LAKE TROUT POPULATION ASSESSMENT

ETHEL LAKE

2011

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Summary

Environment Yukon has been surveying important fish stocks since 1991. We use these surveys to detect population changes and monitor population health. Along with angler harvest surveys, these data are also used to assess the sustainability and impact of fisheries.

Environment Yukon works with First Nations, Renewable Resources Councils, and user groups to determine priority lakes for surveys. Criteria for identification of priority lakes include accessibility, sensitivity, and management concerns. The surveys focus on lake trout, an indicator of the health of northern lake ecosystems.

We surveyed Ethel Lake in 2011 using Summer Profundal Index Netting (SPIN). Environment Yukon previously surveyed the lake using a different index netting technique in 1995, 2001, and 2006. SPIN provides more statistically robust data and improves confidence in survey results (Jessup and Millar 2011).

Lake-wide catch per unit effort (CPUE) was 0.30 lake trout per net set. Lake trout density was estimated at 2.0 lake trout/hectare, which is low when compared to other similar Yukon lakes sampled to date.

Key Findings

- Density of lake trout in Ethel Lake was lower than expected compared to Yukon lakes with similar characteristics,
- The Ethel Lake lake trout population is depleted.

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Introduction

Each year, Environment Yukon conducts assessments of fish populations, with a focus on lake trout. Between 1991 and 2009, over 100 Yukon lakes were surveyed using small-mesh netting, a method based on the index netting techniques described by Lester et al. (1991). Beginning in 2010, we began to assess fish populations using a new method, Summer Profundal Index Netting (SPIN; Sandstrom and Lester, 2009). SPIN provides more statistically robust data and improves confidence in survey results (Jessup and Millar 2011).

We choose lakes for assessment based on the size of the active recreational fishery, the aboriginal subsistence fishery, and the commercial and domestic fisheries, as well as other available information. Lakes with heavy harvest pressure are surveyed on a regular basis.

The SPIN assessment involves setting gillnets at various sites in the lake and recording the catch and biological information about each fish caught. The survey usually tells us:

- relative abundance of lake trout as measured by an index (CPUE, or catch per unit effort);
- changes in relative abundance from previous surveys;
- the estimated density (number of lake trout per hectare) and abundance (number of lake trout) in the lake;
- length and weight of individual lake trout as well as other species captured; and
- age and diet of any fish killed.

Environment Yukon surveyed Ethel Lake using SPIN in 2011 and using small-mesh netting in 1995, 2001, and 2006. Differences in methodology between the 2 methods mean that results from the 2011 survey cannot be compared statistically with past surveys. Here we report the results of the 2011 SPIN survey and make subjective comparisons with previous surveys.

Study Area

Ethel Lake is located approximately 20 km east of Stewart Crossing (Figure 1). A seasonal access road is located approximately 10 km south of Stewart Crossing off the Klondike Highway. The lake has an east-west aspect, is approximately 21 km long, and covers an area of 4,610 ha. Mean depth is about 31 m and maximum depth is 62 m. The lake is fed by Ethel Creek, Sether Creek, and several other small, unnamed creeks. Ethel Creek drains the lake to the east into Nogold Creek which flows to the Stewart River, part of the Yukon River watershed. Fish species present in Ethel Lake include lake trout, northern pike, Arctic grayling, lake whitefish, round whitefish, burbot, and slimy sculpin.

Ethel Lake is in the Traditional Territory of the First Nation of Na-Cho Nyäk Dun.

There is a Yukon government campground and boat launch located at the western end of the lake along with several private cabins and summer residences. There is a camp belonging to the First Nation located approximately 4.5 km along the north side of the lake from the campground. The lake is highly valued by area residents, being one of only a few lake trout lakes locally available to residents of Mayo, Stewart Crossing, and Dawson. Consequently, the lake sees a lot of recreational use, especially during the summer months.

Historically, Ethel Lake has been used for subsistence, domestic, commercial, and recreational fishing. The lake was fished commercially at least as early as the 1930s, but commercial quotas were retired in 1967 in order to minimize conflict with sport and recreational fishing (Seigel and McEwen 1984). The recreational fishery at Ethel Lake has been managed with Conservation Waters Regulations since 1991. Lake trout catch and possession limits are 2; no lake trout between 65 and 100 cm may be kept, and only one trout may be over 100 cm. Barbless hooks are mandatory.

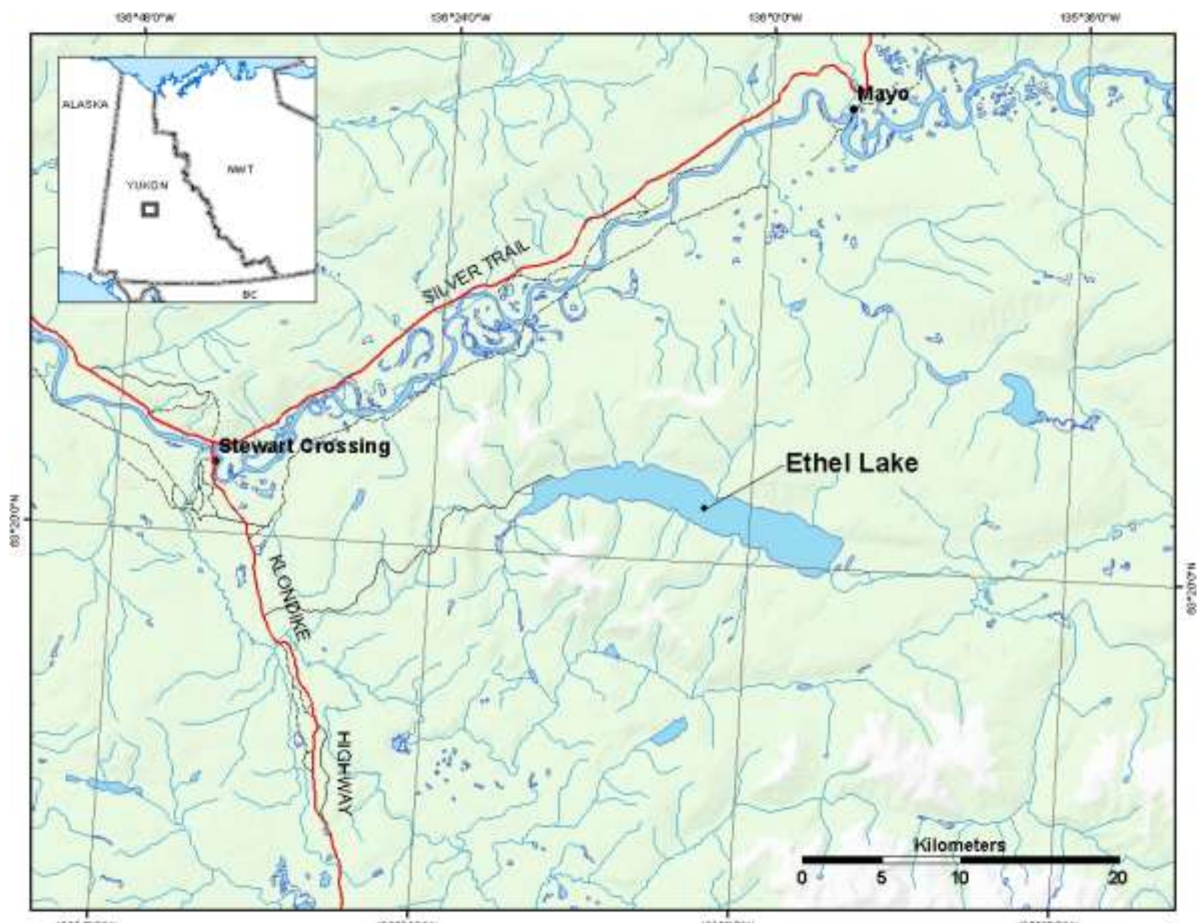


Figure 1. Location of Ethel Lake, Yukon.

Methods

We sampled Ethel Lake 18-21 July 2011. We followed the Summer Profundal Index Netting (SPIN) methodology for lake trout assessment (Sandstrom and Lester 2009, Jessup and Millar 2011). We set a total of 90 nets, divided among 5 depth strata (Table 1). Each net was set for 2 hours.

Each 64-m gillnet was composed of 8 panels of monofilament web of different mesh sizes from 57 mm to 127 mm. The number of sets in each stratum was initially weighted by stratum surface area. However, we adjusted the final distribution of effort during the survey by concentrating on those strata with the highest catch rates. Initial set locations within each stratum were chosen using random point generation in ArcGIS 9.3. Any clumped distributions of points were dispersed manually to ensure coverage of the entire lake.

Table 1. Effort breakdown by stratum.

Stratum (depth range)	Area		Samples	
	Ha	%	No.	%
1 (0 - 10 m)	723	16	9	10
2 (10 - 20 m)	590	13	16	18
3 (20 - 30 m)	638	14	19	21
4 (30 - 40 m)	772	17	29	32
5 (40+ m)	1887	41	17	19
Total	4610	100	90	100

Catch per unit effort (CPUE), or the number of lake trout of “harvestable” size (300mm and up) caught per net was calculated for each stratum. We accounted for net selectivity (the fact that certain sizes of fish are more prone to capture than others) by applying a correction factor to each fish caught, based on its likelihood of capture (see Sandstrom and Lester (2009) for a full rationale of net selectivity). The total stratified lakewide CPUE was calculated as:

$$\text{Lakewide CPUE} = \sum(\text{CPUE}_i \bullet W_i)$$

where:

CPUE_i = selectivity adjusted CPUE of stratum $_i$

W_i = area of stratum $_i$ / lake area

CPUE is considered an index of abundance and changes in the CPUE are thought to reflect actual changes in the lake trout population. Therefore, CPUE can be compared between surveys and used to detect population growth or decline. The method excludes fish below 300 mm because they are not usually caught by anglers.

We then converted CPUE to density (fish/ha) based on an empirical relationship between CPUE and density that has been established for Ontario lakes. From this, we estimated absolute abundance (i.e., the total population size) by multiplying density by lake size (number of fish/ha • lake area (ha) = number of fish in lake). Before we can be fully confident in our estimates of density and absolute abundance, the relationship between CPUE and density must be verified for Yukon lakes.

We used SPIN Support Systems Ver. 9.04 for calculations of CPUE, density, and population size, as well as predictions of sample size and power for future surveys. Temperature and dissolved oxygen profiles were taken using a multi-parameter probe (YSI 600QS; YSI Inc., Yellow Springs, OH).

We measured, weighed, and released all fish captured. Any fish that died was sampled for age (using otoliths or ear "bones") and diet (stomach contents).

Results and Discussion

Temperature and Dissolved Oxygen

Temperature and dissolved oxygen are water quality variables critical to lake trout and they determine suitable habitat within a lake. Following Clark et al. (2004), we define lake trout habitat as *suitable* where temperatures are less than 15°C and dissolved oxygen is greater than 4 mg/L. At temperatures above 15°C or dissolved oxygen less than 4 mg/L the habitat is *unsuitable*.

The *optimal* temperature range for Yukon lake trout is between 2° and 12°C (Mackenzie-Grieve and Post 2006). The *optimal* dissolved oxygen level for lake trout is greater or equal to 7 mg/L (Evans 2005).

Temperature and dissolved oxygen profiles were taken on July 18. The lake was stratified with the thermocline (zone of steep temperature gradient) between 8 and 12 m (Figure 2).

The profiles of oxygen and temperature show that water conditions were suitable for lake trout in the entire water column sampled. However, optimal habitat ranged from 8 – 38 m, limited at the surface because of high temperatures and at depth because of low dissolved oxygen. Maximum depth at the profile location was 46 m and dissolved oxygen at this depth was dropping sharply; it is possible that in deeper waters (>45 m; not profiled), dissolved oxygen may have been below suitable levels (<4 mg/L). These data show that we would be most likely to encounter lake trout in strata 2 - 4, but that we might find lake trout distributed throughout the entire water column, with the possible exception of below 45 m (most of stratum 5).

CPUE, Density, and Population Size

We captured a total of 30 lake trout in this survey (not including 1 fish <300 mm; see Appendix 2 for set and capture locations and Appendix 3 for capture details). We also captured lake whitefish, round whitefish and Arctic grayling.

Total mortalities during the survey were 8 lake trout (27% mortality rate), 8 lake whitefish (53%), 6 round whitefish (33%), and 1 Arctic grayling (20%).

We adjusted the total catch for net selectivity bias based on the lengths of lake trout captured, resulting in an estimated selectivity-adjusted total catch of 39 lake trout. After weighting the data by catch in each strata, we found a lake-wide CPUE of 0.30 (SE = 0.07).

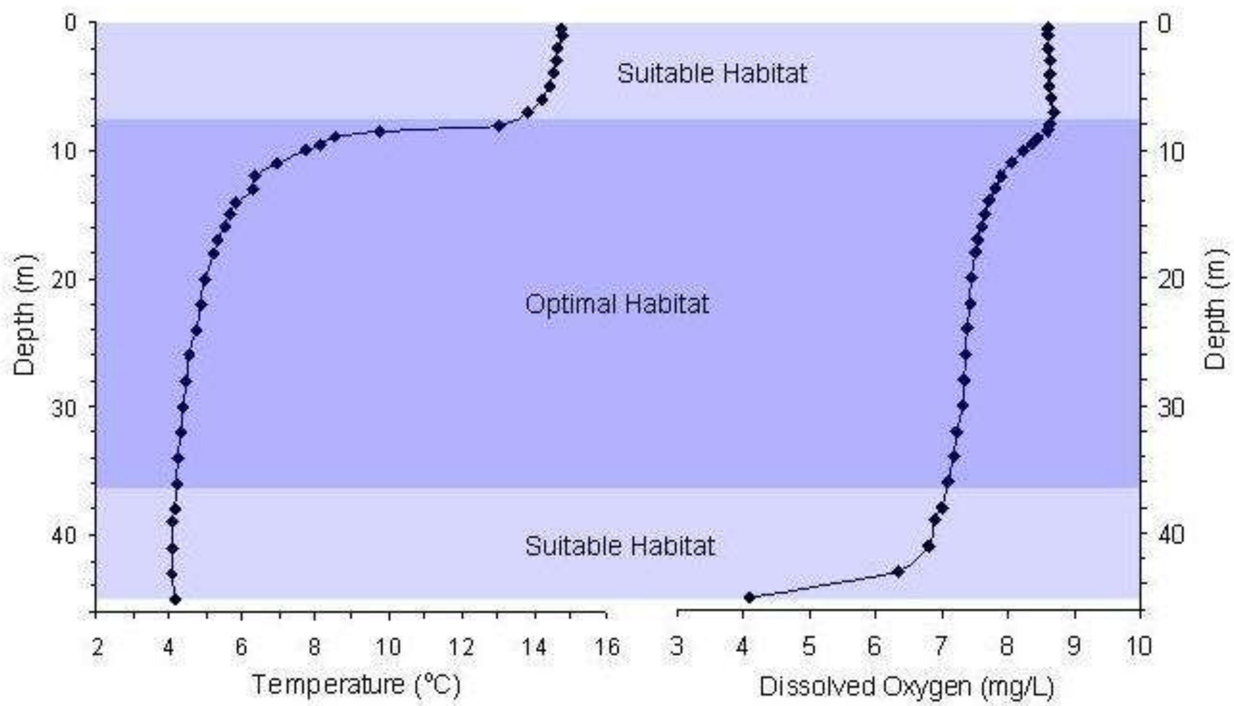


Figure 2. Temperature and dissolved oxygen profiles taken on July 18.
The lake was strongly stratified with the thermocline between 8 and 12 m. The water column was only sampled to 45 m (max depth at the profile location was 46 m) but maximum lake depth was 62 m.

Table 2. Selectivity-adjusted catch by stratum.

Stratum (depth range)	Sample Sites		Catch	CPUE
	#	% of Total		
1 (0–10 m)	9	10	4	0.44
2 (10–20 m)	16	18	6	0.4
3 (20–30 m)	19	21	11	0.55
4 (30–40 m)	29	32	18	0.61
5 (40+ m)	17	19	0	0
Total	90	100	39	0.3

Lake trout density was estimated at 2.0 lake trout / ha and lake-wide abundance was estimated at 9,102 lake trout (68% confidence interval: 1,902 – 16,450).

Biological Characteristics

Average length, age, and diet can reveal whether fish in a lake are small-body lake trout that feed mostly on invertebrates or large-body lake trout that feed mostly on fish. The large-body, fish-eating form has a higher growth rate, a larger maximum size, and a larger size-at-maturity than the small-body, invertebrate-eating form.

Average length and weight of lake trout were 573 mm and 3,333 g respectively. The length distribution of lake trout captured is presented in Figure 3. Stomachs retained for diet analysis from Ethel Lake in 2011 revealed that lake trout feed on both fish and invertebrates (Table 3).

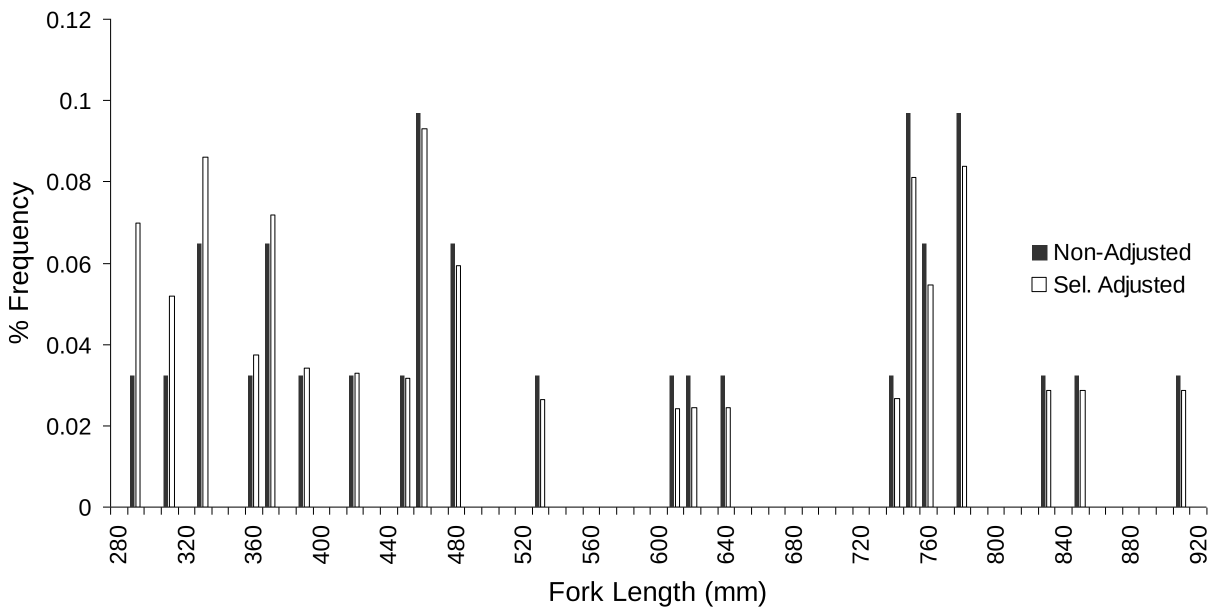


Figure 3. Frequency distribution of selectivity adjusted and non-adjusted lengths of lake trout captured in the 2011 Ethel Lake SPIN survey.

Table 3. Stomach contents of lake trout sampled in the 2011 Ethel Lake SPIN survey.
8 fish were sampled and 1 of these had an empty stomach.

	Percent volume of stomach contents
Water fleas	37.7
Freshwater shrimp (scuds, sideswimmers)	30.2
Slimy sculpin	9.4
Unidentified fish	9.4
Non-biting midges	9.4
Caddisflies	3.8

The proportion of invertebrates in the diet seems high considering the average size of lake trout captured, but this apparent discrepancy can be explained by differences in average size in the catch (576 mm), compared to average size of the mortalities sampled for stomach contents (407 mm). The average size of released fish was 656 mm. The larger fish had a much lower mortality rate and so the stomach content sample was biased toward smaller fish, which are more likely to be feeding on a broad range of invertebrate prey, rather than fish (Burr 1997). While invertebrates make up a significant portion of the diet, the length distribution (Figure 3) and large average size indicates that a significant proportion of the lake trout in Ethel Lake are of the large-body type. Otoliths were also retained from mortalities for age analysis but results are not yet available.

Results from previous surveys

Environment Yukon conducted small-mesh netting surveys in 1995, 2001, and 2006 (Table 4). The surveys in 2001 and 2006 found CPUE that was slightly higher than the average CPUE for other lakes with large-body lake trout in Yukon, while the 1995 survey found a CPUE of half the average. This wide variation in results underlines some of the difficulties of using our previous method and is discussed in detail elsewhere (Jessup and Millar 2011). Further, these surveys used methodology that is quite different from the current methods in terms of assumptions, set location, net materials and size, set duration, and total number of sets, so we can only make subjective comparisons between these results and the results from a SPIN survey. We put more weight on the results from the SPIN survey than we do from our previous netting studies.

Table 4. Results of small-mesh netting surveys of Ethel Lake.

	1995	2001	2006	Yukon Average (47 large-body lakes)
Gillnet sets	32	36	34	
Lake trout caught	7	19	16	
Small-mesh CPUE	0.22	0.53	0.47	0.41

Environment Yukon also conducted angler harvest surveys on Ethel Lake in 1990, 1995, 2003, and 2012. Angler effort has increased over this time, while angler success rates for lake trout have declined (Foos, 2012).

The most recent angler success rate for lake trout (0.12) was slightly below the Yukon average of 0.14 lake trout per hour. Harvest was near or above estimated sustainable levels in all 4 survey years (Foos, 2012).

Population Status and Conclusions

Larger, less productive lakes with large-body lake trout usually have lower densities than smaller, more productive lakes with small-body lake trout (Burr 1997). Lakes that have predator species other than lake trout, like northern pike and burbot, are also expected to have lower densities than lakes with fewer predators (Carl et al. 1990).

Ethel Lake is a large, low-productivity (in terms of fish yield) lake with large-body lake trout, which also contains northern pike and burbot (see Appendix 3). We compared density to Sekulmun Lake, another large-body lake trout lake sampled with SPIN. Sekulmun Lake is very similar to Ethel Lake in terms of size and fish community but is less productive. Sekulmun Lake is also considered to have a healthy population of lake trout (Jessup and Millar 2012). We found that Ethel Lake (2.0 fish/ha) had almost half the density of lake trout of Sekulmun (3.7 fish/ha). Based on the results of the 2011 survey, and in the context of the lakes surveyed to date, the abundance of lake trout in Ethel Lake is lower than we would expect for a lake of its type. Taken in the context of high fishing pressure, declining angler success, and high harvest relative to sustainable yield, our results suggest Ethel Lake has a depleted population of lake trout.

Future Surveys

Because this population is depleted, future management actions may be undertaken to allow the population to recover. To facilitate responsive management, we target the ability to detect 25% changes in CPUE with a power of 80%. Power refers to the probability of detecting a change when that change is real. In other words, we want to have an 80% chance to detect an increase or decrease in numbers of 25%.

At the current sample size (n = 90 net sets), we have a predicted power of 43% to detect future increases in CPUE of 25%. This power to detect change is below our target of 80%. A recovery of this population to densities similar to Sekulmun, however, would likely involve an increase of greater than 100%, a level easily detectable at current sample sizes. The smallest decline that we will be likely to detect is 50%.

Power can be increased by raising the sample size, reducing the variation in catch data, or relaxing the magnitude of change to be detected. Variation in catch data was high in 2011. We recommend that future surveys maintain the current sample size but monitor and attempt to minimize variance by performing more sets in strata where variance is highest.

Literature Cited

BURR, J. M. 1997. GROWTH, DENSITY AND BIOMASS OF LAKE TROUT IN ARCTIC AND SUBARCTIC ALASKA. PAGES 109-118 IN J.B. REYNOLDS, ED., FISH ECOLOGY IN ARCTIC NORTH AMERICA. AMERICAN FISHERIES SOCIETY SYMPOSIUM 19, BETHESDA, MARYLAND.

CARL, L., M.-F. BERNIER, W. CHRISTIE, L. DEACON, P. HULSMAN, D. MARALDO, T. MARSHALL, AND P. RYAN. 1990. Fish community and environmental effects on lake trout. Lake Trout Synthesis. Ministry of Natural Resources, Toronto, Ontario.

CLARK, B. J., P. J. DILLON, AND L. A. MOLOT. 2004. Lake trout (*Salvelinus namaycush*) habitat volumes and boundaries in Canadian shield lakes. Chapter 6 *in*: Boreal Shield Watersheds: Lake Trout Ecosystems in a Changing Environment. J.M. Gunn, R.J. Steedman, and R.A. Ryder, Editors. Lewis Publishers, Boca Raton, Florida.

EVANS, D. O. 2005. Effects of hypoxia on scope-for-activity of lake trout: defining a new dissolved oxygen criterion for protection of lake trout habitat. Technical Report 2005-01. Habitat and Fisheries Unit, Aquatic Research and Development Section. Ontario Ministry of Natural Resources, Peterborough, Ontario.

FOOS, A. 2012. Angler Harvest Survey: Ethel Lake 2012. Yukon Fish and Wildlife Branch Report TR-12-28. Whitehorse, Yukon, Canada.

JESSUP, L. G., AND N. MILLAR. 2011. Application of a new method for monitoring lake trout abundance in Yukon: Summer Profundal Index Netting (SPIN). Yukon Fish and Wildlife Branch Report TR-11-11, Whitehorse, Yukon, Canada.

JESSUP, L. AND N. MILLAR. 2012. Lake trout population assessment: Sekulmun Lake 2010. Yukon Fish and Wildlife Branch Report TR-12-12, Whitehorse, Yukon, Canada.

LESTER, N., M. PETZOLD, W. DUNLOP, B. MONROE, S. ORSATTI, T. SCHANER, AND D. WOOD. 1991. Sampling Ontario lake trout stocks: issues and standards. Lake trout synthesis sampling issues and methodology working group, Ontario Ministry of Natural Resources. <http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@letsfish/documents/document/226944.pdf>. Accessed 30 April 2013.

MACKENZIE-GRIEVE, J. L. AND J. R. POST. 2006. Thermal habitat use by lake trout in two contrasting Yukon Territory lakes. Transactions of the American Fisheries Society. 135(3): 727-738.

RYDER, R. A. 1965. A method for estimating the potential fish production of north-temperate lakes. Transactions of the American Fisheries Society. 94: 214-218.

SANDSTOM, S. J., AND N. LESTER. 2009. Summer profundal index netting protocol; a lake trout assessment tool. Ontario Ministry of Natural Resources. Peterborough, Ontario. Version 2009.1. 22p. + appendices.

.

SCHLESINGER, D., AND H. A. REGIER. 1982. Climatic and morphoedaphic indices of fish yields from natural lakes. Transactions of the American Fisheries Society. 111: 141-150.

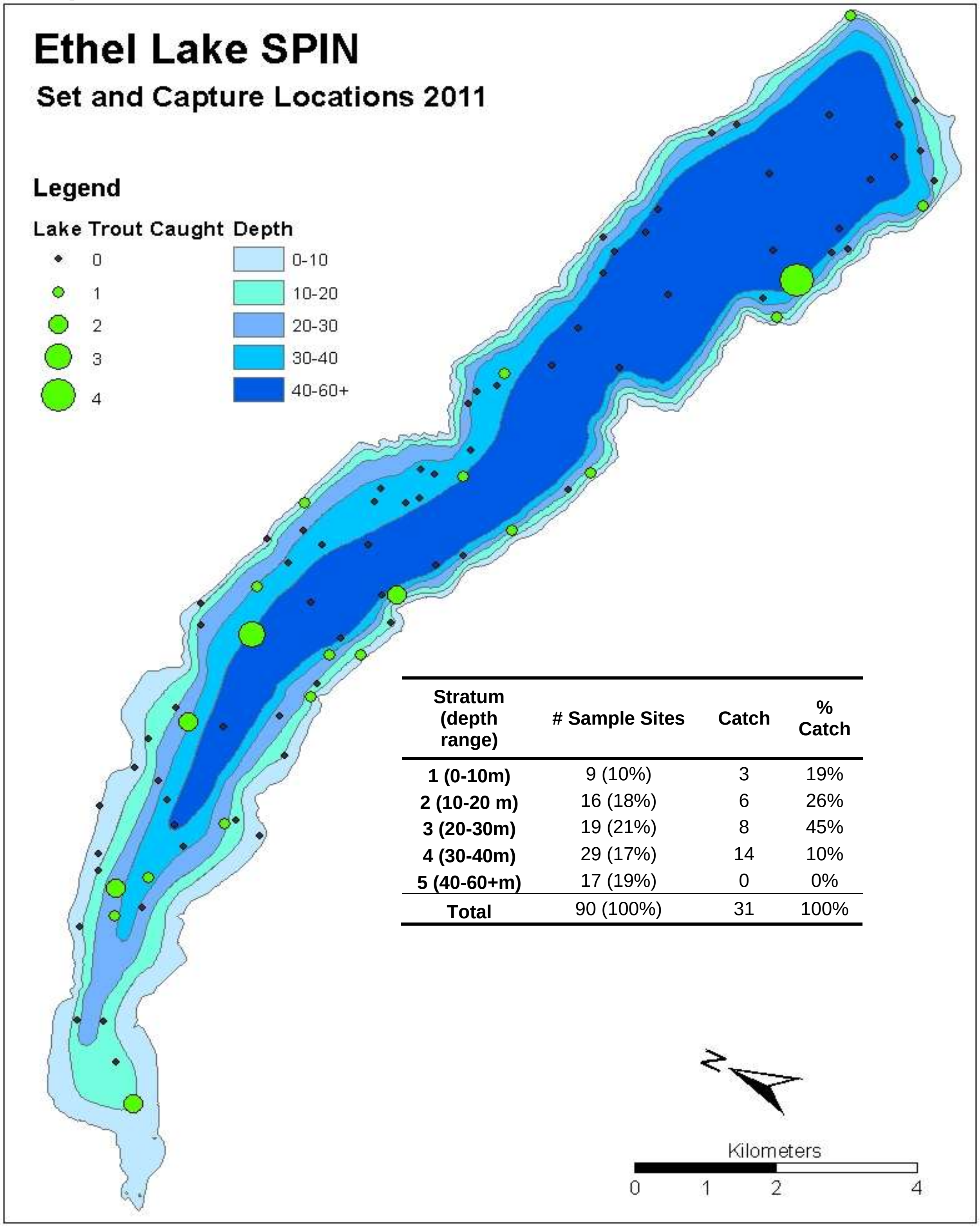
SEIGEL, N., AND C. MCEWEN. 1984. A historical overview of fishing in the Yukon. Northern Biomes Ltd. Environmental Services, Whitehorse, Yukon, Canada

APPENDIX 1 – Estimated CPUE (SPIN) and density from Yukon lakes to date.

Lakes are arranged in descending order of lake trout density (last column). Information on lake trout morphology and life history (small body vs. large body), and the presence of other top predators is included. Lake productivity refers to the annual maximum sustainable yield of all fish in kilograms per hectare. It is estimated following the method proposed by Schlesinger and Regier (1982) of relating mean annual air temperature to the morphoedaphic index (Ryder, 1965). This information is presented so that comparisons can be made between lakes with similar characteristics.

	Lake Characteristics				SPIN Results		
Lake	**Surface Area (ha)**	**Productivity (kg fish / ha)**	**Lake Trout Morphology**	**Other Top Predators**	**Year**	**CPUE**	**Density (fish/ha)**
Caribou	51	3.89	Small body	None	2011	3.63	53.2
Lewes	131	3.17	Small body	None	2010	3.31	48.6
Fish	1386	2.44	Small body	None	2009	2.64	38.9
Kathleen	3398	1.87	Small body	None	2011	2.11	31.2
Louise (Jackson)	68	3.27	Small body	Rainbow trout	2011	2.02	29.8
Fish	1386	2.44	Small body	None	2010	2.01	29.7
Kathleen	3398	1.87	Small body	None	2010	1.94	28.6
Ta’tla Mun	3265	2.05	Large body	Pike/burbot	2011	1.00	4.1
Sekulmun	4985	1.16	Large body	Pike/burbot	2010	0.88	3.7
Ethel	4610	1.42	Large body	Pike/burbot	2011	0.30	2.0
Tarfu	405	2.74	Large body	Pike	2010	0.2	1.7
Pine	603	2.87	Small body	Pike/burbot	2010	0.08	1.5
Snafu	284	3.54	Large Body	Pike	2010	0	0

APPENDIX 2 – Set and capture locations (non-adjusted catch data), 2011 Ethel Lake SPIN.



Stratum (depth range)	# Sample Sites	Catch	% Catch
1 (0-10m)	9 (10%)	3	19%
2 (10-20 m)	16 (18%)	6	26%
3 (20-30m)	19 (21%)	8	45%
4 (30-40m)	29 (17%)	14	10%
5 (40-60+m)	17 (19%)	0	0%
Total	90 (100%)	31	100%

APPENDIX 3 – Capture details, 2011 Ethel Lake SPIN.

Date	Effort (Set #)	Stratum	[1]Species	Fork Length (mm)	Weight (g)	Fate	Sex
July 18, 2011	1	2	No Catch				
July 18, 2011	2	3	LT	475	1150	D	F
July 18, 2011	2	3	LT	640	2800	R	
July 19, 2011	3	3	LT	475	2200	R	
July 19, 2011	4	4	No Catch				
July 19, 2011	5	3	No Catch				
July 19, 2011	6	4	No Catch				
July 19, 2011	7	2	No Catch				
July 19, 2011	8	1	No Catch				
July 19, 2011	9	4	No Catch				
July 19, 2011	10	3	No Catch				
July 19, 2011	11	4	No Catch				
July 19, 2011	12	2	LT	460	1350	R	
July 19, 2011	13	1	AG	375	700	R	
July 19, 2011	13	1	AG	480	1100	R	
July 19, 2011	13	1	AG	405	1000	R	
July 19, 2011	14	4	LW	385	990	R	
July 19, 2011	14	4	LW	370	980	R	
July 19, 2011	15	3	No Catch				
July 19, 2011	16	4	No Catch				
July 19, 2011	17	2	LT	460	1500	R	
July 19, 2011	17	2	LT	290	250	R	
July 19, 2011	17	2	RW	335	600	R	
July 19, 2011	17	2	RW	320	500	R	
July 19, 2011	18	2	No Catch				
July 19, 2011	19	2	LT	385	650	D	F
July 20, 2011	20	1	LT	370	550	R	
July 20, 2011	20	1	LW	465	1450	D	NA
July 20, 2011	20	1	RW	290	300	RP	
July 20, 2011	20	1	RW	310	400	D	F
July 20, 2011	20	1	RW	330	400	RP	
July 20, 2011	20	1	RW	310	400	RP	
July 20, 2011	20	1	RW	295	300	RP	
July 20, 2011	20	1	RW	300	350	RP	
July 20, 2011	21	5	No Catch				
July 20, 2011	22	5	No Catch				

[1] AG=Arctic grayling; LT=lake trout; LW=lake whitefish; RW=round whitefish

R=released; RP=released, poor condition; D=dead; ESC=escaped

Appendix 3 Continued

Date	Effort (Set #)	Stratum	[2]Species	Fork Length (mm)	Weight (g)	Fate	Sex
July 20, 2011	24	5	No Catch				
July 20, 2011	25	3	No Catch				
July 20, 2011	26	4	No Catch				
July 20, 2011	27	4	No Catch				
July 20, 2011	28	3	No Catch				
July 20, 2011	29	5	No Catch				
July 20, 2011	30	5	RW	270	200	RP	
July 20, 2011	30	5	RW	250	100	RP	
July 20, 2011	31	5	No Catch				
July 20, 2011	32	2	LT	750	4900	R	
July 20, 2011	32	2	LW	465	1400	R	
July 20, 2011	32	2	LW	450	1300	R	
July 20, 2011	33	3	No Catch				
July 20, 2011	34	4	LT	750	5100	R	
July 21, 2011	35	4	No Catch				
July 21, 2011	36	3	LT	825	7700	R	
July 21, 2011	37	4	No Catch				
July 21, 2011	38	4	No Catch				
July 21, 2011	39	4	LT	780	7400	R	
July 21, 2011	39	4	LT	780	7600	R	
July 21, 2011	39	4	LT	740	5000	R	
July 21, 2011	40	4	No Catch				
July 18, 2011	41	2	No Catch				
July 18, 2011	42	1	LT	415	700	D	Unk
July 18, 2011	42	1	LT	530	1750	D	F
July 18, 2011	42	1	RW	310	350	R	
July 18, 2011	42	1	RW	298	300	R	
July 18, 2011	42	1	RW	284	300	D	M
July 18, 2011	42	1	RW	330	400	R	
July 19, 2011	43	1	LW	520	2100	D	NA
July 19, 2011	44	2	No Catch				
July 19, 2011	45	3	No Catch				
July 19, 2011	46	3	RW	274	250	D	NA
July 19, 2011	46	3	LT	615	2250	R	
July 19, 2011	47	2	No Catch				
July 19, 2011	48	1	No Catch				

[2] AG=Arctic grayling; LT=lake trout; LW=lake whitefish; RW=round whitefish

R=released; RP=released, poor condition; D=dead; ESC=escaped

Appendix 3 Continued

Date	Effort (Set #)	Stratum	Species[3]	Fork Length (mm)	Weight (g)	Fate	Sex
July 19, 2011	49	4	LT	850	8650	R	
July 19, 2011	49	4	LT	460	500	R	
July 19, 2011	49	4	LW	366	700	R	
July 19, 2011	50	1	AG	450	1150	D	M
July 19, 2011	50	1	LW	523	2300	D	F
July 19, 2011	51	3	LT	310	350	D	Unk
July 19, 2011	52	2	No Catch				
July 19, 2011	53	4	LT	325	400	D	Unk
July 19, 2011	54	1	No Catch				
July 19, 2011	55	5	No Catch				
July 19, 2011	56	4	LT	760	6000	R	
July 19, 2011	57	5	No Catch				
July 20, 2011	58	5	No Catch				
July 20, 2011	59	3	No Catch				
July 20, 2011	60	5	No Catch				
July 20, 2011	61	5	LW	464	1220	R	
July 20, 2011	61	5	LW	362	630	R	
July 20, 2011	61	5	RW	281	250	D	M
July 20, 2011	62	2	No Catch				
July 20, 2011	63	5	No Catch				
July 20, 2011	64	4	No Catch				
July 20, 2011	65	5	No Catch				
July 20, 2011	66	5	No Catch				
July 20, 2011	67	2	No Catch				
July 20, 2011	68	5	No Catch				
July 20, 2011	69	4	LT	745	4500	R	
July 20, 2011	69	4	LT	760	6750	R	
July 20, 2011	69	4	LT	780	6250	R	
July 20, 2011	69	4	LT	610	2400	R	
July 20, 2011	70	5	No Catch				
July 20, 2011	71	5	No Catch				
July 20, 2011	72	3	No Catch				
July 21, 2011	73	4	No Catch				
July 21, 2011	74	3	No Catch				
July 21, 2011	75	4	No Catch				
July 21, 2011	76	2	LT	442	975	D	M

[3] AG=Arctic grayling; LT=lake trout; LW=lake whitefish; RW=round whitefish

R=released; RP=released, poor condition; D=dead; ESC=escaped

Appendix 3 Continued

Date	Effort (Set #)	Stratum	[4]Species	Fork Length (mm)	Weight (g)	Fate	Sex
July 21, 2011	77	4	No Catch				
July 21, 2011	78	4	No Catch				
July 21, 2011	79	3	No Catch				
July 21, 2011	80	4	No Catch				
July 21, 2011	81	1	AG	420	950	R	
July 21, 2011	81	1	LW	551	2435	D	F
July 21, 2011	81	1	RW	325	375	D	F
July 21, 2011	82	4	LW	347	610	D	F
July 21, 2011	82	4	LW	389	760	D	M
July 21, 2011	82	4	RW	270	250	D	M
July 21, 2011	83	4	No Catch				
July 21, 2011	84	2	No Catch				
July 21, 2011	85	3	No Catch				
July 21, 2011	86	4	LT	370	550	D	M
July 21, 2011	87	3	LT	360	500	RP	
July 21, 2011	87	3	LW	360	600	D	M
July 21, 2011	88	4	No Catch				
July 21, 2011	89	2	No Catch				
July 21, 2011	90	4	LT	330	400	R	
July 21, 2011	90	4	LW	225	200	D	NA

[4] AG=Arctic grayling; LT=lake trout; LW=lake whitefish; RW=round whitefish

R=released; RP=released, poor condition; D=dead; ESC=escaped