years there is an increase. In extremely clear lakes, very high, super-saturated oxygen conditions often occur in the thermocline but this doesn't occur in Oxbow Lake.

Below the thermocline, both lakes experience oxygen depletion in the deer waters, with greater depletion occurring in Dotty Lake due mostly to the shallower depth and smaller volume of water in the deep areas of the lake.

By all three measures, both lakes have a moderate quality of Lake Trout habitat (Table 1). Optimal and useable habitat volumes are no longer used by the province from a policy perspective but still provide an indication of habitat quality. Values of at least 40% useable and 20% optimal are indicative of good habitat quality that will generally support a self-sustaining population. The habitat in Dotty Lake is considerably below these values, while Oxbow Lake approaches or exceeds them.

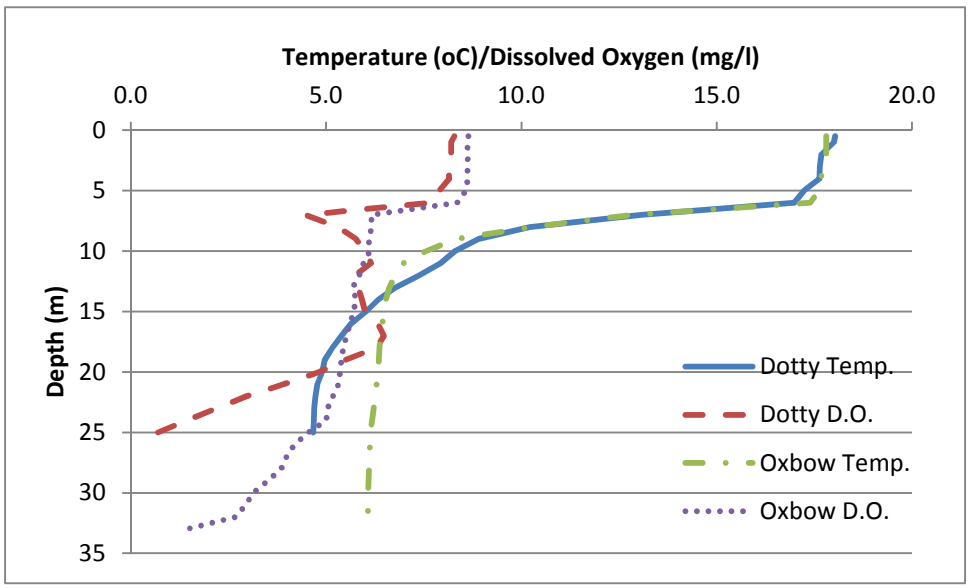


Figure 2 Temperature and dissolved oxygen profiles from the main basin of Dotty Lake and Oxbow Lake, Sept 19, 2009.

The province has now adopted the MVWHDO in its policy for protecting Lake Trout habitat. A criterion of 7 mg/l has been established as a threshold; as measured values fall below 7 mg/l a lake will generally have a lesser capability to support a natural and eventually even a stocked population. At 5.2 and 5.4 mg/l, respectively, Dotty Lake and Oxbow Lake have a moderate ability to support Lake Trout and if there were no other stresses or limiting factors, would be expected to be able support moderate self-sustaining populations. Even though the oxygen levels are very similar in both lakes, Oxbow Lake has a greater total volume and greater proportion of the lake volume that is Lake Trout habitat and therefore

might be expected to sustain a higher population density and be more likely to support naturally reproduced fish.

The habitat potential indicated by deep water oxygen levels is probably limited by other natural and human-induced factors. As inhabitants of deep water, the availability of light can limit a lakes' ability to support Lake Trout even if adequate oxygen-rich deep water is present. As water clarity decreases (as measured with a Secchi disk) so too does a lakes ability to support Lake Trout, with the critical value varying with the size and depth of the lake. Within MNR's Parry Sound District, lakes with clarity less than about 3.5 m seldom support or are managed for self-sustaining populations (Figure 3). With measured clarity of 3.1 m, Dotty Lake has a marginal ability to support natural Lake Trout and would be expected to provide a moderate quality stocked fishery. Oxbow Lake is somewhat clearer than Dotty (4.3. m) and if all other factors were equal, should have a greater potential for supporting a self-sustaining population.

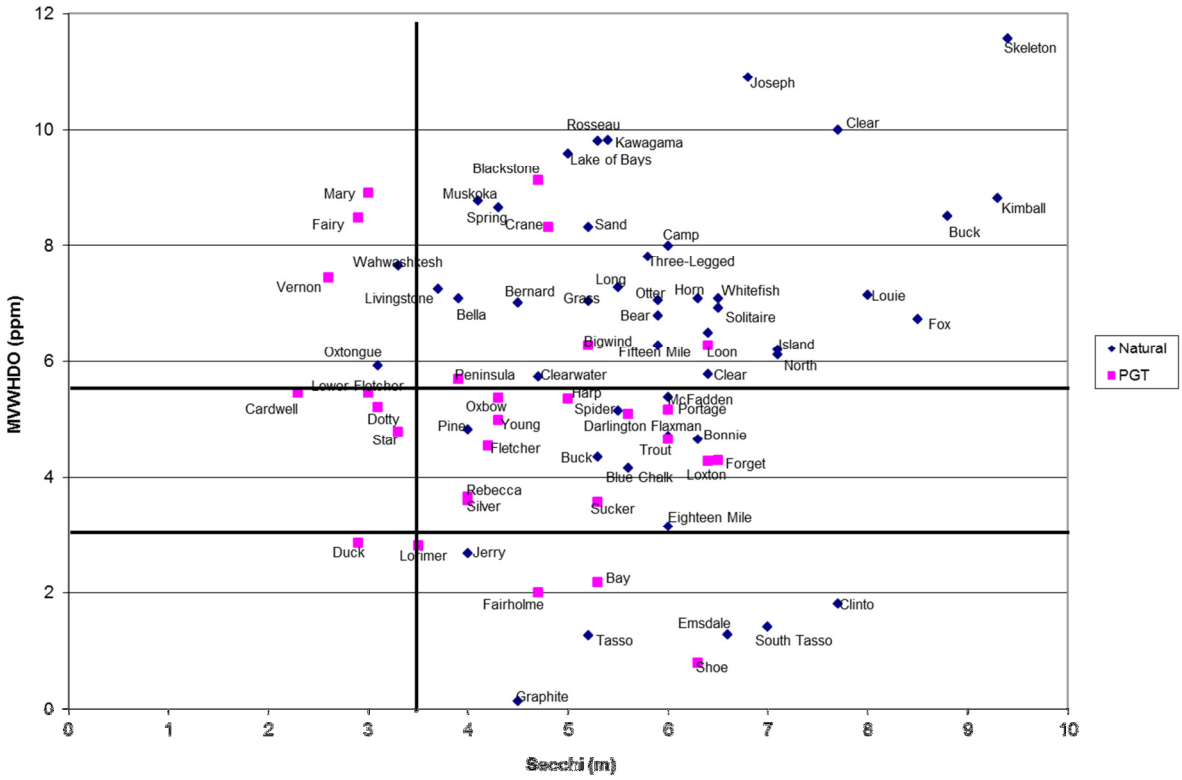


Figure 3 Plot of Secchi depth and mean volume-weighted hypolimnetic dissolved oxygen (MVWHDO) values for Lake Trout lakes in Parry Sound District. "Natural" are lakes designated for management as self-sustaining populations. "PGT" refers to put-grow-take stocked lakes.

The unknown impact of introduced Rainbow Smelt is a factor that may override the other habitat features of both lakes. It has been my observation that smelt have a greater impact in lakes with low

clarity, possibly because fish are being forced to a narrower range of depths and interact more with other species or smelt obtain some other competitive advantage at low water clarity.

Lake Trout Population

The different assessment projects conducted on the two lakes provide only sporadic point-in-time snapshots of the characteristics of the Lake Trout populations. The data collection has not been frequent or intensive enough to explain any long-term changes that may have occurred. The primary metrics that have been collected include relative abundance (number of fish caught per net set), whether a fish was stocked (as indicated by hatchery fin clip) and the size and age of the fish.

The 1978 survey, SLIN, SPIN and BsM protocols employed different gear and netting methods, therefore catch rates (number of fish per net) cannot be directly compared and given the low intensity and frequency of netting only general classification of abundance can be done. The report on the 1978 survey on Oxbow Lake rated Lake Trout abundance as "mysteriously" low (considering the apparently reasonable habitat quality) and recommended that stocking be discontinued. Despite the recommendation, stocking was continued. In 1997, the SLIN survey indicated a moderate abundance of 1.2 Lake Trout/net set. In Dotty Lake, the SLIN catch in 1999 was low (and lower than Oxbow), at 0.5 Lake Trout/net set. The SPIN surveys were conducted almost a decade apart, but results were somewhat similar to the SLIN surveys, with catches being moderately low in both lakes but somewhat higher in Oxbow Lake (0.8/net) than in Dotty Lake (0.5/net).

In 1978, 1997 and 1999 unclipped fish comprised a significant part of the catch in both lakes (Table 5). In the 1999 SLIN report for Dotty Lake, Thomas (1999) speculated that the unclipped fish, which were all very large, were not natural, but instead stocked fish from the 1970's when clipping did not always occur or that fin regeneration had occurred. The same assumption could be applied to Lake Trout caught in Oxbow lake in 1978 and 1997.

Table 5 Number of Lake Trout caught, with and without a fin clip, by year, Dotty Lake and Oxbow Lake.

	Dotty		Oxbow	
Year	No Clip	Clip	No Clip	Clip
1978			5	3
1997			6	16
1999	10	6		
2005	0	13		
2011	0	3		
2013	0	3	1	0
2014			0	9
2012-2014 (angler reported)	18	123		

From 2005-2014 MNR surveys caught only one Lake Trout (from Oxbow Lake) which was not fin clipped. Overall, based on formal assessment projects, our belief was that virtually no natural reproduction was occurring. However the sample sizes from these surveys were quite small and the occurrence of a small proportion of natural fish could go undetected.

The angler submitted reports from 2012-2014 included a much larger sample size which changed our understanding of the occurrence of naturally reproduced (un-clipped) fish. A small, but significant, proportion of angled fish from Dotty Lake were not fin clipped. Another regular angler of Oxbow Lake has also reported catching unclipped fish regularly. It is reasonable to expect that a similar, or greater proportion of unclipped fish exists in Oxbow Lake, especially considering the better habitat that exists in Oxbow Lake.

Despite the apparent presence of some naturally reproduced Lake Trout, it is difficult to predict whether either lake would be capable of supporting significant reproduction, and if the abundance of natural fish would decrease or increase, if stocking were to be stopped. That is because changes to the fish community have occurred that may influence reproduction and because of the effect of the stocking itself.

The stocking of Lake Trout could be improving reproduction by keeping the adult biomass high. If stocking was discontinued the populations may simply dwindle. It may be more likely though that stocked fish are suppressing the reproduction of natural fish. Since 1991, the Killala Lake genetic strain of Lake Trout has been stocked in both lakes (different strains were stocked prior to that time, most commonly Lake Manitou strain). Recent genetic profiling of Lake Trout in southern Ontario has revealed the Killala Lake origin Lake Trout do not contribute genes to the population in lakes in which they are stocked (C. Wilson, Pers. Comm.). It is possible that stocking the lakes with fish that don't reproduce may suppress the natural fish that are still present and that if stocking was reduced or stopped more natural reproduction may occur.

In addition to the differences in abundance and possibly the occurrence of naturally reproduced fish that has occurred between lakes and over time, the size composition in the catches of Lake Trout has differed. In Dotty Lake the mean size was very large in 1999, at almost 700 mm FL long (Table 6). Since then the average has ranged from 402-502 mm FL. The average size will change cyclically, especially when a lake is not stocked every year as fish of different ages enter and grow through the fishery; however, the shift from extremely large to a normal range suggests there has been a change in the growth potential and/or longevity of Lake Trout since 1999. As with the occurrence of naturally reproduced fish, the most likely causes would be the introduction of smelt and the stocking of a different genetic strain of Lake Trout. While smelt are preyed on by Lake Trout they do not grow large enough to be a prey item of optimal size for very large Lake Trout. Smelt may also affect the reproduction, and therefore the abundance, of potentially larger prey, such as the Coregonid species.

In Oxbow Lake there has also been a shift to a smaller average size of Lake Trout since 1997; also, compared to Dotty Lake, the mean size is smaller in Oxbow Lake, both before and after the shift. A plot

of assigned age against the length of fish indicates that that smaller mean size in Oxbow Lake is largely due to an absence of older fish in Oxbow Lake (Figure 4).

Table 6 Mean fork length (mm) of Lake Trout, by year and gear, Dotty Lake and Oxbow Lake.

		Dotty		Oxbow	
Year	Gear	n	Mean FL (mm)	N	Mean FL (mm)
1978				8	506
1997	SLIN			22	523
1999	SLIN	16	676		
2005	SPIN	13	499		
2011	BsM	7	483		
2013	Angled	3	438	1	280
2012	SPIN			9	342
2012	Angled	8	502		
2013	Angled	37	427		
2014	Angled	46	402		

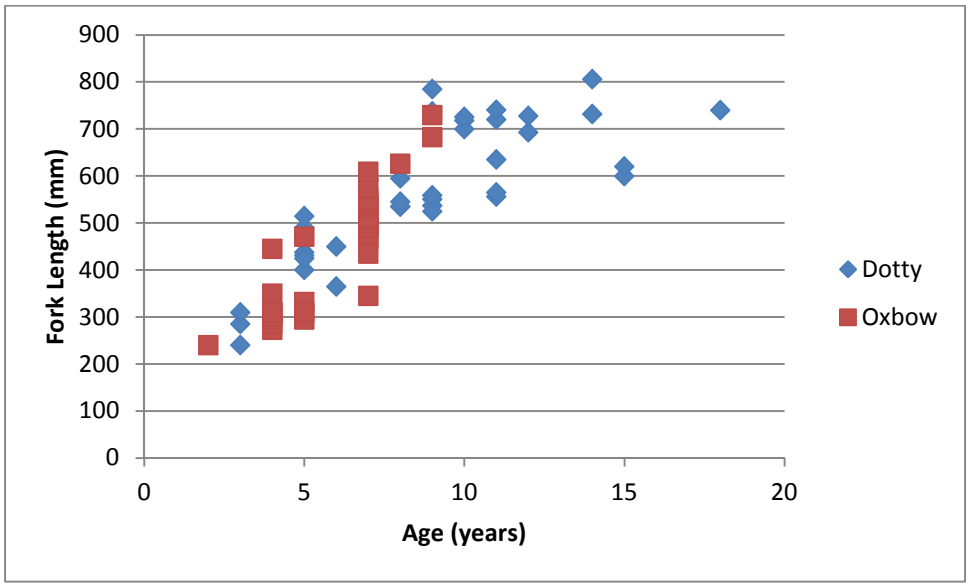


Figure 4 Plot of fork length-at-age for Lake Trout caught in MNRF sampling projects, 1978-2014, for Dotty Lake and Oxbow Lake.

A factor in the differing size structure of the Lake Trout populations between lakes, and possibly the change over time, is evidence of fish movement between the two lakes. As the lakes have not typically been stocked in the same year it is possible to discern, in many cases, which lake fish were stocked into based on their fin clip. For each fish for which the fin clip was recorded, an age was assigned based on the clip, the size of the fish and in some cases an age assessed from fin rays or otoliths. The age/fin clip combination was then compared to the stocking history to determine in which lake the fish was probably stocked.

Most fish caught in Oxbow were assigned as having been stocked in Oxbow Lake (some fish could not be assigned with confidence, Table 7). However, of the fish caught in Dotty Lake, a large proportion was assigned as having been stocked in Oxbow Lake. That is, there is a significant upstream movement of Lake Trout from Oxbow Lake to Dotty Lake, with the result of a larger average size and older age of fish in Dotty Lake. The emigration, particularly upstream, of stocked fish is a well-known occurrence, but this example is exceptional. Even though there is a net movement of Lake Trout into Dotty Lake, the density of fish has been higher in Oxbow Lake, suggesting that there is high survival of small Lake Trout in Oxbow Lake and poor survival of small fish stocked in Dotty Lake.

A possible cause of the emigration is that fish leave the lake while searching for or following prey items, especially once they grow to a size where optimal-sized prey is not available. It seems quite likely that lake trout follow the spring smelt run into the adjoining creek and onward into Dotty Lake. Other explanations are that they search for spawning locations when they reach sexual maturity or that there is some other behavioural manifestation of their hatchery origin. Stocking intensity may be a factor in the rate of emigration in that high stocking rates may increase competition amongst small fish beyond what would occur naturally. Evidence for this is that within Dotty Lake fish that originated from Oxbow Lake were consistently smaller at the same age than fish that were stocked into Dotty Lake (Table 8). This suggests that high density and slow growth are driving Oxbow Lake fish to seek better feeding opportunities.

In essence, Oxbow Lake is acting somewhat as a nursery lake where good survival of stocked fish is occurring but a significant portion leave the lake as they age. Whereas, the survival of small Lake Trout stocked into Dotty may be poor due to the lower quality of deep water habitat but larger fish are able to survive well.

Table 7 The number of Lake Trout caught, classified by the lake into which they were stocked, for Dotty Lake and Oxbow Lake.

		Caught In:	Dotty			Oxbow		
Year	Gear	Stocked In:	Dotty	Oxbow	Unknown	Dotty	Oxbow	Unknown
1978	Index						1	2
1997	SLIN						16	
1999	SLIN		3	3				
2005	SPIN		8	5				
2011	BsM		6	1				

2013	Angled	2	1				
2014	SPIN					4	5
2012	Angled	6	2				
2013	Angled	11	19				
2014	Angled	6	50	11			

Table 8 Mean fork length (mm), by age, of Lake Trout angled from Dotty Lake 2012-2014, classified by the lake in which the fish were originally stocked.

	Dotty		Oxbow	
Age	n	Mean FL	n	Mean FL
3	1	295		
4				
5	3	410	16	352
6	4	481	12	387
7	5	476	25	416
8	1	496	5	459
9	1	577	1	410
10	2	489		
11	1	573	2	538
12	1	565		

Fishery

The primary purpose of Lake Trout stocking has been to maintain the sport fishery, in the absence of strong natural reproduction. Until recently, very little has been known about the fishery. In 2013, a winter creel survey was completed on all of the Lake Trout lakes that are open to fishing in the winter in the Limberlost Road corridor (Scholten 2013). The estimated fishing effort was 746 ang-hr (4.7 ang-hr/ha) on Dotty Lake and 332 ang-hr (2.0 ang-hr/ha) on Oxbow Lake. The sampling intensity of the survey was fairly low resulting in wide confidence limits of the effort and catch estimates but overall it was apparent that Dotty received a moderate amount and Oxbow a low amount of fishing effort.

No surveys of open water fishing effort have been done but it is believed that fishing effort for Lake Trout is low in both lakes and most effort is directed at bass.

Contact made with a frequent angler of Dotty Lake during the creel survey resulted in the volunteer submission of personal fishing information for 2012-2014 which has been very useful for the describing the lake trout populations.

Summary and Management Implications

Dotty Lake and Oxbow Lake originally supported self-sustaining Lake Trout populations. Based on the volume of useable and optimal habitat, late summer dissolved oxygen concentrations and water clarity, Oxbow Lake provides considerably more and better Lake Trout habitat than Dotty Lake. The introduction of Smallmouth Bass and smelt has probably reduced the ability of the lakes to support natural populations at the levels of abundance that they once did. The presence of a small proportion of natural fish indicates that some reproduction does occur and that rehabilitation of self-sustaining populations may be possible, particularly in Oxbow Lake. Ongoing stocking may be suppressing natural reproduction through the stocking of an unsuitable genetic strain of Lake Trout. There is significant emigration of Lake Trout from Oxbow to Dotty Lake resulting in a small average size in Oxbow Lake possibly due to excessive stocking as demonstrated by the higher density and slower growth. Dotty Lake is providing more fish opportunities (in winter at least) due to a more attractive size structure of the Lake Trout population and possibly the convenience of access.

In the future, stocked Lake Trout should be of a genetic strain that is best suited to the environment. In that regard, Killala Lake strain Lake Trout are no longer stocked. Lake Manitou strain fish have been stocked since 2012.

Stocking should be significantly reduced or suspended on a trial basis in Oxbow Lake. Oxbow Lake has more and better habitat that is more likely to be able to support natural reproduction, a large portion of stocked fish leave Oxbow anyway, stocking is creating only a small fishery and an alternate species, Lake Whitefish, is available (for winter anglers). The reduction or suspension of stocking would provide insight as to whether Oxbow Lake is capable of supporting a productive self-sustaining population in the absence of stocking. The implications of reduced or suspended stocking in Oxbow Lake are that, if reproduction is being hindered by other factors, significant Lake Trout reproduction may not occur and the population may experience a major decline. Given the relatively low intensity of the Oxbow Lake fishery the impact would be fairly minor. A possible indirect impact may be that the quality of the fishery in Dotty Lake may suffer without the availability of Oxbow Lake as a nursery.

Stocking should be continued on Dotty Lake. The smaller amount and poorer quality of habitat compared to Oxbow lake in combination with several introduced species renders it less likely that a significant population can be sustained without stocking. If a trial suspension of stocking on Oxbow Lake is successful, a similar exercise could be considered for Dotty Lake. The potential benefits and risks would have to be weighed at that time.

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Appendix Lake Trout stocking history, Dotty Lake and Oxbow Lake, 1974-2014.

Year	Dotty	Oxbow	Clip	Strain
1974	3000	6000	LV	LM
1975				
1976	5000		RV	SP
1977		2900	RV	LM
1978	1450		NC	HL
1979		1000	NC	
1980				
1981		2800	NC	SP
1982				
1983				
1984		2800	LV	LM
1985		1900	LP	KL
1986				
1987				
1988		1267	AD	LM
1989	1000		LV	LM
1990				
1991	2700 RV	1700 RP		KL
1992				
1993				
1994		1700	LV	LM
1995	988		LP	KL
1996				
1997		1700	RV	KL
1998	1500		AD	KL
1999				
2000		1700	LP	KL
2001	1500		RP	KL
2002				
2003		1700	AD	KL
2004	1500		LV	KL
2005				
2006		1700	RP	KL
2007	1500		RV	KL
2008		1700	AD	KL
2009	500		LV	KL
2010		1000	LP	KL
2011	500		RP	KL
2012		1000	RP	LM
2013				
2014		1000	LV	LM

SUMMER PROFUNDAL INDEX NETTING REPORT

Lake Dotty | Office | Secchi | TDS Secchi | Phosphorus | Linf | GDD | Xfield 1

Date 2005 (Year) 6 (Month) | Total Area 152 | Sampled Area 38 | Max Depth | Mean Depth | Lmat | Z | Xfield 2

Using Large Body Conversion

Area Wt. Selectivity Adj Values	Total Catch	Arith CUE	SE CUE	RSE CUE
Lake Trout >=300 and <=1000mm	11	0.47	0.17	0.36

Density (ha)	Pop Est	Low Est	Upper Est	Pred. Level
1.7	66	1	132	68%

Stratum Info	Sites #	Total # Nets	% Sites	% Samp Area	Tot Catch #	Tot Catch %	Mean CUE	SE CUE	RSE CUE	Mean FLEN	SE FLEN
Stratum 1 (0-10m)	0	0			0						
Stratum 2 (10-20m)	13	21	62%	76%	10	91%	0.76	0.08	0.11	549	43.85
Stratum 3 (20-30m)	8	10	38%	24%	1	9%	0.13	0.10	0.80	600	0.00
Stratum 4 (30-40m)	0	0			0						
Stratum 5 (40-60m)	0	0			0						
Stratum 6 (60-80m)	0	0			0						
Stratum 7 (80+m)	0	0			0						
Total	21	31	100%	100%	11	100%	0.47	0.17	0.36	561	33.47
				actual	11						

Total Biomass >300mm 3.31 kg/ha sampled

avg wt of a fish 1.91 kg

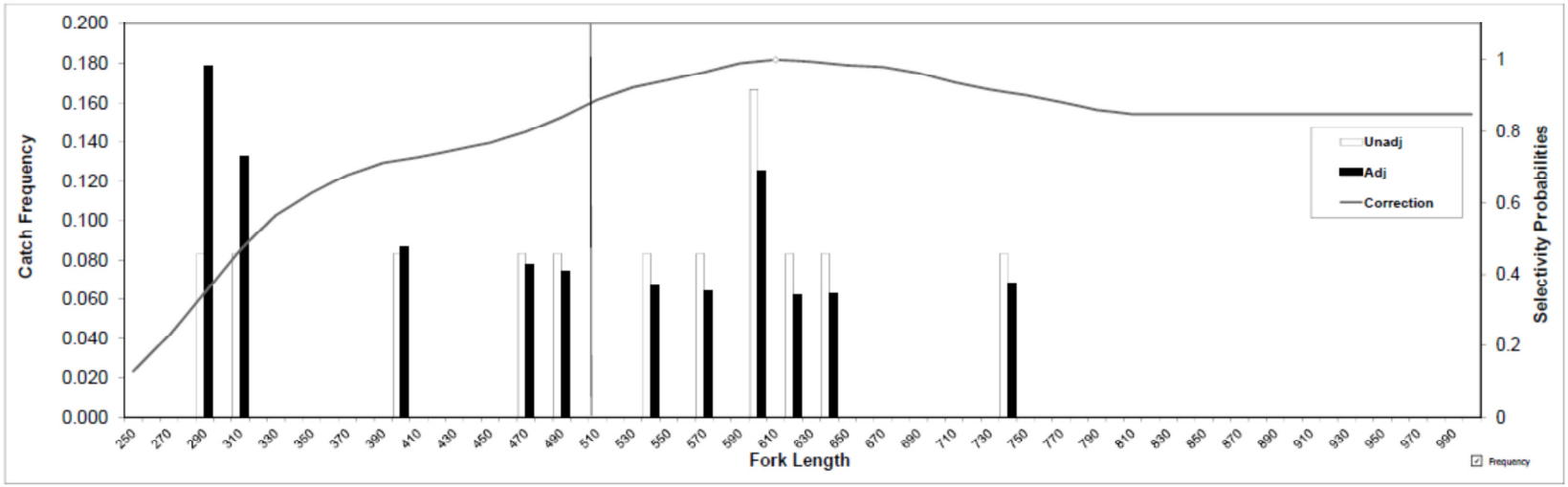
Previous Arith Mean
Previous Arith Stdev
Previous n=

p-Value
Previous Mean,Stdev, n= not specified

Power Observed 27%

Power Desired 80%
Change Detectable 25%
Sets Required (n=) 195

Thermocline(top) n/a m
Thermocline(bottom) 0 m



Selectivity Model
- no correction
- 1_Paloheimo
- gamma
- 5_Walker (use this)
- bi-modal

(density relationship available)

% zero S1	
% zero S2	29%
% zero S3	70%
% zero S4	
% zero S5	
% zero S6	
% zero S7	
Area Wt % zero	38%

No. of Sets Next Day	
Stratum 1	
Stratum 2	9
Stratum 3	1
Stratum 4	
Stratum 5	
Stratum 6	
Stratum 7	

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Print Date 06/04/2015

SUMMER PROFUNDAL INDEX NETTING REPORT

Lake: Oxbow | Office: | Secchi: | TDS: | Phosphorus: | Linf: | GDD: | Xfield 1:

Date: 2015 (Year) 9 (Month) | Total Area: 169 | Sampled Area: 76 | Max Depth: 34 | Mean Depth: | Lmat: | Z: | Xfield 2:

Using Large Body Conversion

Area Wt. Selectivity Adj Values	Total Catch	Arith CUE	SE CUE	RSE CUE
Lake Trout >=300 and <=1000mm	9	0.75	0.26	0.35

Density (ha)	Pop Est	Low Est	Upper Est	Pred. Level
2.8	211	75	350	68%

Stratum Info	Sites #	Total # Nets	% Sites	% Samp Area	Tot Catch #	Tot Catch %	Mean CUE	SE CUE	RSE CUE	Mean FLEN	SE FLEN
Stratum 1 (0-10m)	0	0			0						
Stratum 2 (10-20m)	10	10	59%	82%	9	100%	0.92	0.14	0.16	350	25.64
Stratum 3 (20-34m)	5	5	29%	18%	0		0.00				
Stratum 4 (34-40m)	2	2	12%	0%	0		0.00				
Stratum 5 (40-60m)	0	0			0						
Stratum 6 (60-80m)	0	0			0						
Stratum 7 (80+m)	0	0			0						
Total	17	17	100%	100%	9	100%	0.75	0.26	0.35	350	25.64
				actual	5						

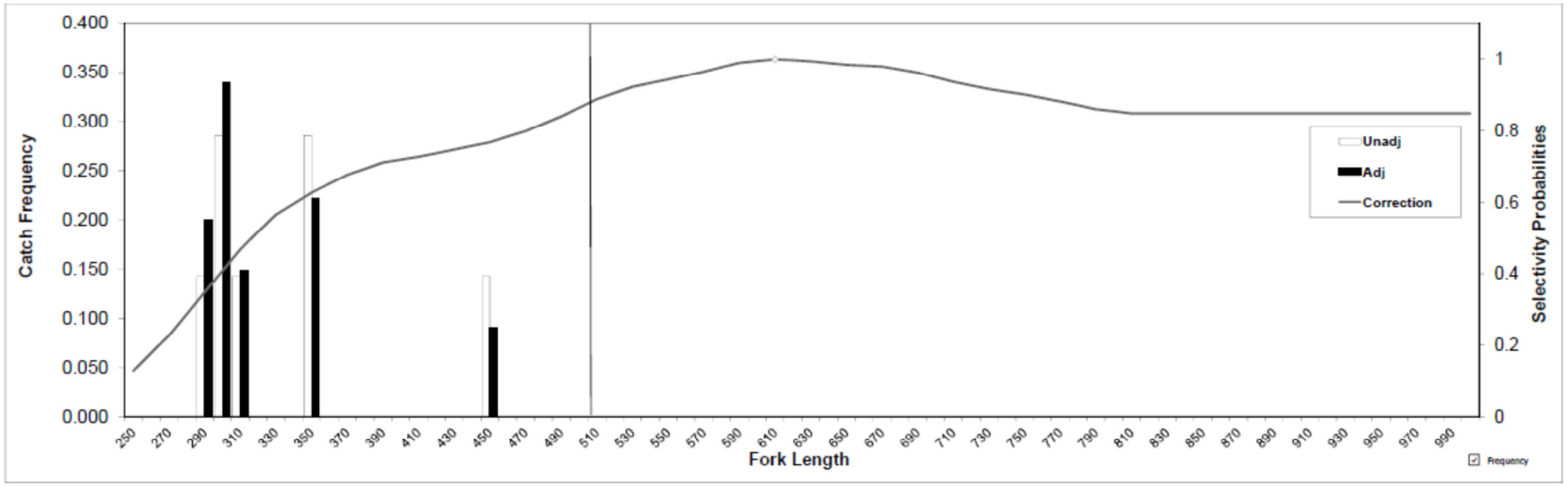
Total Biomass >300mm: 1.12 kg/ha sampled

avg wt of a fish: 0.40 kg

Previous Arith Mean:
Previous Arith Stdev:
Previous n=
p-Value:
Previous Mean,Stdev, n= not specified

Power Observed: 27%
Power Desired: 80%
Change Detectable: 25%
Sets Required (n=): 150

Thermocline(top): n/a m
Thermocline(bottom): 0 m



Selectivity Model
- no correction
- J_Palohelmo
- gamma
- S_Walker (use this)
- bi-modal

(formerly fish/lake avg/table)

% zero S1	
% zero S2	50%
% zero S3	100%
% zero S4	100%
% zero S5	
% zero S6	
% zero S7	
Area Wt % zero	59%

No. of Sets Next Day	
Stratum 1	
Stratum 2	10
Stratum 3	0
Stratum 4	0
Stratum 5	
Stratum 6	
Stratum 7	

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