Results of a Summer Profundal Index Netting (SPIN) Survey Conducted on Shoe Lake in 2012

File Report

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Shoe Lake is a small (39 ha) lake located in Ridout Township. It is moderately deep (Z_{max}= 16 m, Z_{mean} = 6 m) and is an oligotrophic lake with high water clarity and low nutrient levels (Secchi depth = 5.2 m, TP = 5.9 ug/l, 2000-2011, MOE 2011) (Figure 1).

Shoe Lake appears to not have supported any native sport fish populations; field notes from 1927 state “no trout ever seen in lake”. Stocking of lake trout and brook trout began in the 1940’s and continued until 1966. Rainbow trout were stocked two times, in 1987 and 1989. There is no documentation of why stocking was discontinued, but it seems likely to have been due to limited catches by anglers and in the case of brook trout, the presence of a competing species, yellow perch.

Lake trout stocking began again in 1994 and continued to 2010, with typical stocking of about 300 fish occurring every second year (Table 1). In 1999 the angling season for lake trout fishing changed to open all year, in recognition that the population was being supported solely by artificial stocking. In 2006, the lake was formally designated for management of a put-grow-take trout population (OMNR 2006). Since stocking was re-started no information has been available on the status of the lake trout population or the fishery.

A Summer Profundal Index Netting (SPIN) survey was conducted in 2012 to obtain information on the current status of the lake trout population. Angler spot checks were also done in the winter of 2012 (file data).

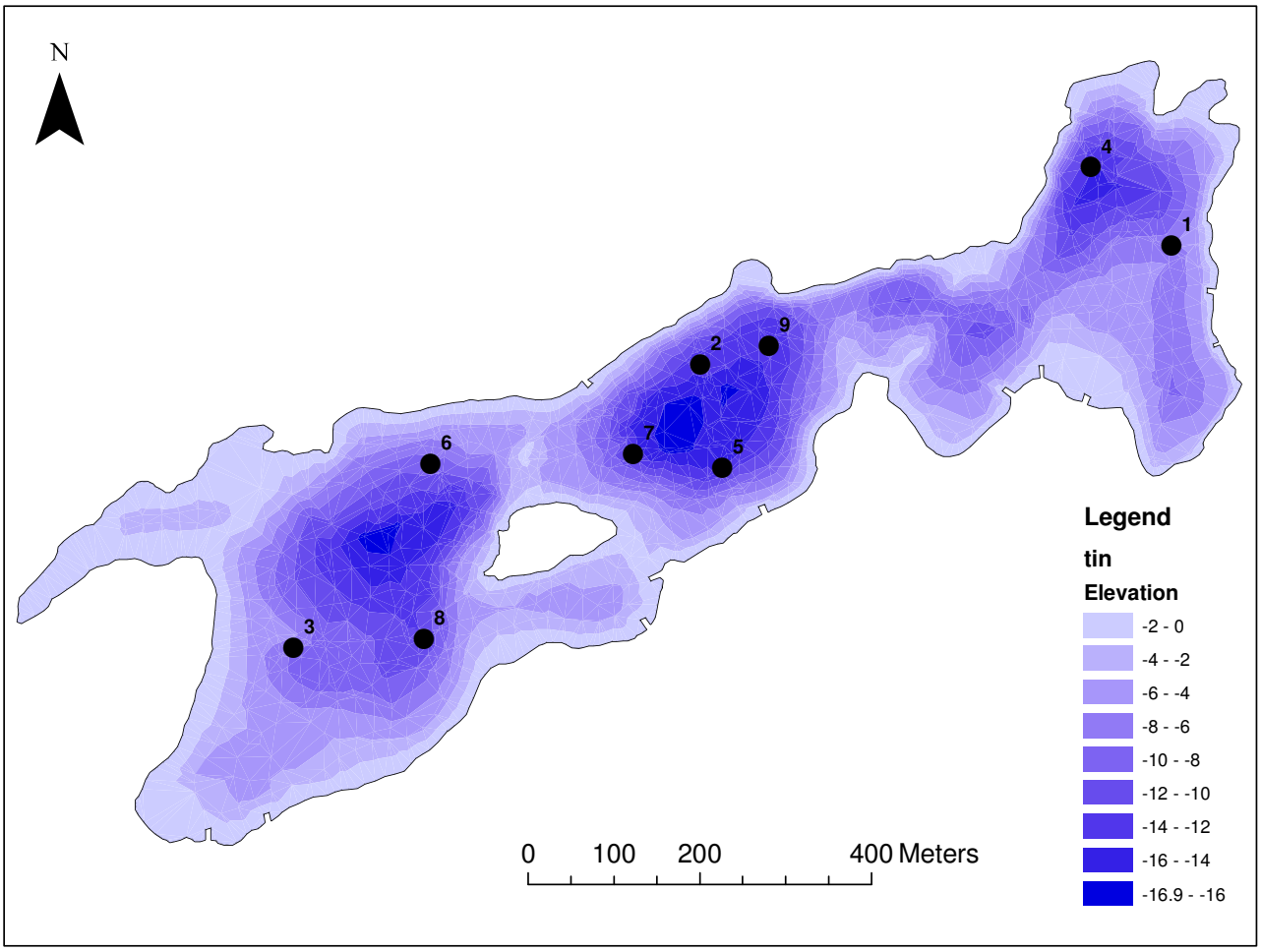


Figure 1 Map of Shoe Lake showing bathymetry and net set locations, 2012.

Table 1 Stocking history, Shoe Lake, 1994-2012.

Year	Number	Fin Clip
1994	300	left ventral
1996	300	
1998	300	
2000	300	left pectoral
2002	300	right ventral
2004	300	left ventral
2006	1000	right pectoral
2008	300	adipose
2010	200	left pectoral

Methods

The SPIN protocol was followed (Sandstrom and Lester 2007). Gear consisted of gangs of eight panels of clear mono-filament gill net; each panel was 1.8 m high and 8.0 m long. Panel mesh sizes were 2.25 2.50 2.75 3.00 3.50 4.00 4.50 and 5.0 inch stretch measure, randomly arranged. Net sets consisted of single-gang straps due to the small size of the lake. Nets were set non-randomly in the areas and depths where lake trout were thought to be most likely to be caught. Nets were set for two-hour periods.

A temperature and dissolved oxygen profile was collected to determine the depth of the thermocline at the time of netting and bathymetric data was collected.

Results and Discussion

Netting occurred on July 13, 2012. At the time of netting the thermocline was well defined and occurred from approximately 5 to 10 m deep (Table 2). Useable lake trout habitat (defined as water less than 15 ^{o}C with greater than 4 mg/l of dissolved oxygen) was present from about 6 to 14 m deep.

Table 2 Temperature and dissolved oxygen profile, Shoe Lake, July 13, 2012.

Depth (m)	Temp. (oC)	D.O. (mg/l)
0.5	26.5	7.7
1	25.9	7.8
2	25.7	7.8
3	25.4	7.7
4	25.1	7.9
5	21.0	10.5
6	16.4	10.6
7	13.7	10.2
8	12.2	10.7
9	10.4	11.3
10	9.4	10.8
11	8.0	7.7
12	7.4	6.0
13	6.7	4.6
14	6.5	3.4
15	6.1	2.2
16	6.0	1.0

A total of nine net sets were completed (Table 3, Figure 1); four in the deepest central basin, three in the west and two in the shallower east basin.

Table 3 Net set details, Shoe Lake, 2012.

Effort	Easting	Northing	Set Date	Set Time	Lift Time	Depth Start	Depth Mid	Depth End
1	664771	5008424	13-Jul-12	10:35	12:35	6	7	8
2	664222	5008285	13-Jul-12	11:11	13:10	6	11	14
3	663748	5007955	13-Jul-12	11:25	13:26	6	8	9
4	664677	5008515	13-Jul-12	11:40	13:40	8	11	14
5	664248	5008165	13-Jul-12	12:00	14:00	6	13	16
6	663908	5008169	13-Jul-12	12:20	14:20	6	9	12
7	664144	5008181	13-Jul-12	12:45	14:45	6	10	16
8	663900	5007965	13-Jul-12	13:25	15:25	8	12	12
9	664302	5008307	13-Jul-12	13:35	15:35	10	13	14

No fish were caught in the nets. Several smallmouth bass were observed along the shoreline, the first documentation of this species in the lake.

The SPIN methodology samples large-bodied species that live in and below the thermocline in the summer. Warm water species such as bass are not typically captured other than as incidental catches. The total amount of netting effort expended during this survey was low, but relative to the very small amount of lake trout habitat, was enough to have detected the presence of a significant lake trout population. Undoubtedly there are some lake trout in the lake but their abundance is very low, despite regular stocking occurring since 1994.

The unauthorized introduction of smallmouth bass is a negative development in terms of the potential survival and growth of lake trout. In a small, clear, relatively shallow, unproductive lake such as Shoe Lake smallmouth bass typically dominate the fish community; outcompeting trout for the limited prey and possibly directly depredating small trout.

The modest depth of the lake results in low levels of dissolved oxygen in the deep waters of the lake by late summer (Figure 3). The volume-weighted hypolimnetic dissolved oxygen (VWHDO) concentration has averaged less than 1 ppm (n=4). A criterion of 7 ppm has been established; at VWHDO values progressively less than 7 ppm, lakes typically have a lower ability to support a self-sustaining and ultimately any population of lake trout. A value of less than 1 ppm indicates an extremely limited ability to support lake trout. This natural limitation prevents even regular stocking from establishing a significant lake trout population. Shoe Lake has among the smallest amount of lake trout habitat of the lake trout lakes in MNR's Parry Sound District (Figure 4).

The purpose of put-grow-take stocking is to provide angling opportunities. The source of these anglers can vary from local residents to destination anglers from a broader area. Spot checks done in the winter of 2012 indicate that the lake is receiving minimal winter fishing pressure by a small number of local residents largely due to convenience and stocking is not attracting anglers from elsewhere. The netting survey crew spoke to several residents who reported that lake trout are occasionally caught; a cabin on Crozier Island apparently has a list of lake trout caught by users over the years. One resident reported that historically he would catch one or two trout in a season but that the catch rate has declined since bass have become established.

The presence of very little habitat, a limited fishery that isn't attracting anglers and the introduction of smallmouth bass lead to a conclusion that Shoe Lake should be no longer managed for lake trout. It is recommended that stocking be discontinued, the all year open season regulation be rescinded and the Shoe Lake be formally removed from the list of designated lake trout lakes.

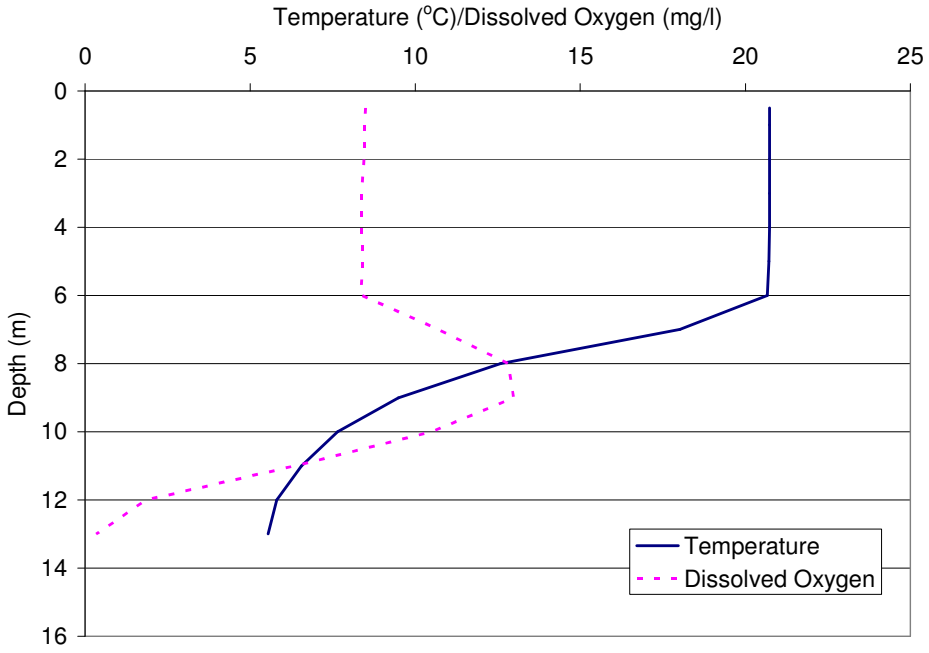


Figure 3 Temperature and dissolved oxygen profile, Shoe Lake, September 11, 2007. Dissolved oxygen less than 4 ppm and temperature greater than 15 °C is considered not useable by lake trout.

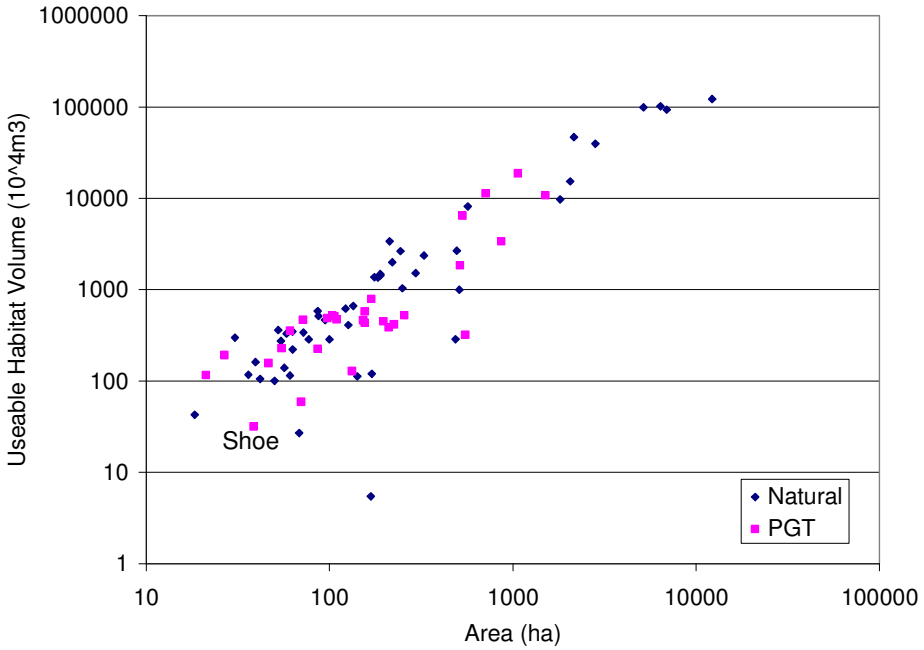


Figure 4 Comparison of surface area and volume of late summer useable lake trout habitat (<15 C and >4 mg/l oxygen) for designated natural and put-grow-take (PGT) stocked lakes in MNR's Parry Sound District.

References

MOE, 2011. Lake Partner program raw data.

OMNR. 2002. Guidelines for stocking fish in inland waters of Ontario. Fisheries Section, Fish and Wildlife Branch, Ontario Ministry of Natural Resources, Peterborough. 44p p.

OMNR, 2006. Inland Ontario lakes designated for lake trout management. Ontario Ministry of Natural Resources, Fisheries Section, Fish and Wildlife Branch. Peterborough.

Sandstrom, S. J. and N. Lester. 2007. Summer Profundal Index Netting Protocol; a Lake Trout Assessment Tool. Ontario Ministry of Natural Resources. Peterborough,Ontario. Version 2007.2. 25 p. + appendices.