Fish Community and Lake Trout Population Assessment of Forget Lake

2017

File Report

Stephen Scholten

Ontario Ministry of Natural Resources and Forestry

Bracebridge

2022

Forget Lake is a small (27ha) lake located within the geographical townships of Conger and Foley and the municipalities of Seguin and Archipelago. It is moderately deep (Z_{max}: 21m, Z_{mean}: 13m) and oligotrophic with high water clarity (Secchi depth=6.5m). The shoreline of the lake is undeveloped with only a single seasonal water access cottage at the northeast end. Approximately half of the shoreline is Crown Land. Public access to the lake is readily available via Blackstone and Crane Lake Road, although parking is limited.

The original fish community of the lake appears to have included Cisco, White Sucker, Mimic Shiner, Bluntnose Minnow, Creek Chub, Iowa Darter, and Longnose Dace. Smallmouth Bass and Rock Bass also occur, but it isn't clear whether they are native due to the large amount of stocking and range expansion that has occurred, sometimes undocumented and prior to lake inventories being conducted.

Based on the depth and shape of the lake basin, availability of dissolved oxygen in the deep waters and high water clarity, the lake provides fair habitat for lake trout. Despite the presence of suitable habitat, there is no evidence that a native lake trout population ever existed.

Stocking of Lake Trout began in 1978. The original intent was to determine if a self-sustaining population could be established. Over the years a transition occurred such that the lake is currently stocked on a put-grow-take (PGT) basis every other year and no natural reproduction is expected (Table 1).

Table 1 Lake Trout stocking history, Forget Lake.

Stocking Year	Stock Strain Name	Development Stage	Fish Weight (g)	Number of Fish Stocked	Fin Clip
1978		Yearling		800	
1979		Yearling		1200	
1985		Yearling		1000	
1987		Yearling		650	
1988		Yearling	14	1000	AD
1989		Yearling	13	500	LV
1991		Yearling	22	500	RP
1993		Yearling	28	500	AD
1994		Yearling	31	500	LV
2001	Killala Lake	Yearling	20	500	RP
2003	Killala Lake	Yearling	20	500	AD
2005	Killala Lake	Yearling	17	350	LP
2007	Killala Lake	Yearling	21	350	RV
2009	Killala Lake	Yearling	45	250	LV
2011	Killala Lake	Yearling	20	350	RP
2013	Killala Lake	Yearling	25	350	AD
2015	Killala Lake	Yearling	30	350	LP
2017	Lake Manitou	Yearling	26	350	RV

Even though the lake had been actively managed by stocking for close to 40 years, the only information available was the original lake survey, conducted in 1977, before stocking was initiated. Therefore, surveys were done in 2017 to obtain current information on the status of the fish community and, more specifically, the Lake Trout population with a view to verifying or updating the management strategy for the lake.

Methods

Two netting protocols were employed. The Summer Profundal Index Netting (SPIN, Sandstrom and Lester 2009) protocol was used to assess the abundance and characteristics of the Lake Trout population. That information was supplemented by setting the small mesh nets (ON2) employed by the provincial Broad-scale Monitoring (BsM, Sandstrom et al 2015) program, to detect any previously undocumented species in the lake.

Overviews of the netting protocols are provided in Table 2 and 3. SPIN sets deviated from the protocol in that many nets crossed stratum boundaries due to the small size of the lake and individual strata.

A temperature and dissolved oxygen profile was collected in late summer.

Table 2 Overview of the SPIN netting protocol.

Season	Surface water greater than 18° C or 4-6 weeks of peak summer temp for northern systems
Set Durations	$SPIN_{(L2)}$ two hour (min); two hours twenty minutes (max) $SPIN_{(L18)}$ eighteen hours (min); twenty hours (max)
Gear Length	64m (8 mesh sizes x 8 m panels)
Mesh Series	2.25, 2.50, 2.75, 3.0, 3.5, 4.0, 4.5, 5.0 (stretch inch)
Set Orientation	Random
Depth	7 Strata (2-10m, 10-20m, 20-30m, 30-40m, 40-60m, 60-80m, 80+m)
Spatial Stratification	Effort equally distributed over entire lake
No. Samples per Lake	No. of Sets $SPIN_{(L2)}$ = 0.0184(Area >10m, ha) + 24 (max. 140) Minimum of three sets in non-core stratum and five in core stratum (10-40m)
No. Sets per Day	6, 9 or 12 sets
Target Biological Sample	n = 75+ lake trout
Overall Target CUE	Relative Standard Error = 0.15

Table 3 Overview of the BsM netting protocol (only small mesh nets were deployed in Forget Lake).

Sampling Season	Surface water temperature greater than 18°C
Set Duration	Large Mesh: min sixteen hours; max twenty two hours Small Mesh: min twelve hours; max twenty two hours
Gear Length	Large Mesh: 49.6m (8 mesh sizes per gang x 3.1m panels x 2 gangs) Small Mesh: 25.0m (5 mesh sizes per gang x 2.5m panels x 2 gangs) *with option for use of single gang net*
Gear Height	Large Mesh: 1.8m (option of 0.9m for 1-3m stratum) Small Mesh: 1.8m (option of 0.9m for 1-3m stratum)
Mesh Series	Large Mesh: 38, 51, 64, 76, 89, 102, 114, 127 (stretch mm) Small Mesh: 13, 19, 25, 32, 38 (stretch mm)
Mesh Order	Non sequential single series
Set Orientation	Perpendicular or oblique to contours
Depth Stratification	1-3m, 3-6m, 6-12m, 12-20m, 20-35m, 35-50m, 50-75m, >75m
Spatial Stratification	Effort equally distributed over entire lake
No. Samples per Lake	Varies with lake size and maximum depth
No. Sets per Day	Large Mesh: 4 or 6 double strap sets Small Mesh: 2 or 4 double strap sets

Results and Discussion

Field operations occurred between Aug 14 and 16, 2017. A total of 21, 2-hour single-gang SPIN sets were completed, which, considering the small size of the lake, thoroughly encompassed all areas and depths of the lake (Table 4). Fourteen Lake Trout and 15 Cisco were caught. The overall Lake Trout catch rate was 0.66/net. Because the nets were set atypically with regard to strata, no attempt was made to calculate stratum-weighted catch rates or to convert the catch rate to density or biomass estimates.

Ten, single-gang, small mesh ON2 sets were completed (Table 5). Net set depths conformed closely to BsM depth strata. Several nets were set parallel to shore to fit them into the steeply sloping strata. The catch consisted of five species (Table 6). Yellow Perch had not previously been documented to occur in the lake, though they are likely native but occur at a low density due to limited habitat and the presence of bass.

Table 4 Net set and catch summary, Forget Lake, SPIN, 2017.

Effort	Strata	Easting	Northing	Start Depth (m)	Mid Depth (m)	End Depth (m)	Set Time	Lift Time	Lake Trout	Cisco
1	2	586326	5011512	15.8	17.3	17.0	11:35	13:35		
2	2,3	586075	5011546	20.7	18.3	10.0	11:45	13:45	3	1
3	2,3	585814	5011711	13.9	23.5	23.5	12:00	14:30		3
4	1,2	585496	5012197	7.0	15.3	15.3	12:10	14:50	2	
5	1,2	585739	5012108	7.5	13.7	13.7	12:15	15:00		2
6	2,3	585932	5011877	10.2	18.7	18.7	12:20	15:10		
7	2	586242	5011441	12.0	16.7	17.2	13:45	15:45		2
8	3	585756	5011970	23.6	23.8	24.1	9:50	11:50		
9	2	586200	5011511	14.3	17.9	17.8	10:10	12:10		1
10	2,3	585795	5011692	10.3	18.8	23.1	10:40	12:40	2	
11	1	585672	5012151	6.6	8.1	9.2	10:50	13:10		
12	2,3	586030	5011564	10.2	18.2	22.0	11:15	13:20	1	5
13	2	586322	5011456	14.1	17.5	17.4	11:35	13:45		
14	1,3	585901	5012246	8.2	16.1	21.7	12:00	14:00		
15	1,3	585882	5011859	9.1	18.2	23.8	12:30	14:30	3	
16	2,3	585066	5011855	11.4	20.1	23.9	12:00	15:00		
17	3	585677	5012012	21.1	22.4	23.6	13:20	15:20		
18	1,2,3	585844	5011742	7.1	18.1	23.9	10:00	12:00	2	1
19	2	586121	5011611	17.1	20.1	20.1	10:10	12:20		
20	1,2,3	586001	5011616	6.0	16.5	22.6	10:30	12:30		
21	1,2,3	585982	5011747	6.4	17.4	24.0	10:45	12:50	1	

Table 5 Net set summary, Forget Lake, ON2 nets, 2017.

Effort	Easting	Northing	Start Depth (m)	End Depth (m)	Set Date	Set Time	Lift Date	Lift Time	Comments
1	586136	5011439	5.1	5.4	08/14/2017	16:05	08/15/2017	10:00	Parallel
2	585930	5011579	7.1	11.9	08/14/2017	16:17	08/15/2017	10:00	
3	586053	5011666	16.9	21.4	08/14/2017	16:25	08/15/2017	11:00	
4	585487	5012150	5.7	5.4	08/14/2017	16:35	08/15/2017	10:45	Parallel
5	586349	5011574	1.9	3.0	08/14/2017	16:45	08/15/2017	10:30	
6	585826	5011979	20.0	23.0	08/15/2017	14:50	08/16/2017	10:15	
7	585891	5012067	8.0	11.1	08/15/2017	15:00	08/16/2017	10:30	Parallel
8	585557	5011947	5.1	4.5	08/15/2017	15:30	08/16/2017	10:45	Parallel
9	586254	5011401	7.2	11.3	08/15/2017	13:40	08/16/2017	11:00	
10	586270	5011485	17.1	18	08/15/2017	13:50	08/16/2017	11:10	

Table 6 Catch summary, Forget Lake, ON2 nets, 2017.

Effort	Lake Trout	Cisco	Rock Bass	Smallmouth Bass	Yellow Perch
1			3		1
2	1	6			
3		3			
4					
5	1		1		
6		1			
7		4			
8			1	2	
9		2			
10		5			
Total	2	21	5	2	1

The Lake Trout ranged from 268-400 mm FL (Table 7). All had hatchery fin clips; no naturally reproduced fish were caught. Based on fin clips, the inferred ages ranged from 3 to 13 years old (the size of the two largest fish recorded to have LP clips were smaller than would be expected for their inferred age and may have been recorded incorrectly).

The cisco ranged from 239 to 270 mm and averaged 253 mm FL in the SPIN nets and 167 to 350 mm with an average of 231 mm in the ON2 nets. (Table 8).

Table 7 Characteristics of Lake Trout, sorted by fork length, Forget Lake, SPIN and ON2, 2017. 'ON' in effort field indicates small mesh gear.

Effort	Fork Length (mm)	Round Weight (g)	Fin Clip	Year Most Likely Stocked	Inferred Age (years)	Sex	Gonad Condition
15	268		LP	2015	3		
15	274	170	LP	2015	3		Unknown
4	321	310	AD	2013	5	M	Unknown
15	321		AD	2013	5		
18	323	290	AD	2013	5		Unknown
10	326	320	AD	2013	5	F	Undeveloped
12	327	320	AD	2013	5	M	Unknown
ON-5	329	350	AD	2013	5	M	Undeveloped
10	330	330	AD	2013	5	F	Undeveloped
2	350	430	AD	2013	5	M	Undeveloped
2	356	430	AD	2013	5	M	Undeveloped
4	360	400	LP	2005?	13?	F	Developing
2	360	430	RP	2011	7	M	Undeveloped
ON-2	370	440	RP	2011	7	M	Undeveloped
18	396	600	LP	2005?	13?		Unknown
21	400	640	RP	2011	7	F	Developing

Table 8 Fork lengths of Cisco, Forget Lake, SPIN and ON2, 2017.

SPIN	ON2
239	167
240	168
240	172
246	172
249	173
250	176
250	182
252	240
254	241
255	246
256	248
261	250
267	251
267	251
270	251
	252
	255
	264
	269
	272
	350
Mean	Mean
253	231

In mid-September, the lake was thermally stratified with a well-defined thermocline occurring from about 6 to 10 m deep (Figure 1). As often occurs in lakes with high water clarity, the dissolved oxygen concentration increased through the thermocline. Dissolved oxygen levels declined to close to zero at the bottom. Useable (<15 C and >4 mg/l) and optimal (<10 C and > 6 mg/l) Lake Trout habitat occurred from 7-17 m and 9-13 m deep, respectively, representing 39 and 19% of lake volume, respectively.

Depth (m)	Temp. (C)	D.O. (mg/L)
0.5	21.2	9.3
1	21.3	9.2
2	20.9	9.4
3	20.6	9.4
4	19.8	9.7
5	18.9	9.5
6	18.0	9.6
7	15.1	12.7
8	11.0	12.8
9	9.1	11.1
10	7.5	8.9
11	6.5	7.4
12	5.7	7.0
13	5.2	6.8
14	4.8	5.9
15	4.5	5.4
16	4.4	4.9
17	4.3	4.2
18	4.2	3.1
19	4.2	1.7
20	4.3	0.7
21	4.3	0.1

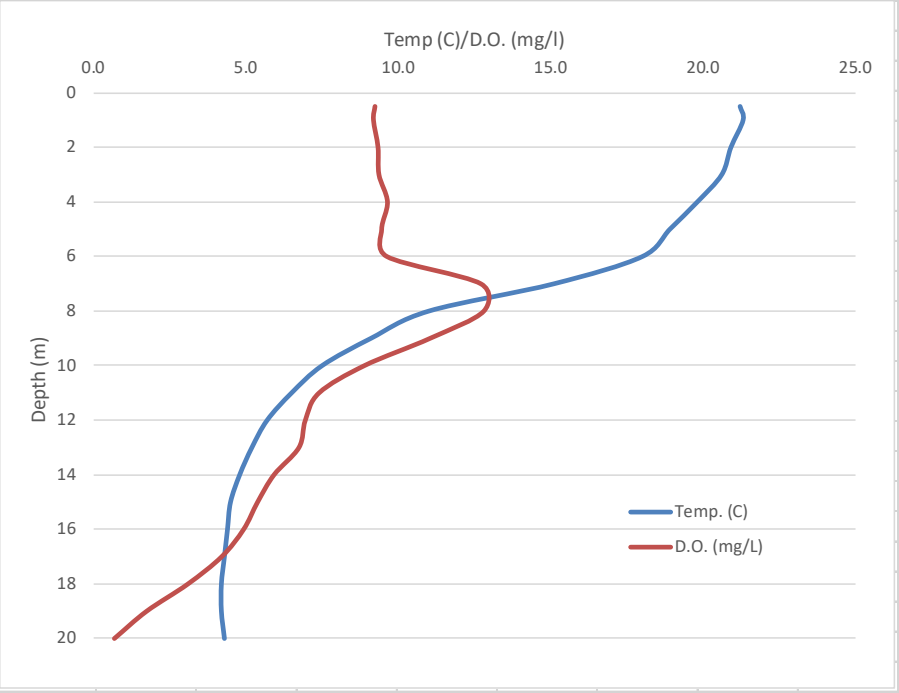


Figure 1 Temperature and dissolved oxygen profile, Forget Lake, Sept 20, 2017.

The catch rate of Lake Trout observed in the SPIN net sets was moderate and about what would be expected based on the amount and quality of habitat in the lake and the presence of Cisco. The population was dominated by small, fairly young fish that are growing fairly slowly. With Cisco being present, it would be expected that larger, fast-growing fish that feed on Cisco would be present. It may be that they are present, but their abundance is low and therefore, not likely to be caught in short duration sets. The presence of Cisco, and Bass represent competition for food in a small unproductive waterbody and may explain the small observed average size.

Compared to other Lake Trout lakes in Parry Sound District, Forget Lake is among the smallest, though for its size it has above average dissolved oxygen (Figure 2) and proportions of useable and optimal habitat due to the relatively high mean depth and high water clarity.

No information is available on the Lake Trout fishery. Anecdotally, it is limited, but the lake is very small and could only sustain a small amount of total effort.

Alternatives to the current management prescription include managing for natural reproduction, continuing to stock Lake Trout on a put-grow-take basis and possibly modifying the prescription or discontinuing management for Lake trout and either not stocking at all or stocking another species.

No evidence of natural reproduction was observed, which was not surprising given the lack of any historical presence. It is also a very small lake. Lakes of its' size can support reproducing populations, but they tend to be lakes with simple fish communities that do not include bass or Cisco. Forget Lake is also directly adjacent to Blackstone Lake and Crane Lake which, despite their large size and apparent abundance of Lake Trout habitat, also do not support any historic or current reproduction. The reason for that hasn't been determined but may be related to an anomalous aspect of its' water clarity where visibility in deep water is poor despite a fairly high Secchi depth. It is possible that phenomenon occurs in

Forget Lake as well. Either way, there doesn't seem to be a prospect for successfully managing the lake for natural reproduction.

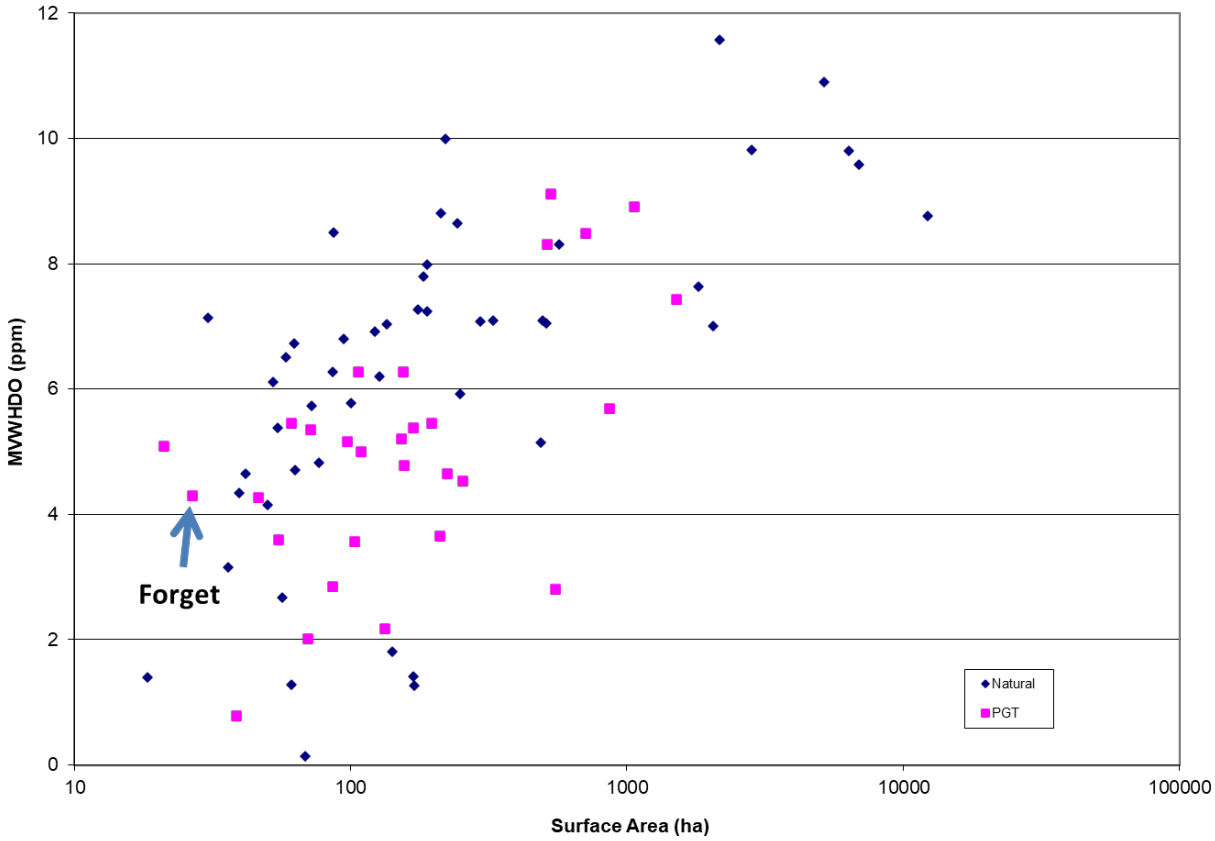


Figure 2 Scatter plot of surface area (ha) and mean volume-weighted hypolimnetic dissolved oxygen (MVWHDO, mg/l) concentration of Lake Trout Lakes, by management designation (natural, put-grow-take), Parry Sound District.

Because of its' small size the lake can only support a nominal amount of effort and in that sense may not be worth continuing to stock on a PGT basis. Other natural and stocked Lake Trout fisheries are located nearby that can sustain much more fishing effort. However, Forget Lake does provide an opportunity for fishing in a small lake with minimal development and may be attractive to some anglers for that reason. The draft FMZ 15 management plan contains recommendations for more restrictive management of natural lakes, which may result in increased interest in stocked lakes in the area in the future, so ongoing stocking of Lake Trout (or another species) is justifiable at least until the impact of the regulation change on angler behaviour is better understood.

The main options for adjusting the current stocking prescription are to change the number and/or size of fish stocked. As deep water nursery habitat is low in supply, stocking a larger life stage, such as fall yearling or two year old's might improve survival and density somewhat, though based on the observed

growth rate, even larger fish would be required to escape what may be a bottle neck for small fish. Stocking more fish doesn't appear to offer much promise as it may only serve to increase competition.

A final option is to stock a species other than Lake trout. Splake is the obvious alternative. The stocking of fall yearlings into lakes with bass has improved Splake fisheries in some lakes in recent years. The presence of Cisco though seems to be a factor that results in slow early growth and possible lower survival. So overall, it is questionable whether Splake would provide a better fishery than Lake Trout. Trial stocking for a couple of cycles might provide some insight.

In summary, Forget Lake supports a modest Lake Trout population that is supported entirely by PGT stocking. The presence of bass and Cisco are probably important constraints on the productive potential of the Lake trout population, especially given the very small size of the lake. It is recommended that stocking continue. If Lake Trout are stocked, larger fall yearling or 2-year-old fish could be tried to possibly overcome nursery habitat and early growth limitations. Alternatively, Splake could be stocked on a trial basis. Again, larger life stages (fall yearlings) should be stocked. In either case, monitoring should be done to ensure the most effective and cost-effective strategy is being employed.

Acknowledgements

Clifford Vankoughnett led the field work and data compilation.

References

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