Results of a Summer Profundal Index Netting Survey Conducted on Clear Lake in 2010

File Report

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Clear Lake is a medium sized (197 ha) lake located in Humphrey Township. It is relatively deep (Z_{max}= 47 m, Z_{mean} = 20 m) for its size and is an oligotrophic lake with high water clarity and low nutrient levels (Secchi depth = 7.0 m, TP = 3.7 ug/l, 1997-2008, MOE 2008) (Figure 1). It is designated for the management of a naturally reproducing lake trout population (OMNR 2006).

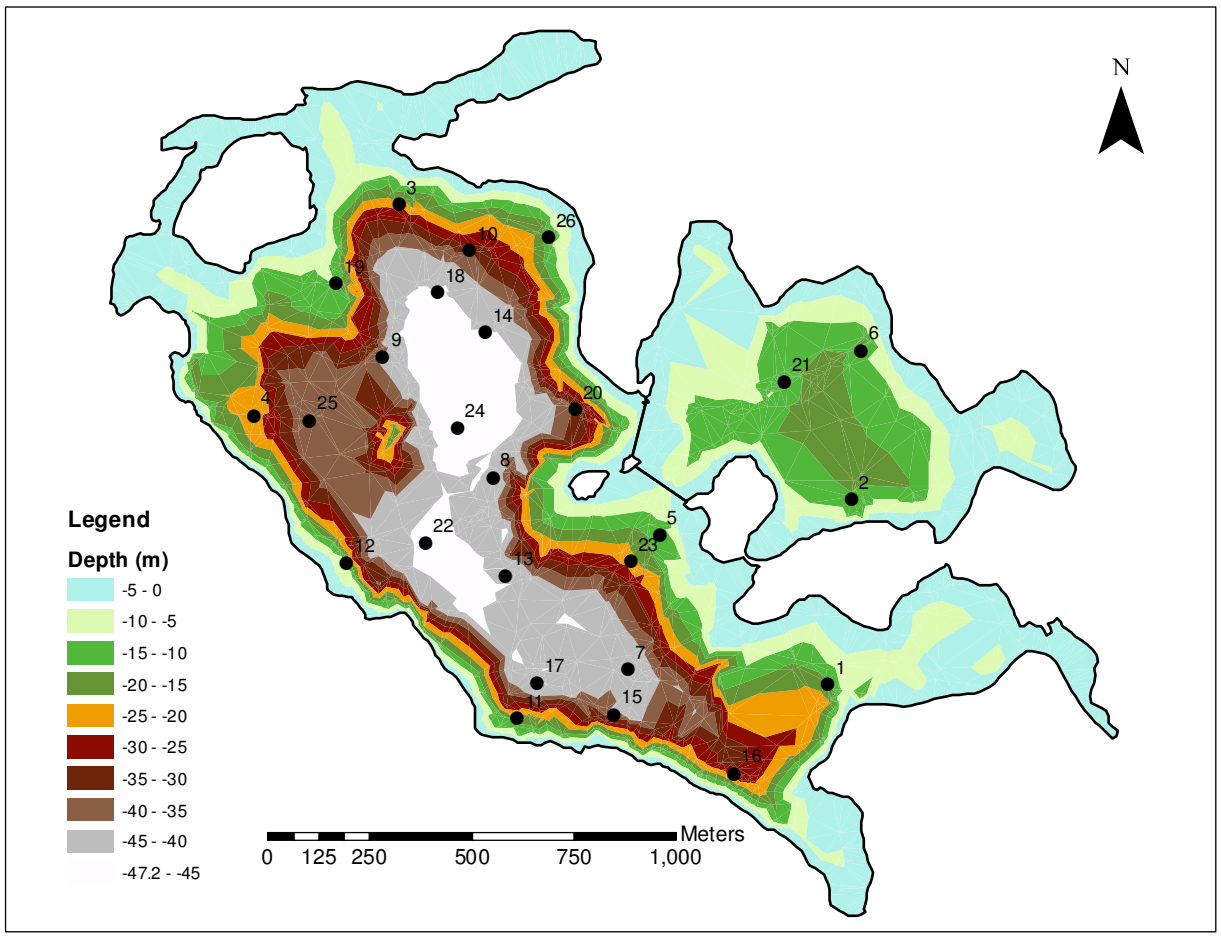


Figure 1 Map of Clear Lake showing bathymetry and net set locations, 2010.

The lake trout population is native to the lake, although supplemental stocking occurred periodically from 1942 to 1988. Other major fish species occurring in the lake include lake whitefish, cisco and smallmouth bass. The bass are probably introduced (first planted in 1939).

The current angling regulations for lake trout include an open season from Jan. 1 to Sept. 30 and a catch and possession limit of two fish, none which may be between 40 and 55 cm total length. Only one line may be used when angling through the ice. This regulation was enacted in the mid 1990's.

Studies done of the lake trout population include assessment netting in 1976/77 (Thurston 1977) and 1989 (Deary Environmental Consultants 1989), spawning observations in 1993 (McAughey 1993) and Spring Littoral Index Netting in 1994 (unpubl. file data). Temperature and dissolved oxygen profiles are collected on a regular basis.

A Summer Profundal Index Netting (SPIN) survey was conducted in 2010 to obtain information on the current status of the lake trout population.

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 is 1.8 m high and 8.0 m long. Panel mesh sizes are 2.25 2.50 2.75 3.00 3.50 4.00 4.50 and 5.0 inch stretch measure, randomly arranged. Net sets generally consist of straps of two gangs, tied together; however for this survey single gangs were used due to the relatively small size of the lake. Nets were set in 10 m depth strata, starting at 10 m deep (10-20, 20-30 30-40, and >40 m), with the number of sets proportional to the area in each stratum. Nets were set for two-hour periods.

Captured fish had standard biological attributes measured. A fin punch was collected for potential future genetic analysis and tissue was collected from mortalities for contaminant analysis.

Partial temperature and dissolved oxygen profiles were collected to determine the depth of the thermocline at the time of netting.

Results and Discussion

Netting occurring on July 15, 16 and 22, 2010. At the time of netting the thermocline was fairly weekly defined and occurred from approximately 8 to 14 m deep in both basins (Table 1). In the main basin (1) dissolved oxygen levels remain high throughout the water column throughout the summer (file data). In the secondary basin dissolved oxygen declined rapidly to close to zero, below the thermocline.

Table 1 Temperature and dissolved oxygen profiles, Clear Lake, July 15, 2010.

Station 1			Station 2		
Depth	Temp. (℃)	D.O. (mg/L)	Depth	Temp. (℃)	D.O. (mg/L)
0.5	25.1	8.8	0.5	25.2	8.7
1	25.1	8.8	1	25.2	8.7
2	25.1	8.8	2	25.2	8.8
3	25.0	8.8	3	25.0	8.8
4	25.0	8.8	4	24.8	10.0
5	22.4	10.1	5	23.5	9.8
6	21.1	10.3	6	22.2	10.0
7	20.4	10.6	7	21.4	10.1
8	18.6	11.7	8	18.3	12.3
9	15.5	12.9	9	16.3	12.6
10	13.6	13.0	10	14.7	12.8
11	12.2	13.2	11	14.0	12.8
12	11.1	13.4	12	12.6	13.3
13	10.1	13.4	13	11.2	12.1
15	8.4	13.6	14	10.7	10.7
17	6.3	12.9	15	10.1	4.4
19	5.6	11.5	16	9.7	0.5

Station 1 was not sampled to bottom - only deep enough to determine depth of thermocline.

A total of 26 net sets were completed (Table 2, Figure 1); twenty 23 in the main basin and three in the secondary basin on the east side of the lake. In the main basin, six sets were in the 10-20 m stratum, four in 20-30 m, five in 30-40 m and eight greater than 40 m deep. All three sets in the secondary basin were set in the 10-15 m depth range as the dissolved oxygen level was too low to support lake trout deeper than 15 m.

Table 2 Net set details, Clear Lake, 2010.

Effort	Date	Gear	Gear Use	Area	Zone	Easting	Northing	Depth (start) (m)	Depth (mid) (m)	Depth (end) (m)	Set Time	Lift Time
1	15-Jul-10	1	1	1	17	595128	5012208	14	18	20	11:00	13:00
2	15-Jul-10	1	1	2	17	595187	5012663	11	14	15	11:20	13:20
3	15-Jul-10	1	1	1	17	594078	5013387	23	25	26	11:40	13:40
4	15-Jul-10	1	1	1	17	593723	5012869	20	22	25	12:00	14:05
5	15-Jul-10	1	1	1	17	594717	5012575	11	16	15	13:15	15:12
6	15-Jul-10	1	1	2	17	595209	5013028	11	14	15	13:40	15:25
7	16-Jul-10	1	1	1	17	594641	5012242	44	44	44	9:40	11:40
8	16-Jul-10	1	1	1	17	594309	5012716	40	43	45	10:00	12:04
9	16-Jul-10	1	1	1	17	594038	5013012	32	39	42	10:20	12:25
10	16-Jul-10	1	1	1	17	594250	5013272	32	34	37	10:40	12:48
11	16-Jul-10	1	1	1	17	594368	5012123	14	15	17	11:00	13:02
12	16-Jul-10	1	1	1	17	593949	5012506	10	12	16	11:20	13:25
13	16-Jul-10	1	1	1	17	594338	5012474	45	44	44	12:00	14:00
14	16-Jul-10	1	1	1	17	594288	5013071	45	45	45	12:20	14:20
15	16-Jul-10	1	1	1	17	594604	5012135	34	37	41	12:45	14:45
16	22-Jul-10	1	1	1	17	594900	5011989	23	27	28	9:20	11:21
17	22-Jul-10	1	1	1	17	594415	5012211	42	44	44	9:40	11:48
18	22-Jul-10	1	1	1	17	594172	5013170	44	45	45	10:00	12:10
19	22-Jul-10	1	1	1	17	593923	5013193	10	14	18	10:20	12:25
20	22-Jul-10	1	1	1	17	594509	5012883	31	34	36	10:40	12:44
21	22-Jul-10	1	1	2	17	595021	5012950	10	12	14	11:00	13:02
22	22-Jul-10	1	1	1	17	594145	5012555	45	45	45	11:18	13:22
23	22-Jul-10	1	1	1	17	594645	5012511	21	23	25	11:40	13:41
24	22-Jul-10	1	1	1	17	594222	5012838	45	46	46	12:07	14:09
25	22-Jul-10	1	1	1	17	593858	5012856	36	37	38	12:22	12:25
26	22-Jul-10	1	1	1	17	594444	5013307	11	12	13	12:40	14:40

A total of 17 lake trout were caught in nine different net sets (Table 3). No other fish species were caught. All trout were caught in the main basin; none in the secondary basin.

The area weighted, net selectivity corrected, catch per unit effort was 0.80 (std. dev. 1.07) lake trout (>30 cm FL) per net set (Figure 2). Using the conversion equation for large-bodied lake trout populations, the estimated population size was 392 lake trout (161-629, 68% prediction interval) or 3.6 lake trout/ha of water greater than 10 m deep in the main basin.

The lake trout ranged in fork length from 287 to 623 mm and averaged 445 mm (std. err.: 19) (Table 4). Ages ranged from 6 to 19 years old, averaging 10.4 (std. err.:0.8). The lengths of 13 of 17 (76%) lake trout were within the protected slot size (40-55 cm TL, or ~36-50 cm FL).

Table 3 Catch summary and biological attributes of lake trout, Clear Lake, 2010.

Effort	Mesh Size (inches)	Species	Fish	Fork Length (mm)	Round Weight (g)	Age (years)	Clip	Fate	Sex	Gonad Code	Stomach Contents
1											
2											
3	3.00	81	1	466	960	9	NC	D	2	21	0
4	3.75	81	2	378	540	8	NC	D	1	10	cisco (~100mm)
5											
6											
7	2.75	81	3	623	3000	16	NC	RG	9	99	
7	2.25	81	4	287	210	6	NC	RP	9	99	
7	3.00	81	5	472	1100	8	NC	D	2	22	
8	3.00	81	6	424	700	9	NC	RP	9	99	
8	4.00	81	7	460	1200	9	NC	RP	9	99	
9	2.75	81	8	410	700	8	NC	RG	9	99	
10											
11	3.00	81	9	393	570	10	NC	D	1	10	0
12											
13											
14											
15	2.75	81	10	394	590	8	NC	D	1	10	
16	2.50	81	11	490	1400	11	NC	D	1	22	cisco (2)
16	2.75	81	12	377	510	8	NC	D	2	10	0
16	4.00	81	13	460	1100	9	NC	RG	9	99	
16	3.00	81	14	510	1800	19	NC	D	1	22	rock bass, cisco, sculpin
17	4.50	81	15	570	2300	14	LP	D	1	22	0
18											
19											
20											
21											
22											
23											
24											
25											
26	2.75	81	16	410	670	15	NC	D	2	10	
26	3.50	81	17	440	700	10	NC	RG	9	99	

Note: Clip: NC: no clip, LP: left pectoral
Fate: D:dead in net, RG: released good health, RP: released poor health
Sex: 1: male, 2: female, 9: unknown
Gonad: 10: undeveloped; 21: dormant, 22: developing, 99:unknown

Table 4 Descriptive statistics for lake trout, Clear Lake, 2010.

	Fork Length (mm)	*Round Weight (g)*	*Age (years)*
Mean	445	1062	10.4
Standard Error	19	175	0.8
Median	440	700	9
Mode	460	700	8
Standard Deviation	78	720	3.5
Minimum	287	210	6
Maximum	623	3000	19
Count	17	17	17

SUMMER PROFUNDAL INDEX NETTING REPORT

Lake: Clear (Basin 1 only) | Office: Bracebridge | Target Sp: Lake Trout | SPIN

Date: 2010 (Year) 7 (Month) | Total Area: | Sampled Area: 109 | TDS:

Using Large Body Conversion

Area Wt. Selectivity Adj Values	Total Catch	Arith CUE	Arith Stdev	Arth RSE
Lake Trout >=300 and <=800mm	18	0.80	1.07	0.28

Density (ha)	Pop Est	Low Est	Upper Est	Pred. Level
3.6	392	161	629	68%

Sel. Corr. Length Summary (mm)

	Mean	Std
Total Catch	436	77
For LT >300	456	69

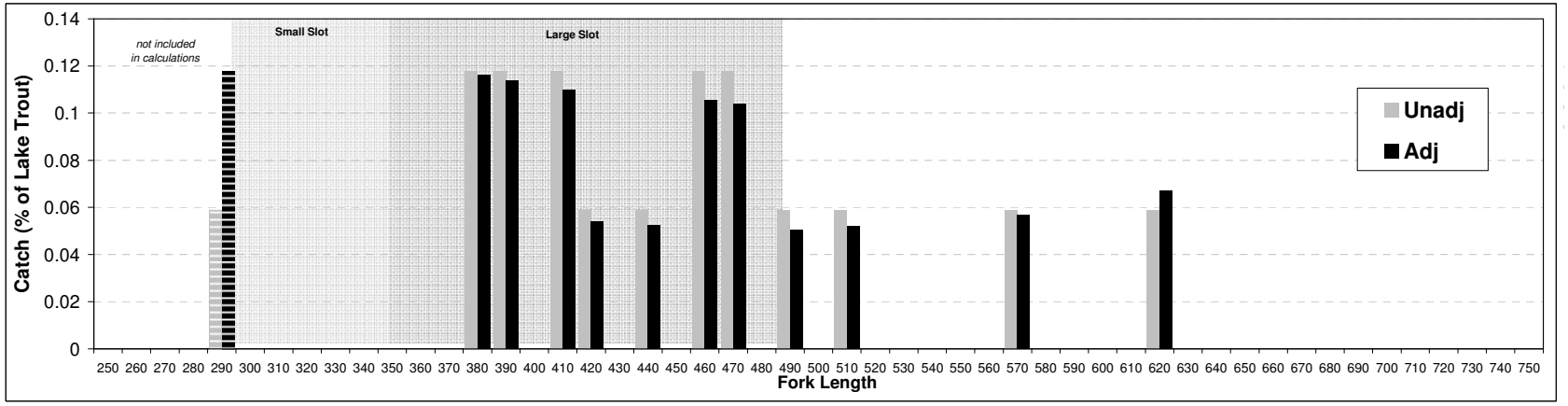
Stratum Info	Sites #	Total # Nets	% Sites	% Samp Area	Tot Catch #	Tot Catch %	Mean CUE	Std	RSE
Stratum 1 (3-10m)	0	0			0				
Stratum 2 (10-20m)	6	6	26%	23%	3	19%	0.54	0.90	0.68
Stratum 3 (20-30m)	4	4	17%	21%	7	37%	1.63	1.84	0.57
Stratum 4 (30-40m)	5	5	22%	24%	2	13%	0.44	0.61	0.61
Stratum 5 (40-60m)	8	8	35%	32%	6	32%	0.70	1.03	0.52
Stratum 6 (60-80m)	0	0			0				
Stratum 7 (80+m)	0	0			0				
Total	23	23	100%	100%	18	100%			
				actual	16				

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

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

Power Observed:
Power Desired: 80%
Change Detectable: 20%
Sets Required (n=): 203

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



% zero S1	
% zero S2	67%
% zero S3	25%
% zero S4	60%
% zero S5	63%
% zero S6	
% zero S7	
Area Wt % zero	55%

Report generated with ver. 8.78

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Figure 2 Summer Profundal Index Netting analysis report, Clear Lake, 2010.

Clear Lake provides very good habitat for lake trout. The high mean depth relative to the size of the lake, high hypolimnetic dissolved oxygen and high water clarity combined provide deep water nursery habitat capable of supporting a productive self-sustaining population. Netting results indicate the lake trout population density is moderately high and all but one of the lake trout was naturally reproduced, as indicated by the absence of a hatchery fin clip. In the absence of stocking the population is maintaining itself at a reasonable density. The approach of managing the lake for a self-sustaining lake trout population should be continued and supplemental stocking should not be done.

It is not possible to make any conclusions regarding trends in the size of the lake trout population due to the different methods used in the various assessments; however some comparisons can be made. In 1994, five of eight lake trout were stocked and in 1989 four of five were stocked whereas in 2010 all but one trout was naturally reproduced. Past stocking practices were likely impacting the native population by increasing competition for resources and by attracting additional angling pressure. The absence of stocked fish and the restrictive angling regulation has allowed the natural population to return to its full potential.

The netting method used specifically targets lake trout, but other species commonly associated with lake trout are also vulnerable, such as lake whitefish and cisco. Neither species were caught in the nets, but small cisco were observed in the stomach contents of three lake trout. The absence of lake whitefish indicates that the population abundance is low or non-existent. None were caught in the 1989 or 1994 assessments. The only documentation of them is two fish in 1953 and one in 1969.

The common occurrence of cisco in the stomachs suggests that cisco are relatively common in the lake. If the cisco are of a small average size, as were those found in the stomachs, they may not be very vulnerable to the meshes sizes in the SPIN nets. A large number (272) were caught in the 1989 assessment but there is no record of their size. Most were caught in 1.5 and 2.0 inch mesh, smaller than the smallest mesh in the SPIN nets.

Anecdotal reports in the file suggest that there may be movement of lake trout between Clear, Little Whitefish and Whitefish Lake. Although there is no evidence that this is the case, it is possible as the lakes are connected by navigable channels. It would be of interest, through tagging or telemetry, to determine if significant movement is occurring as there could be implications for how the three lakes are collectively managed. Tags were applied to several of the lake trout that were released but the number was too small to expect any returns.

A large proportion of the fish caught fell within the protected slot size range. Despite the presence of cisco, the growth potential of individual fish is limited and it takes fish many years to grow larger than the slot size, if they ever do. The regulation is protecting the population, but is so restrictive that few fish can be harvested. This has led to what, anecdotally, is believed to be fairly low fishing effort as people are choosing to not fish the lake because of the limited harvest opportunities. Given that the lake trout population appears to be relatively healthy, if not highly abundant, consideration could be given to implementing a regulation that would allow a greater proportion of lake trout to be harvested. Such a change would have to be coordinated with a review of regulations on other lake trout lakes in FMZ 15.

References

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