Wahwashkesh Lake – South Basin
2004 Spring Littoral Index Netting (SLIN) Report

Eric McIntyre
Parry Sound Area Fisheries Biologist

December, 2004



Wahwashkesh Lake – Lake Trout, Spring 2004

Executive Summary:

In 2004, a *Spring Littoral Index Netting (SLIN)* was conducted on the south basin of Wahwashkesh Lake to assess the status of the lake trout population. It replicates a similar SLIN survey conducted in 1997 that raised concerns regarding poor lake trout recruitment.

From 30-short duration, fine-mesh gill net sets we captured 23 lake trout for a *Catch-Per-Unit-Effort (CPUE)* of 0.77 ± 0.36 ($p < 0.05$) lake trout per net set. All lake trout captured were adult fish, averaging 62.2 cm (24 ½") in fork length and 3.347 kg (7.4 lbs). Catch and size sampling data was almost identical to that observed in the 1997 survey. According to Provincial 'benchmarks' discussed in the report, relative abundance for lake trout was "medium" or average. In terms of size, Wahwashkesh lake trout are quite large relative to the Provincial SLIN database.

We contend the reference dataset may be largely representative of stressed and degraded lake trout fisheries throughout the Province and the Wahwashkesh Lake designation of "average lake trout abundance" should be viewed in this light. We assert the lake trout population is small and characterized by very low levels of recruitment and annual mortality, which appear to be balanced and stable between surveys.

Table of Contents

		Page
1.0	Introduction ……	3
2.0	Methods ……..	5
3.0	Results	
	3.1 Catch Results ……	6
	3.2 Biosampling (Size) Data ……..	7
	3.3 Benchmarks for Lake Trout Abundance and Size ……	9
4.0	Discussion ……..	10
5.0	Acknowledgements ……	10
6.0	Literature Cited ……..	11

Appendices

A.	Wahwashkesh Lake – South Basin, SLIN Catch Summary, Spring 2004 …	12
B.	Lake Trout Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey …..	13
C.	Lake Whitefish Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey	14
D.	Northern Pike Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey ..	14
E.	Walleye Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey ……..	15
F.	'Other Species' Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey	15
G.	Provincial SLIN Dataset Filtered by Lake Size (100-1000 ha) and mode (6 panel, 90 minute set) ……..	16

1.0 Introduction

Wahwashkesh Lake - also known as "Big Deer Lake", is the largest lake in the Parry Sound Area at 1,720 hectares (4,250 acres) (OMNR, 1973). The lake is comprised of two distinct basins, aptly called "the Top Lake" for the north basin and "the Big Lake" for the south basin. A narrow central portion of the lake locally known as "the Middle Lake" connects these basins. This segmentation appears to be very important for lake trout management because trout appear to be common only in the south basin – "The Big Lake". Although it is unclear from available creel data (Thurston, 1981; MacMillan, 1987; McIntyre 2003a; McIntyre, 2003b), it appears that most if not all lake trout fishing is concentrated in the Big Lake. Only the southern basin – the Big Lake, is the subject of this report (Figure 1).

Wahwashkesh Lake is part of the Magnetawan River watershed that has its origin just inside the western boundary of Algonquin Park. It is located almost entirely in the Geographic Township of McKenzie, now part of the Municipality of Whitestone. It is readily accessible by road with two public and two commercial access points. The lake is moderately developed with over 250 cottages.

The lake has a rich historic and present-day active sport fishery consisting of walleye, northern pike, smallmouth bass, largemouth bass and lake trout. The trout fishery, which is the subject of this report, is a natural population that last received supplemental plantings in 1975.

There is an extensive history of lake trout population assessment by netting and creel surveys on the lake (see summary in McIntyre, 2003a; McIntyre, 2003b, McIntyre, 2002; McIntyre, 1998). Perhaps the most alarming trend in fisheries assessment data has been the drastic reduction in the lake trout population. According to creel records, the precipitous decline in lake trout appears to have occurred between the mid 1980's and 2000 (MacMillan, 1987; McIntyre, 2003a; McIntyre, 2003b). This is somewhat surprising and disconcerting by virtue of the fact the lake was closed to winter fishing in 1982 for the very purpose of protecting the lake trout population. Additional protection in the form of a 40-50 cm prohibited slot size was imposed on the lake trout fishery in 2000.

In 1997, a Provincial standard - *Spring Littoral Index Netting (SLIN)* survey was conducted on the south basin of Wahwashkesh lake to assess the status of the lake trout population. It resulted in the capture of 24 lake trout. A SLIN survey conducted on the north basin ("the Top Lake") in 1999 captured only one lake trout. According to the 1997 survey on the south basin, lake trout abundance was "medium" or average within a Provincial context (i.e. within the median 50% of CUE values in the Provincial SLIN database) (OMNR, 1999; McIntyre 1998). However, most notable and disconcerting was the size distribution of lake trout captured, which consisted exclusively of very large and consequently older fish. This raised considerable concern with respect to seeming recruitment failure for this population.

We returned to the Big Lake in 2004 to conduct another SLIN survey similar to one completed in 1997. Our specific purpose was to monitor the relative abundance of lake trout and in particular to ascertain if recruitment had occurred in the intervening time period.

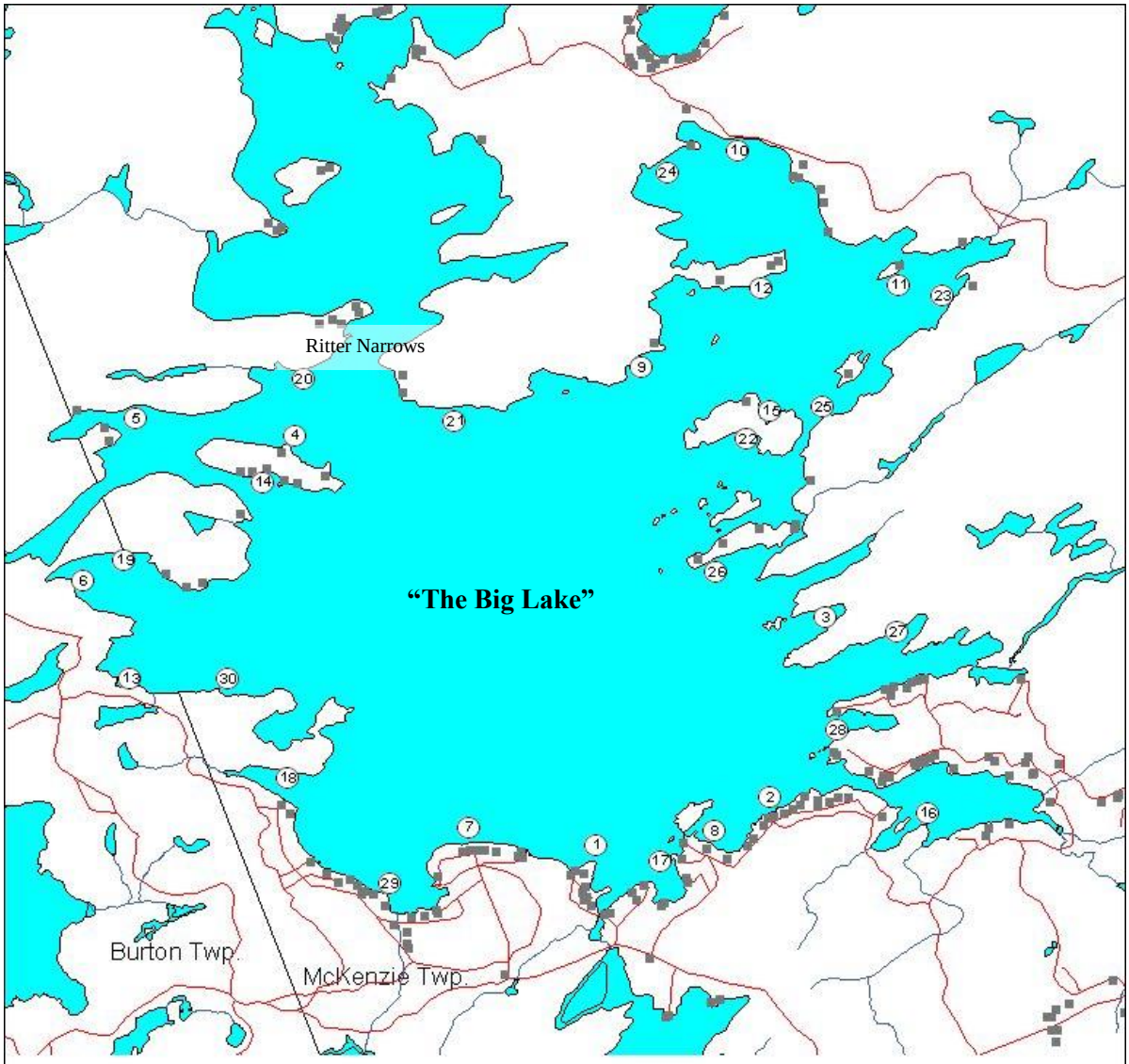


Figure 1.

South Basin ("The Big Lake") of Wahwashkesh Lake showing SLIN Net Set Locations.

Net locations denoted by circle with respective net set number.

2.0 Methods:

Field Operations:

The net setting and sampling protocols used for this survey were according to the "*Manual of Instructions – Spring Littoral Index Netting (SLIN)*" (Hicks, 1999). Netting operations commenced May 3rd when the water temperature was 8º Celsius, and terminated May 11th when water temperature had warmed to 13º C. A total of 30 net sets were made (Figure 1).

Three, 300' standard SLIN monofilament gillnets were used. Although all nets were 300 feet in length – consisting of 6 – 50 foot panels, each had unique mesh sizes: 38-mm (1 ½"), 51-mm (2") and 64-mm (2 ½").

The shoreline – including islands in the south basin of Wahwashkesh Lake was divided into 250 approximately equal length segments, which were then numbered. Net set locations were then randomly selected from these numbered segments. In those instances where selected netting locations were inappropriate due to lake contours, obstructions, navigational or social concerns, we simple went on to the next nearest randomly generated number. Net sets were of 90-minute duration with a general 90º orientation to the shoreline.

Complete catch enumeration and biosampling (size determination) was conducted for fish caught (Appendixes A – G)

Data Analysis:

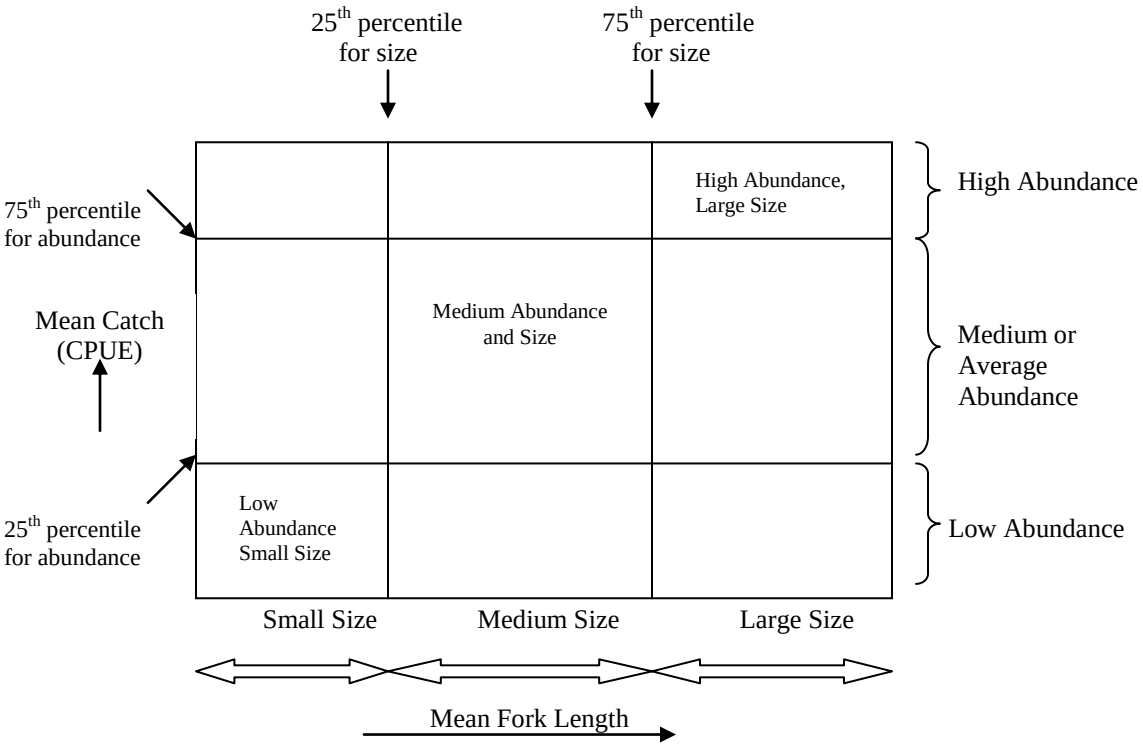
We compare our lake trout abundance (i.e. Catch-Per-Unit-Effort; CPUE) and size data (mean fork length) with benchmarks (reference points) from the Provincial SLIN database to assess lake trout population status. These "benchmarks" are a classification system that divides the mean catch (CPUE) as well as mean fork length (size) into three categories ('low", "medium" and "high" for abundance, and "small", "medium" and "large" for size) as delineated by the 25th and 75th percentiles for each parameter (Figure 2) (OMNR, 1999).

Using the Ministry's FINBrowser (Version 0.999)*, we selected comparison lakes in the Provincial SLIN data base that were 100 – 1000 hectares in size and were similarly surveyed using the "6 panel – 90 minute set duration" used in this survey. We used the "lake size" filter of 100 – 1000 hectares, because this is the area category for the south basin. We came up with 51 surveys that met the foregoing criteria. *CPUE* and *mean size* data for this filtered dataset is presented in Appendix F. We plotted the lake trout CPUE and mean fork length for these surveys along with the 25th and 75th percentile for the values (Figure 5) to assess the lake trout population status in the south basin of Wahwashkesh Lake.

** Note: FINBrowser Ver. 0.999 is a CD compilation of 1991 – 1998 SLIN data in the Ministry's database.*

A diagram to assist in the interpretation of Provincial abundance and size 'benchmarks', is provided in Figure 2. The 25th and 75th percentile for CPUE delineates "high", "medium" and "low" abundance indices. The 25th and 75th percentile for mean fork length delineates "small", "medium" and "large" size indices.

Figure 2. Interpretive illustration of SLIN Mean Catch and Size Benchmarks



.

3.0 Results

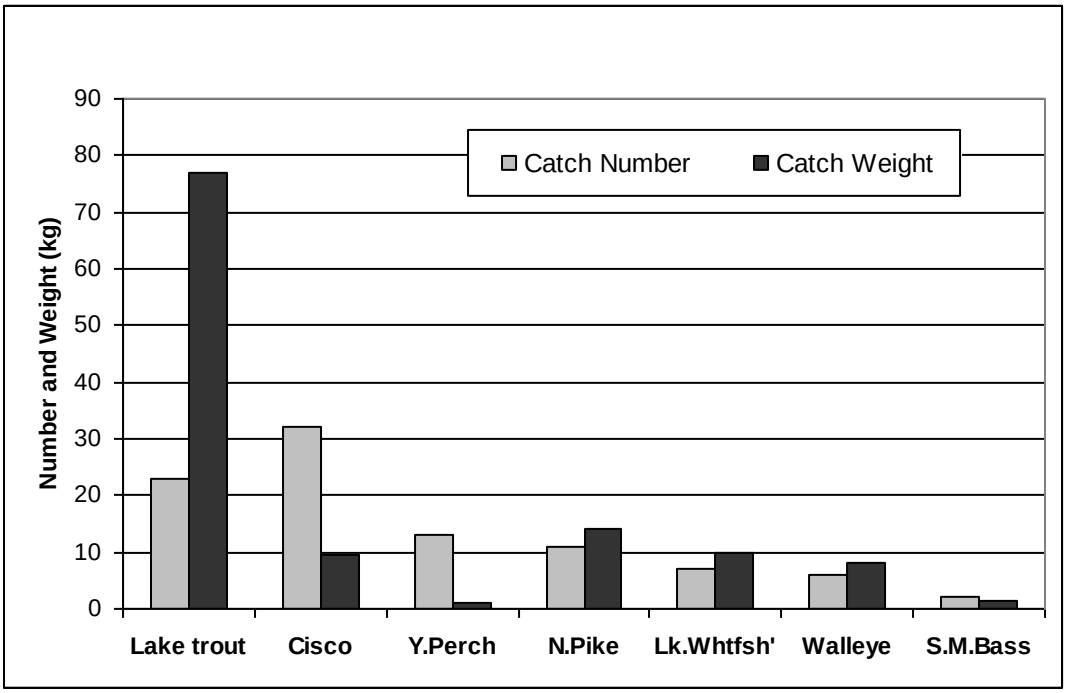
3.1 Catch Results:

From our sampling effort of 30 standard SLIN net sets, we captured 23 lake trout, 32 cisco, 13 yellow perch, 11 northern pike, 7 lake whitefish, 6 walleye and 2 smallmouth bass (Appendix A and Figure 3).

Catch composition by weight was: lake trout 76.98 kilograms, northern pike 14.29, lake whitefish 9.87, cisco 9.60, walleye 8.00, smallmouth bass 1.30 and yellow perch 0.8 kilograms (Appendix A and Figure 3).

We emphasize this netting methodology is conducted at a specific time of year (springtime with water temperature < 13º C) and with gear (fine mesh gill nets) intended to target lake trout. Consequently, our catch composition is not representative of the fish community as a whole.

Figure 3. Catch composition by number and weight (kg) for lake trout and all 'other species' combined, from the 2004 SLIN survey on the south basin of Wahwashkesh Lake.



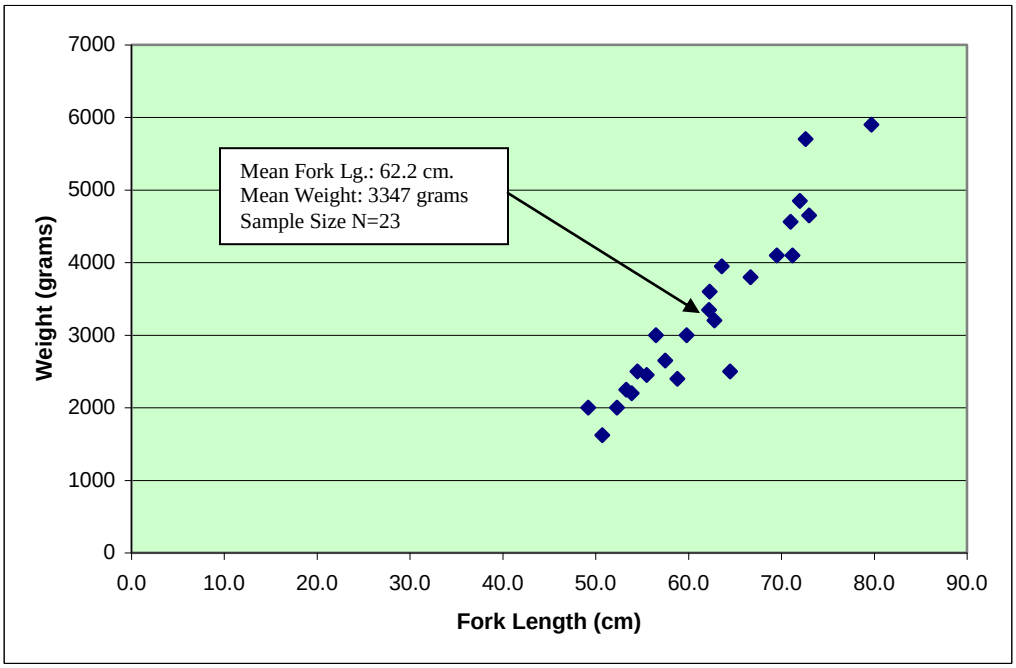
It is quite noteworthy that the catch composition both in terms of weight and number for lake trout is remarkably similar between this survey and the one conducted on the south basin of Wahwashkesh Lake in 1997. In 1997 we captured 24 lake trout weighing 74.4 kilograms (McIntyre, 1998). In 2004 (this survey), we captured 23 lake trout weighing 76.98 kilograms (Appendix A). The inference here is that lake trout abundance and size has not changed between surveys.

3.2 Biosampling (Size) Data:

From our sample of 23 lake trout, mean total length was 67.8 cm. (26 ½"), mean fork length 62.2 cm. (24 ½") and mean weight 3.347 kg. (7.38 lbs) (Appendix B and Figure 3). We captured remarkably large – and presumably old lake trout.

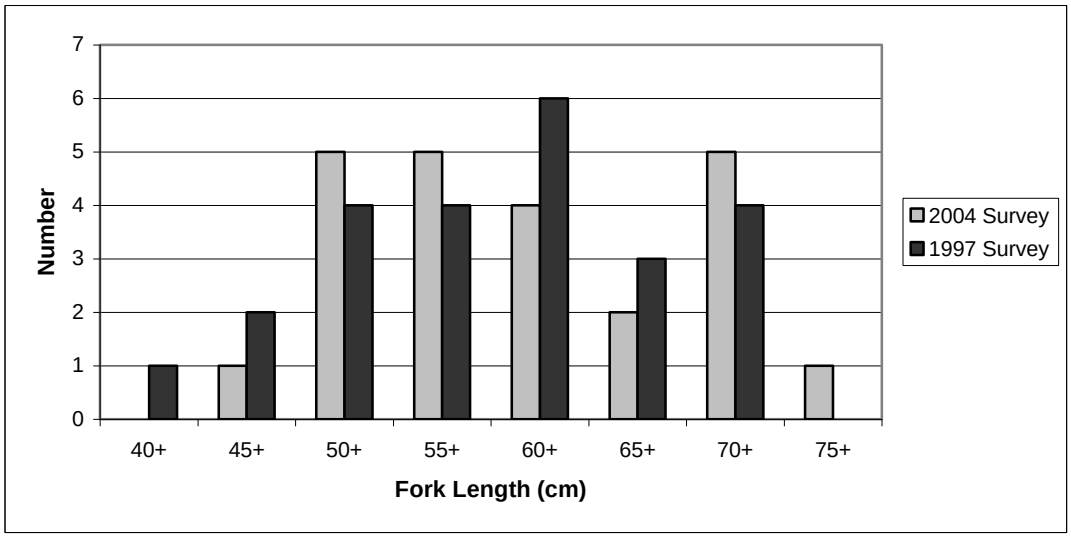
Generally, 40 cm fork length is considered the length at which lake trout become mature. (*This is just a 'rule of thumb' and varies greatly according to individual lake as well as sex differences*.) Indeed, we captured no lake trout with a fork length less than 40 cm, and only one with a fork length less than 50 cm! The size distribution we observed (Figure 4) is indicative of a population with a very low recruitment rate as well as a low mortality rate.

Figure 4. Size distribution (fork length vs. weight) of lake trout captured in the 2004 Wahwashkesh Lake SLIN survey.



We consider it very significant that the size distribution and mean size of lake trout captured in 2004 is very similar to that observed in 1997 (Figure 5). Mean fork length in 1997 was 59.9 cm (vs. 62.2 in 2004) and mean weight was 3102 gram (vs. 3347 in 2004).

Figure 5. Comparison of lake trout size distribution between the 1997 and 2000 SLIN surveys.



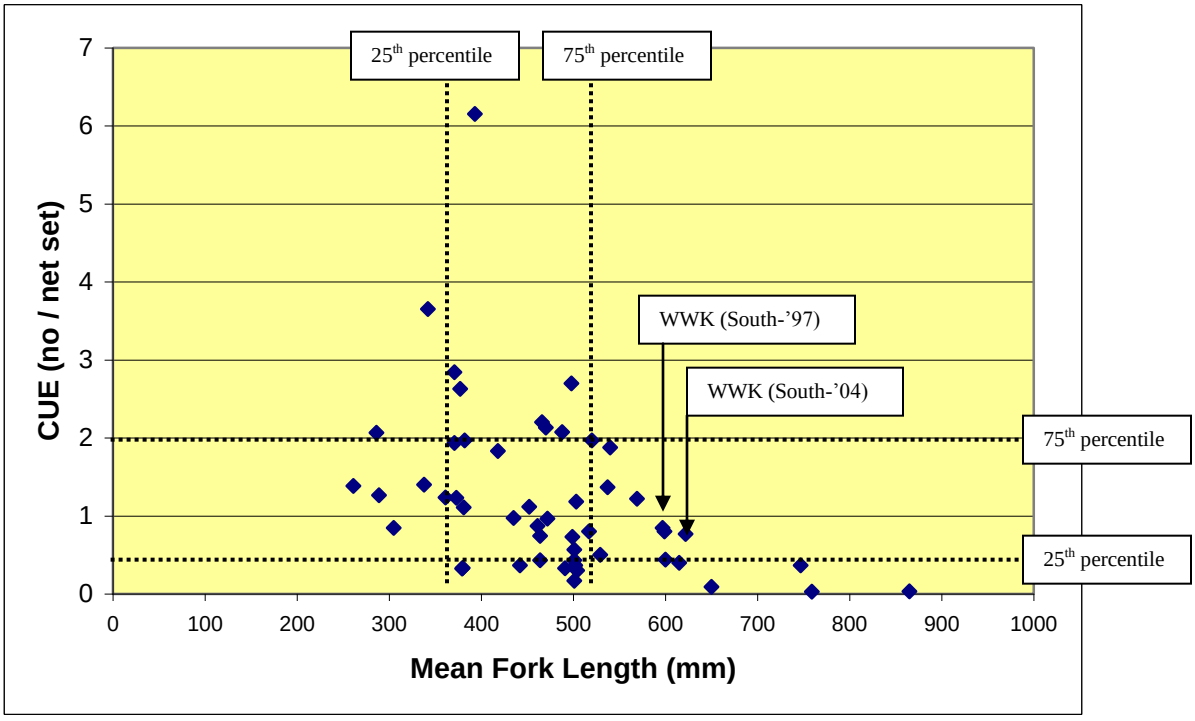
Even though we see little evidence of recruitment in our size distribution (Figure 4), some must be occurring. Annual mortality has been occurring in the intervening 7-year period, and in order for the size distribution and mean size of lake trout to remain essentially unchanged, recruitment has to have balanced mortality. We can only surmise that lake trout recruitment and mortality are exceptionally low in Wahwashkesh Lake.

3.3 Benchmarks for Lake Trout Abundance and Size:

Lake trout Catch-Per-Unit-Effort (CPUE) for this survey was 0.77 fish / net set ± 0.363 ($p < 0.05$) (Appendix A).

To assess the relative abundance of lake trout observed in our survey, we make comparisons with lakes similarly surveyed throughout the Province. Using lake size (100 – 1000 ha) and mode (6 panel, 90 minute sets), we filtered the Provincial SLIN database to come up with 51 surveys that met the foregoing criteria. We plotted the lake trout CPUE and mean fork length for these surveys along with the 25th and 75th percentile for each parameter (Figure 4).

Figure 4. Indices of abundance and size (CUE vs. Mean Fork Length) for 51 SLIN surveys in the Provincial database.



The 25th and 75th percentile of our filtered dataset delineates "high", "medium" and "low" for abundance and "small", "medium" and "large" for size indices. The south basin of Wahwashkesh Lake has "medium" abundance and "large" size lake trout. These are the same indices observed in the 1997 survey. In terms of ranking, our CPUE (0.77) ranked 32nd out of 51 surveys, but in

terms of mean fork length, Wahwashkesh ranked 5th. Again, this is the result one would expect from capturing a small number of large lake trout.

We very much caution our readers that we can take limited solace in the fact that Wahwashkesh Lake appears to have a "medium" or average abundance of lake trout present. One might conclude from the status of 'average' abundance the population is "okay", or at least as good or bad as most. The latter is probably the case. We strongly suspect our reference dataset of 51 lakes is representative of stressed and degraded lake trout populations throughout the Province. Certainly, the eight Parry Sound Area SLIN surveys in the dataset fit this description. Consequently, the Wahwashkesh lake trout population is only 'average' in terms of being equally stressed and degraded.

4.0 Discussion:

We initially took some consolation in the fact results from the 1997 and 2004 SLIN surveys were quite similar, and consequently the lake trout population has remained stable. Some degree of successful reproduction and recruitment must be occurring to offset annual mortality. Discussions with other biologists suggested that perhaps juvenile lake trout were spatially dissociating themselves from cannibalistic adults and inhabiting deeper water where they were not susceptible to our netting gear (pers. comm. W. Dunlop).

To investigate this possibility, we invited the Muskoka Lakes Fisheries Assessment Unit (MLFAU) to conduct a *Summer Profundal Index Netting (SPIN)* survey on the south basin. This experimental, gillnetting technique targets juvenile lake trout. The MLFAU graciously complied and conducted a SPIN survey in the summer of 2004. Much to our dismay, they only captured 3 lake trout, all of which were mature fish greater than 50 cm in fork length. Again the whereabouts of juvenile lake trout – if they exist, remains a mystery.

We conclude this report by expressing grave concern for the future of lake trout in the Big Lake. Historic creel data and more recent netting data clearly suggest the lake trout population is low and a mere shadow of its former self. Although recruitment appears to be balancing annual mortality, both are probably at very low levels. If reproduction and recruitment are further suppressed for whatever reason, or if mortality should increase from even modest angler exploitation, the sustainability of the population could be in jeopardy.

5.0 Acknowledgements:

We gratefully thank Mr. Bill Auld for providing us with access and secure storage of our boat while working on the lake.

Netting operations were conducted by Jim Palmer and Eric McIntyre of the Ministry of Natural Resources, with assistance from Caroline Deary of the Department of Fisheries and Oceans.

6.0 Literature Cited:

Hicks, F. 1999. Manual of Instructions Spring Littoral Index Netting (SLIN). Queen's Printer for Ontario. 37 p.

MacMillan, A. 1987. Results of an intensive creel survey on Wahwashkesh lake McKenzie Township, during the summer of 1983. OMNR Parry Sound District fisheries file report.

McIntyre, 1998. 1997 Spring Littoral Index Netting (SLIN) Report for the South Basin of Wahwashkesh Lake (McKenzie Twp.). OMNR Parry Sound District fisheries file report. 13 p.

McIntyre, 2002. Wahwashkesh Lake Synoptic Trapnet Survey Report, Summer 2002. OMNR Parry Sound District fisheries file report. 31 p.

McIntyre, 2003a. Wahwashkesh Lake 2001 Victoria Holiday Weekend Voluntary Creel Survey. OMNR Parry Sound District fisheries file report. 13p.

McIntyre, 2003b. Wahwashkesh Lake Summer 2002 Intensive Creel Survey Report. OMNR Parry Sound District fisheries file report. 28 p. + Addendum.

OMNR, 1973. Aquatic Habitat Inventory Survey Report (a.k.a. Lake Survey Report), OMNR Parry Sound District fisheries file report.

OMNR, 1999. Spring Littoral Index Netting. Muskoka Lakes Fisheries Assessment Unit Update 1999-2. 6 p.

Thurston, L.D.W. 1981. Results of an intensive creel census conducted on Wahwashkesh Lake (McKenzie Twp.) during the summer of 1980. OMNR Parry Sound District fisheries file report. 29 p.

Appendix A
Wahwashkesh Lake – South Basin, SLIN Catch Summary, Spring 2004

Set Number	Catch							Grand Total
	Lake Trout	Lake Whitefish	Cisco	Yellow Perch	Northern Pike	Walleye	Smouth Bass	
1	1	0	0	1	0	0	0	
2	0	0	1	1	0	0	0	
3	0	0	0	0	0	0	0	
4	1	0	0	0	0	0	0	
5	3	1	0	1	2	0	0	
6	0	0	0	1	0	0	0	
7	0	0	0	1	0	1	0	
8	0	0	0	2	0	1	0	
9	0	1	0	0	1	1	0	
10	2	0	0	0	0	0	0	
11	2	1	0	2	0	2	0	
12	0	0	0	2	0	0	0	
13	1	0	0	1	1	0	1	
14	0	0	0	0	0	0	0	
15	1	0	0	0	0	0	0	
16	0	0	8	0	0	0	0	
17	0	0	0	0	0	0	0	
18	0	0	0	0	0	0	0	
19	0	0	1	0	2	0	0	
20	3	0	0	0	1	0	0	
21	0	3	5	0	0	1	0	
22	1	0	0	0	0	0	0	
23	1	1	0	0	1	0	0	
24	1	0	0	0	0	0	0	
25	0	0	0	0	0	0	0	
26	1	0	0	1	1	0	0	
27	0	0	0	0	1	0	0	
28	1	0	0	0	0	0	0	
29	1	0	0	0	0	0	0	
30	3	0	17	0	1	0	1	
Sum	23	7	32	13	11	6	2	94
C.U.E (Mean Catch)	0.77	0.23	1.07	0.43	0.37	0.2	0.07	3.13
Standard Error	0.177	0.114	0.631	0.124	0.112	0.088	0.046	
Standard Deviation	0.971	0.626	3.453	0.679	0.615	0.484	0.254	
Sample Variance	0.944	0.392	11.926	0.461	0.378	0.234	0.064	
Confidence Level (95.0%)	0.363	0.234	1.290	0.254	0.230	0.181	0.095	
Count	30	30	30	30	30	30	30	
Weight Caught (kg.)	76.980	9.870	9.600	0.975	14.290	8.000	1.300	121.015
% of total Catch Wt.	63.6	8.2	7.9	0.8	11.8	6.6	1.1	100.0

Appendix B

Lake Trout Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey

Set No.	Tot. Lg. (cm)	Fork Lg. (cm)	Weight (gr.)
1	62.1	56.5	3000
4	78.4	72.6	5700
5	84.1	79.7	5900
5	59.5	53.9	2200
5	71.7	64.5	2500
10	65.2	59.8	3000
10	68.4	62.8	3200
11	58.0	53.3	2250
11	68.0	62.3	3600
13	54.2	49.2	2000
15	59.5	54.5	2500
20	79.1	72.0	4850
20	60.2	58.8	2400
20	69.2	63.6	3950
22	77.5	71.0	4560
23	60.6	55.5	2450
24	56.0	50.7	1620
26	77.1	69.5	4100
28	78.3	71.2	4100
29	79.0	73.0	4650
30	73.2	66.7	3800
30	57.0	52.3	2000
30	63.1	57.5	2650
Mean	67.8	62.2	3347.0
Median	68.0	62.3	3000.0
Standard Error	1.894	1.773	252.514
Standard Deviation	9.081	8.502	1211.015
Sample Variance	82.470	72.278	1466558.498
Confidence Level(95.0%)	3.927	3.676	523.683
Sum	1559.4	1430.9	76980.0
Count	23	23	23

Appendix C
Lake Whitefish Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey

Set No.	Tot. Lg. (cm)	Fork Lg. (cm)	Weight (gr.)
5	49.4	44.0	1400
9	46.0	41.6	1350
11	45.2	41.5	1200
21	42.3	38.4	1100
21	58.4	53.3	2500
21	38.5	34.6	850
23	50.0	45.3	1470
Mean	47.1	42.7	1410.0
Median	46	41.6	1350
Standard Error	2.406	2.223	198.158
Confidence Level(95.0%)	5.888	5.440	484.876
Standard Deviation	6.367	5.882	524.277
Sample Variance	40.535	34.592	274866.667
Sum			9870
Count	7	7	7

Appendix D
Northern Pike Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey

Set No.	Tot. Lg. (cm)	Fork Lg. (cm)	Weight (gr.)
5	60.4	56.8	1500
5	32.4	30.6	300
9	50.3	49.9	900
13	50.5	47.5	1100
19	58.2	55.5	1530
19	73.0	69.0	2250
20	58.5	54.4	2500
23	60.0	56.4	1310
26	60.3	56.4	1500
27	46.4	43.6	650
30	52.0	48.8	750
Mean	54.7	51.7	1299.1
Standard Error	3.110	2.910	200.011
Confidence Level(95.0%)	6.930	6.483	445.653
Standard Deviation	10.315	9.650	663.362
Sum			14290
Count	11	11	11

Appendix E
Walleye Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey

	Set No.	Tot. Lg. (cm)	Fork Lg. (cm)	Weight (gr.)
	7	37.5	35.0	700
	8	67.5	64.0	3400
	9	32.5	31.0	500
	11	29.5	27.5	450
	11	31.5	29.9	500
	21	62.0	58.2	2450
Mean		43.4	40.9	1333.3
Standard Error		6.868	6.497	519.241
Standard Deviation		16.824	15.914	1271.875
Confidence Level(95.0%)		17.656	16.701	1334.749
Sum				8000
Count		6	6	6

Appendix F
'Other Species" Biosampling Data, 2004 Wahwashkesh Lake SLIN Survey

	No. Caught	Total Weight (gr)
Yellow Perch	13	975
Cisco	32	9600
smallmouth	2	1300

Appendix G

Provincial SLIN dataset filtered by lake size (100 – 1000 ha.) and mode (6 panel; 90 minute set)

Lake	Mean Fk Lg.	CUE
Flack	371	2.844
Emerald	418	1.833
Manitou	501	0.567
Clearwater	382	1.966
L.Bass	371	1.933
Smyth	865	0.033
3-Legged	380	0.333
Trout	464	0.433
Horn	504	0.3
Island	502	0.367
Sucker	305	0.846
Young	379	0.324
Bigwind	381	1.111
Clinto	501	0.167
Smoke	503	1.183
Smoke	520	1.967
Oxbow	569	1.222
Kimbell	442	0.367
Livingston	466	2.2
Penninsula	461	0.869
Clear	499	0.733
Koshlong	498	2.7
Dickey	342	3.654
Dickey	338	1.4
Dickey	286	2.067
Dickey	261	1.385
St.Anthony	472	0.967
Kushog	650	0.091
Elmer	529	0.5
Dickson	747	0.367
Charlotte	537	1.367
Cross	615	0.4
Louisa	377	2.629
Brule	373	1.233
Mackie	289	1.267
Palmerston	464	0.742
Palmerston	470	2.133
Clarice	501	0.432
Thompson	540	1.877
Robinson	600	0.438
Squeers	361	1.235
Squeers	435	0.974
Crook	393	6.154
Rutter	488	2.076
Secret	452	1.117
Cedarborough	597	0.846
Otter	491	0.33
WWK (North)	759	0.03
WWK (S-'97)	599	0.8
WWK (S-'04)	622	0.77
Lorimer	517	0.8
Mean	478.176471	1.22311765
Standard Error	17.0241283	0.15146385
Median	472	0.967
Standard Deviation	121.576594	1.08166822
Sample Variance	14780.8682	1.17000615
Count	51	51
Confidence Level(95.0%)	34.1939821	0.30422421

	Sorted Ascending	
	CUE	Mean Fk Lg.
	0.030	261
	0.033	286
	0.091	289
	0.167	305
	0.300	338
	0.324	342
	0.330	361
	0.333	371
	0.367	371
	0.367	373
	0.367	377
25th percentile	0.400	379
	0.432	380
	0.433	381
	0.438	382
	0.500	393
	0.567	418
	0.733	435
	0.742	442
	0.770	452
	0.800	461
	0.800	464
	0.846	464
	0.846	466
	0.869	470
	0.967	472
	0.974	488
	1.111	491
	1.117	498
	1.183	499
	1.222	501
	1.233	501
	1.235	501
	1.267	502
	1.367	503
	1.385	504
	1.400	517
	1.833	520
75th percentile	1.877	529
	1.933	537
	1.966	540
	1.967	569
	2.067	597
	2.076	599
	2.133	600
	2.200	615
	2.629	622
	2.700	650
	2.844	747
	3.654	759
	6.154	865