Bear Lake
(Monteith Geographic Township)

Synoptic Trapnet Survey Report

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Executive Summary:

During the late spring of 2001 the Ministry of Natural Resources conducted a synoptic trapnet survey on Bear Lake in the Geographic Township of Monteith. The primary objective of the survey was to assess the status of the walleye population in the lake as well as other species in the near-shore fish community. Secondarily, the Bear Lake Cottage Association had approached the Ministry of Natural Resources with a proposal to conducted walleye spawning bed enhancement work to increase productivity of this species. Determining the status of the walleye population would assist in the evaluation of such a proposal. The survey also provided a fortuitous opportunity to evaluate the 1987 introduction of largemouth bass for the purpose of establishing a self-sustaining population.

In the form of a "Report Card", we compared a number of indices of population and community status with similar surveys conducted on other Parry Sound Area walleye lakes. Overall, we consider the Bear Lake fish community to be in excellent condition, dominated by walleye and northern pike. Abundance and productivity of these species are very high. We do express some concern that the mortality rate for adult walleye appears to be very high. We note that walleye reproduction and recruitment rates are excellent and we doubt the necessity or wisdom of conducting spawning bed enhancement work for this species.

By comparison, the smallmouth bass population is not doing well. Low abundance indices are unchanged from those observed in the 1986 Bear Lake synoptic survey. We attribute this condition to sub-optimal habitat conditions for this species in the lake. The 1987 introduction of largemouth bass to create a self-sustaining population appears to have been a failure. No largemouth bass were caught during this survey.

Table of Contents

		Page
1.0	Introduction ……..	3
2.0	Methods ……	4
3.0	Results and Discussion	
3.1	Catch Composition and Productivity ……..	7
3.2	Walleye ……	8
3.3	Smallmouth Bass …….	10
3.4	Northern Pike ……..	11
3.5	Largemouth Bass …….	12
3.6	Other Species ……...	12
4.0	Conclusions ……...	13
5.0	Acknowledgements ……	14
6.0	Literature Cited ……..	14
Appendix A – Catch Summary for Bear Lake Synoptic Trapnet Survey Summer, 2001 ……		15
Appendix B – Bear Lake Walleye Biosampling Data …….		16
Appendix C – Bear Lake Smallmouth Bass Biosampling Data ……..		17
Appendix D – Bear Lake Northern Pike Biosampling Data ……		18
Appendix E – Bear Lake Coarse Fish Weights ……		19

1.0 Introduction:

Bear Lake in Monteith Geographic Township is a 'medium size' lake at 352 hectares (869 acres). It is relatively shallow with a maximum depth of 7.6 metres (25') and a mean depth of 2.3 meters (7.5') (OMNR, 1975). Shoreline perimeter is 14.2 kilometers. Watercolour is yellow-brown with secchi readings of 2.0 metres (OMNR, 2001) – which is optimal for walleye. The pH of the water is slightly acidic (6.0 – 6.5) with low alkalinity levels (6.8 – 13.7 mg/l) (OMNR, 1975). Total Dissolved Solids (TDS) is low at 20 mg/l (OMNR, 2001).

The Ministry of Natural Resources' predecessor - the Department Lands and Forests (L & F) first surveyed the lake in 1953. Forty-one cottages were reported present at the time. Smallmouth bass was the only game fish mentioned as being present. This was attributed to previous bass plantings by L & F that commenced in 1943. Other species recorded included: yellow perch, pumpkinseed, brown bullhead and a large population of common white suckers (OMNR, 1953). L & F stocked the lake 11 times with smallmouth bass between 1943 and 1973.

The Department of Lands and Forests conducted an additional survey in 1964. Sixty cottages were present at that time (OMNR, 1964). The presence of northern pike was documented for the first time. The survey noted that locals had conducted an unauthorized introduction of northern pike in 1956 or '57. Both smallmouth bass and northern pike populations were well established, but no walleye were present.

An introductory planting of two hundred thousand walleye eggs was made by the Dept. of Lands and Forests in 1949. The absence of walleye in either the 1953 or 1964 surveys suggests it was an unsuccessful introduction. However, in 1975 the Ministry of Natural Resources conducted a standardized *Aquatic Habitat Inventory Survey* and reported good pickerel fishing by local residents despite not catching a single walleye in four over-night gill net sets. Only 7 pike and 2 smallmouth bass were captured. This survey first documented the presence of rock bass and Iowa darter in the lake. Also of interest in the report is the contradictory statement: "In spite of reports of good pickerel fishing this lake does not appear to have any potential for walleye."

An introductory planting of 5,000 largemouth bass fry was made in 1970. In 1979, a contaminant monitoring survey captured golden shiner – the first documentation of this species being present in the lake. Interestingly, no walleye were captured in this netting survey either. In 1998, the presence of johnny darter was documented at the outlet of Bear Lake as part of an assessment for a bridge replacement.

The first concerted effort to assess the status of the fish community of Bear Lake was made in 1986. Black (1986) conducted a synoptic trapnet survey using 4', 6' and 8' trapnets. We make numerous comparisons with the 1986 survey in this report. Black's data indicated that northern pike and white sucker dominated the fish community. Smallmouth bass and walleye populations appeared low. One of his recommendations was to introduce largemouth bass.

The report for the 1986 survey represents the first conclusive evidence by the Ministry that walleye had established a self-sustaining population in Bear Lake. This introduction appears to have been an unauthorized initiative by unknown persons, as was the introduction of northern pike in the mid-1950s. A note on the Bear Lake file in the Ministry of Natural Resources office dated July, 1980 and written by Conservation Officer Henry Kujala states: "Information is available that someone on the lake is stocking it with yellow pickerel. Approximately 15 – 20 fish were stocked in 1973 and a few (6 – 10) stocked each year thereafter."

In the summer of 1987, 146 juvenile and adult largemouth bass were transferred from Axe Lake to Bear Lake (Boudreau, 1987). This introduction had not been assessed prior to this report.

In September of 2000, the *Bear Lake Residents Association* approached the Ministry of Natural Resources with an interest in revitalizing the sport fishery. Their focus was on enhancing spawning grounds and possibly restocking of the lake. Considering the last survey on the lake was in 1986, the Ministry responded that there was a need to first assess the current status of the fish community before embarking on rehabilitative work or stocking efforts. This study uses the *Synoptic Trapnet Survey* methodology adopted by the Parry Sound Area to assess walleye and smallmouth bass populations as part of the near-shore fish community. This survey also afforded a fortuitous opportunity to assess the introduction of adult largemouth bass that was conducted in 1987.

2.0 Methods:

Synoptic surveys are intended to provide a 'snapshot in time' of the status of the fish community and individual populations that comprise it. We selected 8' trapnets as the gear of choice due to the non-lethal nature of the gear and it's proven effectiveness at capturing walleye and smallmouth bass – which were the particular species of interest in this survey. Results must be viewed in light of 'species selectivity' of the gear. This is further discussed in the *Results and Discussion* section of the report.

Due to severe limitations that the gear imposes on net set location, netting sites were not pre-determined. Site selection was at the discretion of the field crew. However, site selection was based on the following guidelines:

- The site had to be suitable for the net to fish effectively. (Consequently – factors such as: contours of the lake bottom, absence of obstructions, depth, sufficient lead length, etc. were to be considered.)
- Nets were to fish all habitat types in approximate proportion to their abundance on the lake in order that the catch would reflect the 'whole lake' as accurately as possible.
- Nets were to be set far enough apart such that they were not competing with each other.
- Nets were to be approximately randomly distributed throughout the study area.

We completed 17 over-night, trapnet sets that met the above guidelines. Nets set locations are indicated in Figure 1. It is apparent in Figure 1 that there is an absence of trapnet sets in the northeast corner of the lake. This was due to shallow conditions that precluded 8' trapnet sets being set in this vicinity of the lake. Nets were generally set perpendicular to shore and as depicted in Figure 1.

Field operations were conducted from May 30th to June 8th, 2001.

In this report the unit of effort is recorded as a "net set" – and approximates a set of 24 hours duration. Nets were relocated daily.

Complete catch enumeration was conducted for all sets (Appendix A).

Biosampling data collection for all game fish included total length, fork length and round weight determination (Appendix B – D). Scale samples were also collected for age determination of walleye (Appendix B). For non-game fish, round weights were recorded in order that a *total weight captured* and *mean weight* for non-game fish species could be determined (Appendix E).

Age determination for walleye was by the scale reading method. As there were no known-age walleye in Bear Lake, we had no method of validating the accuracy of our scale aging. Campbell and Babaluk (1979) concluded that scale aging consistently underestimate the true age of walleye – particularly in older age classes. The reader should bear in mind, that our mean age determination (Appendix B) may underestimate the true mean age of walleye that we sampled.

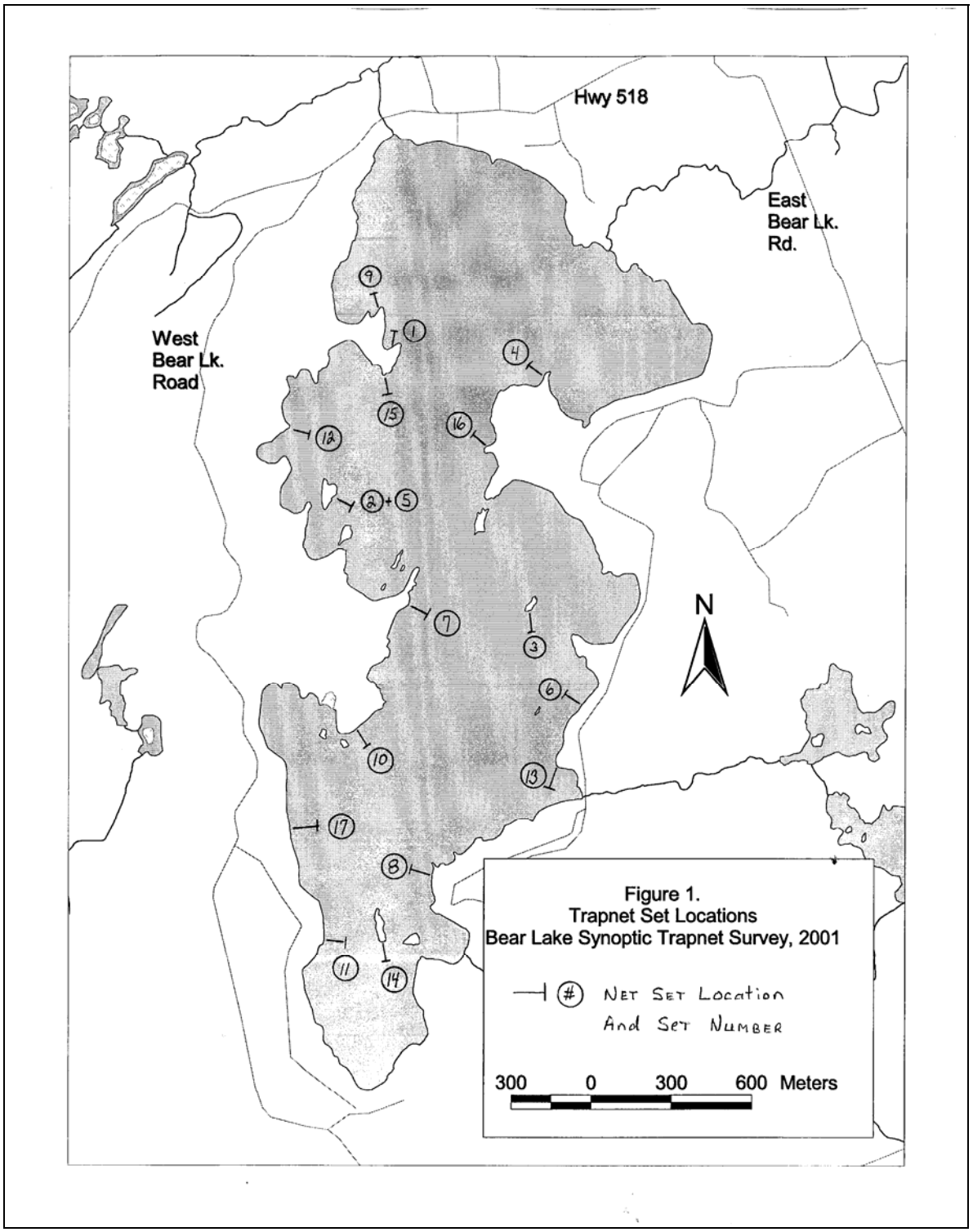
Relative Abundance Analysis and Comparison with other Surveys:

Since 1982, the Ministry of Natural Resources has conducted over 30 synoptic trapnet surveys on various lakes throughout the Parry Sound Area. The primary focus of these investigations has been to assess the status of walleye and smallmouth bass populations and secondarily those of other species in the near-shore fish community.

We use two indices to indicate the abundance and productivity of a particular fish species in the lake community. These are 1) the catch rate or *Catch-Per-Unit-Effort by number (CPUE-no)* and 2) the *Catch-Per-Unit Effort by weight (CPUE-wt).* We use both statistics in conjunction with one another because independently they can be misleading regarding species status. (For instance: A high *CPUE-wt* could be the result of a small number of very large fish being caught or a large number of very small fish being caught. This is clarified when we consider the *CUE-no.)*

We call these "*indices of relative abundance*" because they do not specifically tell us the size of a population. Rather the *CPUE* statistics for a particular species generated on one lake is compared "relative" to that generated on a number of other lakes. Hence the abundance of a fish species on one lake is based on its position relative to a host of other lakes similarly surveyed.

We use size and age distribution data of various game fish species to help give us some insight regarding reproductive, recruitment and mortality rates. We acknowledge that we do not know actual reproductive, recruitment or mortality rates. We simply draw inferences about these rates based on the abundance of size and age classes.


Hwy 518
East
Bear Lk.
Rd.
West
Bear Lk.
Road
N
Figure 1.
Trapnet Set Locations
Bear Lake Synoptic Trapnet Survey, 2001
Net Set Location
And Set Number
300 0 300 600 Meters

3.0 Results and Discussion:

3.1 Catch Composition and Productivity:

A total of 287.82 kilograms of fish comprising 7 different species were caught in 17 overnight trapnet sets (Appendix A). The Catch-Per-Unit-Effort by weight (*CPUE-wt*) was 16.90 kilograms of fish per net set (Appendix A). Relative to 17 synoptic trapnets surveys conducted in recent years (since 1986) in the Parry Sound Area, this index of productivity (i.e. *CPUE-wt*) ranks 8th and is essentially the same as the average for all of these surveys – 17.49 kg. /net set. This index of productivity is up slightly from that observed on Bear Lake during the 1986 survey, which was 13.56 kg. per net set (Black, 1986). **The inference here being that fish productivity has not changed substantially on Bear Lake between this and the 1986 survey, and productivity is approximately equivalent to other similarly surveyed walleye lakes in the Parry Sound Area.**

Game fish (walleye, smallmouth bass, and northern pike) comprise 73.4% of the total biomass catch of 287.82 kilograms (Appendix A). Coarse fish (common white sucker, brown bullhead) comprised 23.9% and pan fish (rock bass, pumpkinseed) comprised 2.3%. This is slightly better than what has been observed in other synoptic trapnet surveys where the average percent of total biomass caught is 63.1% for game fish, 33.8% for coarse fish and 3.1% for pan fish. Furthermore, it is almost identical to what was observed on Bear Lake in the 1986 synoptic trapnet survey (Table 1).

What is noteworthy however, is that walleye comprised an impressive 45% of the total catch weight of 287.82 kilograms. This was followed by northern pike at 20.9%, brown bullhead – 15.4%, common white sucker – 8.5%, smallmouth bass – 7.5%, rock bass – 2.3% and pumpkinseed at less than 0.1% (Table 1 and Appendix A).

Table 1. Catch composition comparison between Bear Lake synoptic trapnet surveys and the average of 17 similar surveys conducted on Parry Sound Area lakes.

	Bear Lake 2001 Survey	Bear Lake 1986 Survey	Average of 17 other surveys
CPUE-wt	16.896 kg. / net set	13.558 kg./ net set	17.49 kg. / net set
Species composition of Catch Biomass – by %			
Walleye	45.0 %	10.0%	23.9 %
Northern pike	20.9 %	56.2 %	N/A
Brown bullhead	15.4 %	0.0 %	N/A
Common Wt. Sucker	8.5 %	22.8 %	N/A
Smallmouth Bass	7.5 %	7.2 %	N/A
Rock Bass	2.3 %	3.6 %	N/A
Pumpkinseed	< 1 %	< 1 %	N/A
Game Fish	73.4 %	73.5 %	63.1 %
Coarse Fish	23.9%	22.8 %	33.8 %
Pan Fish	2.3 %	3.7 %	3.1 %

By contrast, in 1986, walleye only comprised 10.0% of the fish biomass caught and northern pike 56.2%. Smallmouth bass was 7.2% (largely unchanged) and white sucker – 22.8%. **Clearly walleye have enjoyed a tremendous increase in abundance and representation in the catch composition since the 1986 survey.** Conversely, the percentage of northern pike in the catch biomass has decreased considerably – largely due the smaller mean size of pike captured in this survey, - 1370 grams (Appendix D) versus 2860 grams observed in the 1986 survey (Black, 1986).

We emphasize that catch composition results from our nets are not representative of relative species abundance in the fish community. Eight-foot trapnets exhibit species selectivity in their catch due to the nature of the gear. The 'capture portion' of these nets (i.e. "crib") is typically placed well offshore (100 – 150') in depths of 2.5 to 5.0 metres (8 – 18 feet). Consequently, near-shore species such as largemouth bass, rock bass, pumpkinseed and yellow perch are not particularly vulnerable to the gear and are undoubtedly under-represented in the catch relative to their actual abundance in the fish community. Also, because the gear relies on fish to actively swim into it, sedentary species such as northern pike that are 'ambush feeders' are normally under-represented in the catch. Conversely eight-foot trapnets are very effective at capturing walleye and smallmouth bass which are normally the species we are most interested in and target in this survey design.

We captured 7 different fish species - that is 'average' for synoptic surveys conducted in the Parry Sound Area.

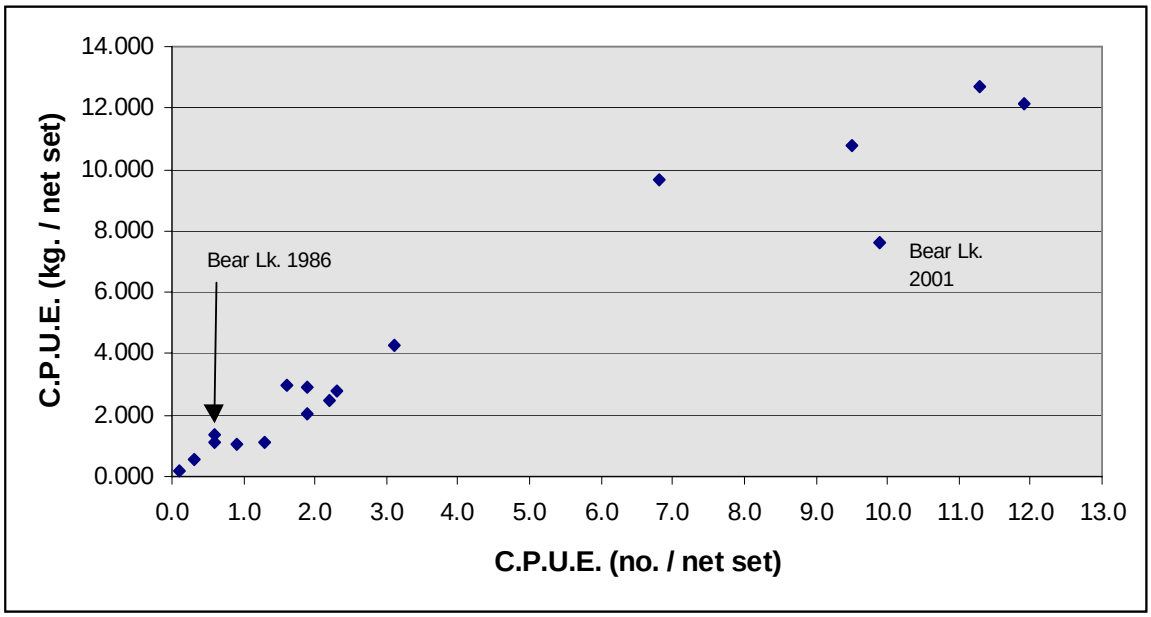
3.2 Walleye:

Our walleye *CPUE-no* was 9.9 walleye per net set (standard error of 4.7) (Appendix A). Relative to 25 other surveys for which this statistic is available, Bear Lake ranks 4th and well above the average walleye *CPUE-no* of 4.0 fish per net set.

Our *CPUE-wt* for walleye was 7.619 kilograms of walleye caught per net set. Relative to 17 other surveys for which this statistic is available, Bear Lake ranks 5th and well above the average walleye *CPUE-wt.* of 4.455 kg. / net set.

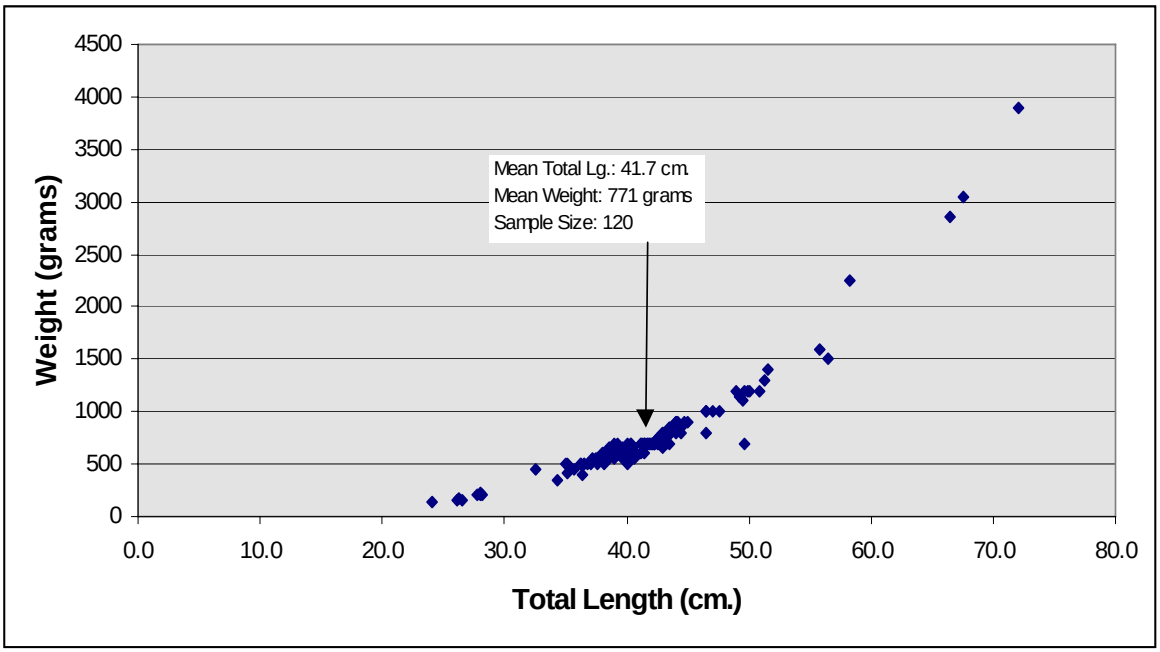
(*We note that the above two indices are not necessarily being compared with exactly the same surveys conducted on other Parry Sound Area walleye lakes. Surveys conducted prior to 1994 did not calculate CPUE-weight. Hence, for surveys conducted prior to this we can only compare CPUE-number. The 1986 Bear Lake survey is an exception because we re-worked the data from this survey to calculate CPUE-weight. Also, we filtered our synoptic survey database to eliminate repetitive surveys where the same lake was surveyed more than once. In these instances we always used the most recent survey for comparative purposes. Of course, the only exception being the 1986 survey on Bear Lake which we have included for comparative purposes.)*

Figure 2. Walleye *CPUE-no* versus walleye *C.P.U.E-wt.* for 17 synoptic trapnet surveys recently conducted in the Parry Sound Area.



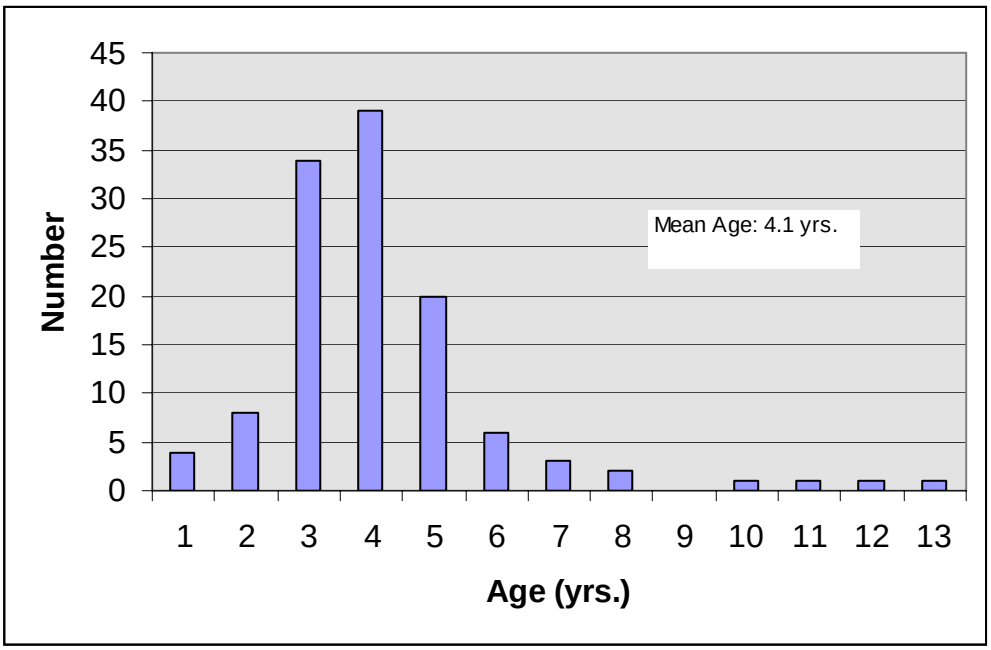
Both of the above indices (*CPUE-no & CPUE-wt*.) point to a high abundance of walleye on Bear Lake in 2001 relative to other walleye lakes similarly surveyed in the Parry Sound Area. We also note a significant improvement in these indices for walleye over that which was observed in the 1986 survey on Bear Lake (Figure 2).

Figure 3. Size distribution of walleye sampled from Bear Lake, 2001.



Of the total walleye catch of 168, we sampled the first 120 walleye captured. Mean size of walleye captured was 41.7 cm. (16.5") total length and 771 grams (1.7 pounds) (Figure 3 – above, and Appendix B). Mean age was 4.1 years (Figure 4 and Appendix A).

Figure 4. Age class distribution of walleye sampled from Bear Lake. N = 120

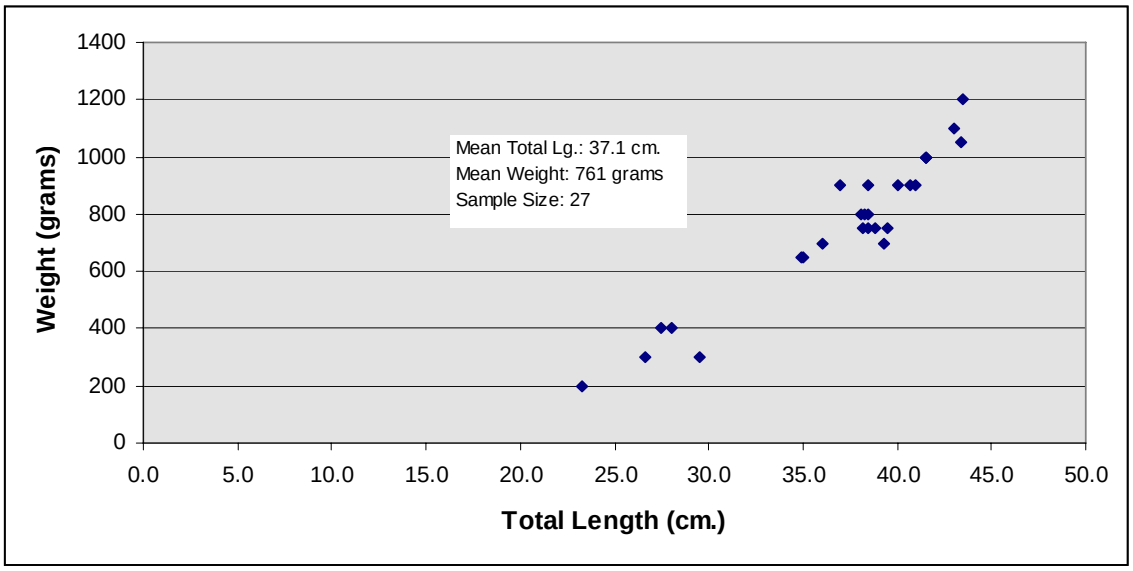


Age and size class distribution of walleye (Figures 3 & 4) are indicative of a highly productive population with excellent levels of reproduction and recruitment. However, the age class structure also displays very high mortality in the adult population – after age 4. We strongly suspect that this mortality is largely attributable to a very active sport fishery with high levels of exploitation and harvest. Admittedly this is an assumption on our part as we have no angling data to substantiate this. Notwithstanding the fact that walleye are very abundant in Bear Lake and are reproducing at a high rate, the scarcity of older, large walleye may be symptomatic of significant angling pressure and harvest.

3.3 Smallmouth Bass:

Smallmouth bass abundance in Bear Lake is relatively low. Our smallmouth bass *CPUE-no* was 1.6 bass per net set (standard error 0.5) (Appendix A). This is well below the average of 5.1 from 24 comparable synoptic trapnet surveys conducted in the Parry Sound Area (since 1987). However, it is essentially the same as the *CPUE-no* of 1.2 bass per net set observed in the 1986 synoptic trapnet survey on Bear Lake (Black, 1986). We strongly suspect that the low abundance of smallmouth bass in Bear Lake is largely attributable to the marginal habitat available for this species.

Figure 5. Size distribution of smallmouth bass sampled from Bear Lake, 2001 synoptic trapnet survey.



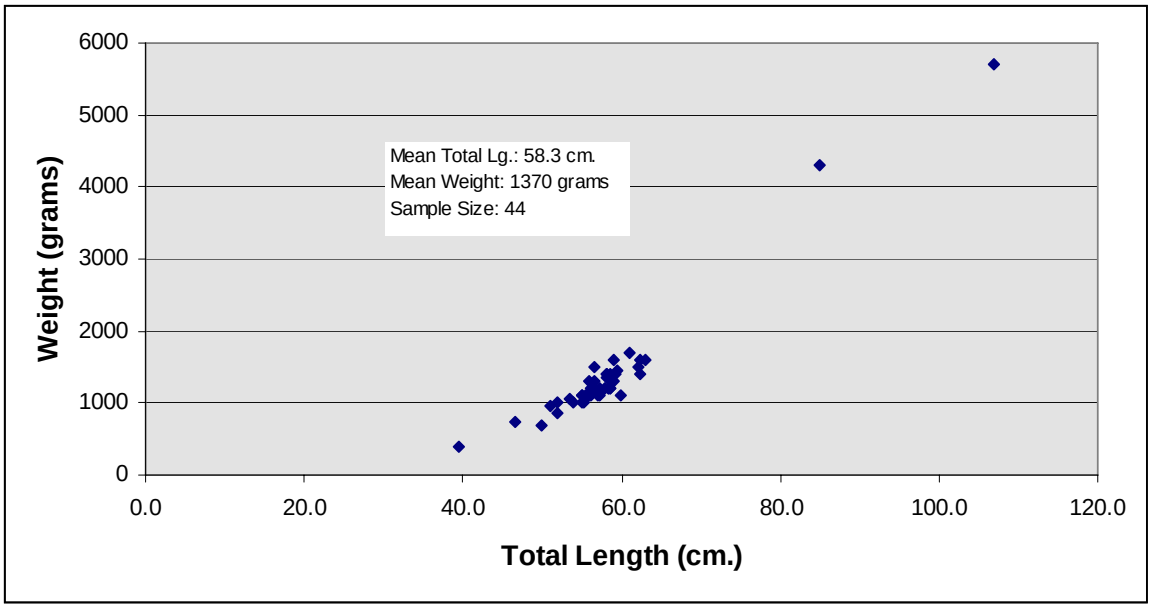
We sampled all 27 smallmouth bass captured in this survey. Mean total length was 37.1 cm. (14.5") and mean weight was 761 grams (1.7 pounds) (Figure 5 and Appendix C). Our size distribution suggests that smallmouth bass reproductive and recruitment rates are low, but mortality does not appear particularly high in the adult population. We suspect that this is symptomatic of a small population with low levels of reproduction, and seemingly a low adult mortality rate. The population is probably quite healthy and sustainable, although of a small size and not very productive.

3.4 Northern Pike:

Indices of abundance for northern pike must be viewed in light of the fact that this species is typically under represented in the catch relative to its abundance in the lake. Because of the low catch rate for this species, it is more difficult to ascertain what constitutes a high or low abundance.

Our northern pike *CPUE-no* was 2.6 pike per net set (standard error 0.6) (Appendix A). This is almost identical to the 2.7 pike per net set observed in the 1986 survey (Black, 1986), suggesting that pike abundance has remained constant. The mean *CPUE-no* for 21 synoptic trapnet surveys that have caught pike is 1.2 per net set. Although this may not seem like a huge difference with what we observed (2.6), it is when one considers that our *CPUE-no* ranks 1st out of those 21 comparable surveys and is more than two times the average catch rate for pike. We conclude that northern pike abundance is high on Bear Lake relative to other lakes containing pike in the Parry Sound Area that have been similarly surveyed.

Figure 6. Size distribution of northern pike sampled from Bear Lake, synoptic trapnet survey, summer 2001.



We sampled all 44 northern pike caught in the survey. Mean total length was 58.3 cm. (23") and mean weight was 1370 grams (3 pounds) (Figure 6 and Appendix D). We note the apparent tight clustering of pike samples about the mean size. Perhaps the scarcity of pike greater than 65 cm. may be indicative of high exploitation and mortality, similar to what we suspect for walleye.

Noteworthy is the fact that the mean size of pike captured in this survey (Figure 6) is considerably smaller than that observed by Black (1986) in the 1986 survey. In that survey, pike averaged 2860 grams (6.3 pounds), more than double that which we observed.

3.5 Largemouth Bass:

In 17 overnight, 8' trapnet sets we failed to capture a single largemouth bass in Bear Lake. Largemouth bass typically reside in very shallow waters close to shore and therefore are not highly vulnerable to 8' trapnets. In 15 synoptic trapnet surveys conducted in the Parry Sound Area that have captured largemouth, the average *CPUE-no* has only been 1.1 per net set. Nonetheless, the complete absence of largemouth in our survey is a 'strong indicator' that the introductory planting of 146 juvenile and adult largemouth bass in 1987 has failed to establish a self-sustaining population.

3.6 Other Species:

Due to gear selectivity and habitat considerations, brown bullhead, rock bass and pumpkinseed are not caught in numbers proportionate to their abundance in the fish community. For this reason we draw no conclusions on the abundance of these species in Bear Lake. Catch-Per-Unit-Effort by number (*CPUE-no*) for common white sucker was 2.1 per net set (standard error 0.6)

(Appendix A). This is 'average' for similar synoptic trapnet surveys conducted on Parry Sound Area lakes.

We computed mean weights from a representative sample of common white sucker, brown bullhead, rock bass and pumpkinseed captured in the survey (Appendix E). We found nothing of a highly significant nature in this data which was typical for these species.

4.0 Conclusions:

Bear Lake Report Card - 2001				
Parameter / Indicy	Bear Lake 2001 Observation	Reference Value (Average)	Interpretation (+ / - rating relative to Reference Value)	Grade
Productivity Overall CPUE-wt.	16.90 kg./set	17.49 kg. / set	Average	C
% Game Fish (catch composition)	73.4% of total biomass caught	66.0%	+ Good	C+
Walleye CPUE-no.	9.9 walleye / net set	4.0	+ Very Good	A
Walleye CPUE-wt.	7.619 kg. / net set	4.455	+ Very Good	A
Mean Age of Walleye	4.1 years	-	Good Reproduction but high adult mortality	C+
Mean Wt. of Walleye	771 grams	-	Good	C+
Smallmouth bass CPUE-no.	1.6 per net set	5.1	- Low Abundance	D
Northern pike CPUE-no.	2.6 per net set	1.2	+ High Abundance	A
Largemouth bass CPUE-no.	0.0 per net set	1.1	Introduction probably A failure	F
Overall, the fishery of Bear Lake appears to be excellent condition in 2001 with walleye and northern pike dominating the fish community and exhibiting excellent levels of reproduction and recruitment.				B

We present a hypothetical "Report Card" (above) for the Bear Lake fishery. We caution the reader that the 'grading' is somewhat arbitrary in that we have no specified criteria as to what constitutes an "A" or a "D". We do use the 'reference values' as indicating "average" conditions where this statistic is available.

We rate the walleye and northern pike populations as being in 'excellent condition' relative to comparable surveys that have been conducted in the Parry Sound Area. We express some concern that the mortality rate for adult walleye may be high. We suspect this is probably the

result of considerable fishing effort and harvest. We note that walleye reproduction and recruitment are excellent. We very much doubt the necessity or wisdom for any spawning bed enhancement work for this species.

By comparison, the smallmouth bass population is not doing well. However, we ascribe this condition as being primarily related to the sub-optimal habitat for this species on Bear Lake. The 1987 introduction of largemouth bass to create a self-sustaining population appears to have been a failure.

Overall, we are pleased to report that the fish community of Bear Lake is dominated by highly desirable game fish that are providing highly productive, natural, self-sustaining populations.

5.0 Acknowledgements:

Jim Palmer capably supervised Field operations with assistance from Dean Timson, Miles Segmiller and Eric McIntyre. We especially thank Mr. Bill Fisher, representative of the Bear Lake Cottage Association, for his voluntary assistance with trapnetting operations.

6.0 Literature Cited:

Black, R. 1986. Bear Lake trapnet survey, July 1986. OMNR Parry Sound District fisheries file report. 13 p.

Boudreau, T.A. 1987. Largemouth bass introductions made in the Parry Sound District – 1987. OMNR Parry Sound District fisheries file report. 13 p.

Campbell, J.S. and J.A. Babaluk. 1979. Age determination of walleye, Stizostedion vitreum vitreum (Mitchell) based on the examination of eight different structures. Fisheries & Marine Service Technical Report No. 849, Department of Fisheries and the Environment, Winnipeg, Manitoba. 23 p.

OMNR, 1953. Lake survey report. OMNR Parry Sound District fisheries file document (found on lake file).

OMNR, 1964. Lake survey report. OMNR Parry Sound District fisheries file document (found on lake file).

OMNR, 1975. Aquatic Habitat Inventory Report (Lake Survey). OMNR Parry Sound District fisheries file report (found on lake file).

OMNR, 2001. Raw data (as yet unreported) of TDS and secchi readings on walleye lakes in the Parry Sound Area. OMNR Parry Sound District fisheries files.

Appendix A

Catch Summary for Bear Lake Synoptic Trapnet Survey, Summer, 2001

Net Set Number	Effort (Net Nights)	Net Depth (meters)	Catch							
			Walleye	SM.Bass	N.Pike	C.W. Sucker	Brown Bullhead	Rock Bass	Pumpkin-seed	
1	1	3.8	8	3	3	0	0	0	0	
2	1	3.3	0	3	0	0	0	0	0	
3	1	2.7	1	0	2	5	2	0	0	
4	1	3.9	81	7	7	2	31	7	0	
5	1	2.7	0	0	5	0	0	0	0	
6	1	2.3	2	6	4	6	5	1	0	
7	1	3.7	0	0	0	0	1	0	0	
8	1	4.6	10	0	2	3	1	0	0	
9	1	3.4	5	3	1	5	8	9	3	
10	1	4.6	0	0	0	0	0	3	0	
11	1	4.6	1	0	0	5	1	3	0	
12	1	4.0	23	2	4	7	16	5	0	
13	1	2.3	1	0	8	0	0	1	0	
14	1	2.9	7	0	2	1	0	0	0	
15	1	3.2	9	1	3	0	10	8	0	
16	1	4.9	3	0	0	0	1	0	0	
17	1	3.2	17	2	3	2	1	7	0	Grand Totals
Total Catch by species			168	27	44	36	77	44	3	399
CPUE (no.)			9.9	1.6	2.6	2.1	4.5	2.6	0.2	
Standard Error of CPUE			4.718	0.536	0.594	0.612	1.980	0.800	0.176	
Median			3	0	2	1	1	1	0	
Standard Deviation			19.451	2.210	2.451	2.522	8.163	3.299	0.728	
Sample Variance			378.360	4.882	6.007	6.360	66.640	10.882	0.529	
Confidence Level(95.0%)			10.001	1.136	1.260	1.297	4.197	1.696	0.374	
Sample Size (Count)			17	17	17	17	17	17	17	
Total Weight (kg.)			129.528	21.550	60.300	24.531	44.352	6.512	1.050	287.823
% of Total Catch Weight			45.00%	7.48%	20.96%	8.52%	15.41%	2.26%	0.00%	99.63%
CUE (wt) (kg./net set)			7.619	1.268	3.547	1.443	2.609	0.383	0.061	16.896
Mean Weight (grams)			771	798	1370	1443	576	148	350	
Sample Size			120	27	44	15	23	24	3	

Appendix B

Bear Lake Walleye Biosampling Data

Total Lg. (cm)	Fork Lg. (cm)	Wt. (gr.)	Age (yr.)	Total Lg. (cm)	Fork Lg. (cm)	Wt. (gr.)	Age (yr.)	Total Lg. (cm)	Fork Lg. (cm)	Wt. (gr.)	Age (yr.)	Total Lg. (cm)	Fork Lg. (cm)	Wt. (gr.)	Age (yr.)
39.7	37.1	550	4	41.7	39.1	700	3	40.1	37.6	600	3	42.0	39.3	700	3
26.5	24.6	160	1	26.1	24.3	160	1	38.2	35.7	550	3	42.5	40.0	700	4
35.7	33.7	450	3	24.0	22.3	130	1	28.0	26.6	220	2	37.6	35.0	500	3
40.6	37.6	550	4	26.2	24.3	170	1	44.0	41.1	900	5	42.5	39.6	750	4
41.6	39.0	700	5	66.5	63.2	2850	13	38.1	36.0	550	3	40.5	38.1	650	3
36.4	34.2	400	3	67.5	63.7	3050	12	42.6	40.0	700	4	40.3	38.1	700	4
40.2	37.5	550	4	42.9	40.0	650	4	38.5	36.1	550	3	49.7	39.3	700	4
56.5	52.7	1500	7	39.0	36.3	550	3	35.1	33.0	420	2	36.8	34.4	500	3
44.7	42.5	900	5	49.9	47.0	1200	6	41.1	38.9	600	3	50.9	47.6	1200	6
37.0	34.5	500	3	43.5	40.5	850	5	41.5	38.9	600	3	41.8	39.1	700	3
38.5	36.5	650	3	50.0	46.6	1200	6	43.2	40.5	700	4	40.0	37.6	700	4
39.6	37.2	600	3	51.3	48.0	1300	7	44.2	41.6	900	5	51.5	48.3	1400	8
40.5	37.9	650	3	49.0	46.2	1200	6	32.6	30.6	450	3	46.5	43.3	1000	5
46.5	43.7	1000	5	42.2	39.9	700	5	39.1	36.5	600	4	42.9	40.1	750	5
42.1	39.5	700	4	49.6	46.5	1200	6	38.5	35.9	600	3	58.2	54.2	2250	10
42.8	40.0	700	4	47.0	44.2	1000	5	42.1	39.4	700	4	47.6	45.0	1000	5
44.4	41.7	850	4	40.8	37.9	600	4	43.6	41.4	800	5	46.5	43.8	800	4
28.2	26.0	210	2	55.8	52.4	1600	8	27.7	26.1	200	2	41.2	39.1	700	4
43.4	40.4	800	5	40.1	37.2	500	3	41.1	38.5	700	4	72.0	68.8	3900	11
39.3	36.8	700	4	43.5	40.8	700	4	43.5	40.3	800	5	39.1	36.0	600	3
35.0	33.0	500	2	49.2	46.3	1150	7	41.5	38.5	700	5	42.0	39.3	700	4
38.1	35.5	600	3	43.0	40.0	800	6	42.3	40.0	700	4	39.6	37.0	650	3
40.3	37.3	700	4	38.0	35.4	600	4	36.5	33.8	500	3	42.3	39.7	700	4
39.0	36.6	700	4	28.1	26.1	200	2	35.1	32.6	500	3	37.6	35.0	550	3
42.8	39.6	700	4	36.5	34.1	500	3	45.0	42.0	900	5	37.5	35.2	550	3
42.6	39.8	700	4	41.3	38.8	700	4	34.3	32.1	340	2	38.1	35.3	500	4
44.5	41.6	800	4	44.0	41.4	900	5	41.4	39.0	700	4	44.1	41.2	800	4
40.0	37.2	600	3	42.3	39.2	700	4	41.9	39.2	700	4	41.5	38.5	700	4
49.5	46.5	1100	5	42.5	39.8	750	4	36.2	33.8	500	3	36.2	33.6	500	3
37.2	34.7	550	2	43.0	40.5	800	5	41.7	39.1	700	3	43.2	40.5	750	5

Mean	41.7	39.0	771	4.1
Standard Error	0.660	0.632	45.960	0.174
Standard Deviation	7.293	6.920	503.500	1.907
Confidence Level(95.0%)	1.318	1.251	91.012	0.345
Sum			92460	
Count	120	120	120	120

Appendix C

Bear Lake – Smallmouth Bass Biosampling Data

	Net Set Number	Total Length (cm)	Fork Length (cm)	Round Weight (grams)
	1	43.4	40.8	1050
	1	38.8	36.3	750
	1	38.2	36.4	750
	2	27.5	26.4	400
	2	23.3	21.9	200
	2	28.0	27.0	400
	4	39.5	37.1	750
	4	43.0	41.0	1100
	4	38.3	36.2	800
	4	36.0	34.1	700
	4	26.6	25.1	300
	4	40.7	38.1	900
	4	38.5	36.2	800
	6	41.5	39.5	1000
	6	35.0	33.4	650
	6	41.5	39.6	1000
	6	34.9	33.1	650
	6	39.3	37.3	700
	6	41.0	39.0	900
	9	38.5	36.6	750
	9	29.5	27.7	300
	9	41.5	39.2	1000
	12	38.1	36.6	800
	12	40.0	37.5	900
	15	43.5	41.4	1200
	17	37.0	34.6	900
	17	38.5	36.5	900
Mean		37.1	35.1	761
Standard Error		1.052	0.993	49.162
Standard Deviation		5.467	5.161	255.453
Sample Variance		29.886	26.640	65256.410
Confidence Level(95.0%)		2.163	2.042	101.054
Sum				20550
Count		27	27	27

Appendix D

Bear Lake – Northern Pike Biosampling Data

Net Set Number	Total Length (cm.)	Fork Length (cm.)	Round Weight (grams)	Net Set Number	Total Length (cm.)	Fork Length (cm.)	Round Weight (grams)
1	59.8	56.6	1100	9	56.0	52.9	1100
1	49.9	47.1	700	12	59.5	56.3	1450
1	55.0	51.6	1000	12	58.5	54.7	1200
3	59.0	56.5	1600	12	56.6	53.3	1500
3	58.5	56.0	1400	12	58.2	55.1	1350
4	62.3	58.5	1400	13	58.0	54.8	1200
4	51.8	48.5	850	13	56.5	53.5	1300
4	55.5	52.4	1100	13	57.0	54.4	1100
4	55.3	52.1	1000	13	51.0	48.3	950
4	39.5	37.0	400	13	46.5	44.0	750
4	58.6	55.3	1200	13	56.0	52.9	1300
4	56.1	52.9	1100	13	54.0	50.9	1000
5	58.3	55.0	1200	13	56.5	54.4	1200
5	57.2	54.0	1100	14	59.1	55.7	1300
5	58.4	55.0	1200	14	58.2	54.6	1400
5	57.2	54.0	1200	15	51.8	49.0	1000
5	56.2	53.2	1200	15	59.3	56.0	1400
6	63.0	59.3	1600	15	62.0	58.6	1500
6	55.1	51.8	1100	17	58.1	54.9	1400
6	107.0	102.0	5700	17	53.5	50.8	1050
6	85.0	81.0	4300	17	62.4	58.9	1600
8	61.0	57.6	1700				
8	55.0	51.7	1100				

Mean	58.3	55.1	1370
Standard Error	1.452	1.398	128.717
Standard Deviation	9.634	9.272	853.809
Sample Variance	92.820	85.977	728990.486
Confidence Level(95.0%)	2.929	2.819	259.582
Sum			60300
Count	44	44	44

Appendix E

Bear Lake – Coarse Fish Weight

Species:	C.White Sucker	Brown Bullhead	Rock Bass	Pumpkin seed
(Note: Weight in grams)	1600	450	200	300
	1500	450	100	400
	1500	1000	125	350
	1700	500	125	
	1500	500	110	
	1600	450	120	
	1500	600	80	
	1600	500	150	
	1200	600	100	
	1600	600	80	
	600	600	150	
	1500	700	140	
	2000	550	140	
	1250	650	110	
	1000	500	100	
		550	300	
		500	200	
		700	210	
		900	220	
		450	120	
		300	250	
		600	140	
		600	70	
			210	
Mean	1443	576	148	350
Standard Error	84.356	31.257	12.019	28.868
Standard Deviation	326.708	149.901	58.883	50.000
Sample Variance	106738.095	22470.356	3467.210	2500.000
Confidence Level(95.0%)	180.925	64.822	24.864	124.207
Sum	21650	13250	3550	1050
Count	15	23	24	3