Manitouwabing Lake

2004 *End of Spring Trapnet* (ESTN) Survey Report

Eric McIntyre
Parry Sound Area Fisheries Biologist

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Executive Summary:

During May and June of 2004, an *End of Spring Trapnet* (ESTN) survey was conducted on Manitouwabing Lake. The purposes of this survey were:

- To assess the status of the near shore fish community and in particular the walleye population;
- To evaluate the impact of recent walleye fry plantings by the Manitou-Seguin Game and Fish Club;
- To evaluate the impact of existing "exception" walleye regulations implemented in 1998; and
- To make informed and appropriate recommendations for Manitouwabing Lake in anticipation of revised walleye regulations for the Southern Region expected in 2007.

The results of this survey are summarized in a 'hypothetical report card' in which we accord Manitouwabing Lake an overall grade of "C". Productivity – as measured by *Catch-Per-Unit-Effort by weight* (CPUE-wt) was exceptionally high; however, over 70% of our catch weight was accorded to brown bullhead. Abundance indices for walleye, smallmouth bass and largemouth bass were somewhat low relative to Provincial and Parry Sound Area lakes, but similar or perhaps slightly better than those observed on the lake in the 1980s. Northern Pike abundance appears slightly higher than the Provincial and Parry Sound 'average' and is equivalent to those observed in the 1980s. Other nearshore species including yellow perch, rock bass and pumpkinseed were caught in very low abundance. This probably is related to the phenomenally high abundance of brown bullhead in Manitouwabing Lake, which appears to be recent development (post 1982).

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1.0 Introduction

At 1,250 hectares in size, Manitouwabing Lake is one of the largest lakes in the Parry Sound Area. The lake is almost wholly located within the Geographic and Municipal Township of McKellar. It is part of the relatively small Seguin River watershed. There are three major inlets (Village of McKellar, inlet from Moffat Lake and the Manitouwabing River) as well as several small ones that drain the surrounding area. The Manitouwabing River exits the lake at Hurdville and the water level is regulated at this site. *Parry Sound Power Generation Corporation* (formerly Parry Sound PUC) own and operate the dam located at Hurdville, for hydroelectric power generation downstream at Parry Sound.

The lake has a maximum depth of 33.6 meters (110 feet) and a mean depth of 5.6 meters (18.4 feet) (OMNR, 1974). The water is darkly stained, meaning it has a yellow brown colour related to high dissolved organic carbon content. The water has low light transparency (secchi reading of 2.3 meters; OMNR, 1974), which is highly favourable for walleye. The lake is readily accessible with numerous roads and public access points available to all sectors of the lake. The picturesque and historic Village of McKellar on Highway 124 is located at the northern extremity of the lake.

The fish community in Manitouwabing Lake is large and complex. The game fish component of the community consists of walleye, northern pike, smallmouth bass, largemouth bass, yellow perch and lake whitefish. Other fish recorded in the lake include: cisco (lake herring), common white sucker, carp, bluntnose minnow, blacknose dace, brown bullhead, rock bass, pumpkinseed and mottled sculpin.

The lake has a long and extensive history of walleye and smallmouth bass plantings. Almost certainly, these species were introduced to the lake. Walleye were first planted in 1938 and smallmouth bass in 1941.

The first reported fisheries work done on the lake was a cursory "*Biological Survey Report*" conducted in 1959 (Rettie, 1959). At that time, the above noted game fish were all present except northern pike. An unreferenced report in the lake file indicates that pike were introduced to the lake by an unauthorized introduction in the 1960s. Also noteworthy was the observation of carp in the lake at this time. This is an anomaly in the Parry Sound Area, as Manitouwabing is the only lake known to contain this species. Another unreferenced note on the lake file indicates carp were introduced "at the turn of the century (1900) or earlier".

In 1974, an *Aquatic Habitat Inventory Survey* (a.k.a. Lake Survey) was conducted that included 9-overnight gillnet sets. Some significant observations from this survey were:

- First documentation of pike being present in the lake;
- Walleye, smallmouth bass and brown bullhead were captured in low number;
- Northern pike, common white sucker, rock bass, yellow perch and cisco, were captured in high number.

This is quite a different catch composition from more recent survey conducted on the lake – including this one, the significance of which is discussed in the report.

Synoptic surveys of the fish community using a combination of 4', 6' and 8'-trapnets as well as gillnets were conducted on Manitouwabing Lake in 1982 (McIntyre, 1983) and 1988 (Sober, 1989). We make extensive comparisons to the results of the 6'-trapnet data collected in these

surveys with those observed in this one. We note significant changes in the fish community between surveys; especially the phenomenal increase in the abundance of brown bullhead.

Intensive creel surveys were conducted on Manitouwabing Lake in the summer of 1983 (MacMillan, 1985a) and the winter of 1984 (MacMillan, 1985b). Cumulatively, these surveys indicate intensive fishing pressure at that time (greater than 30 angler hours per hectare) and modest harvest of game fish. Fishing appeared to be very good for pike, but only fair for walleye and smallmouth bass. Other species were of minor importance to the sport fishery.

In an effort to promote rehabilitation and enhance the walleye population, fishing regulations were changed in 1998. The walleye daily catch limit was reduced to two fish per day and a maximum size catch limit of 35.6 cm (14") was imposed. (That is, all fish over 35.6 cm had to be released.) This survey provided an opportunity to assess the impact these regulation have had on the walleye population in Manitouwabing Lake.

In the year 2000, the Manitou-Seguin Game and Fish Club in partnership with the Ministry of Natural Resources, commenced rehabilitative plantings of walleye fry. Since that time, over 1 million walleye fry have been planted into Manitouwabing Lake. This survey also offered an opportunity to evaluate the impact of fry plantings on the walleye population.

A strong impetus for conducting this survey is the on-going review of the Ministry's Southern Region walleye regulations. Significant changes to these regulations are likely to occur in 2007. This survey was conducted in order to ascertain if *exception regulations* should be applied to Manitouwabing Lake, or if the new forthcoming Division-wide regulations will be appropriate.

2.0 Methods:

2.1 Field Operations:

Field operations were in accordance with the Ministry's *End of Spring Trap Netting (ESTN)* manual (Skinner and Ball, 2004). The ESTN survey is an Ontario Ministry of Natural Resources' standard netting methodology, intended to monitor the status of walleye populations on a consistent and landscape basis throughout Ontario. Six-foot, spring-haul trapnets are used to make overnight sets of approximately 24-hours duration. Netting is conducted near the end of spring when surface water temperatures range from 12 to 18º Celcius.

We commenced trapnet operations on May 17 and concluded on June 10, 2004. Water temperatures ranged from a low of 14.5º C. on May 27 to a high of 20º on June 10. In the later portion of the survey we inadvertently exceeded the temperature threshold due to extended survey dates related to equipment repair.

Our survey consisted of 30-trapnet sets. The field crew selected net-set locations in accordance with the following guidelines:

- Nets were to be approximately evenly dispersed throughout the lake in an effort to fish various fish habitats in the proportion of which they occurred in the lake. The intention here was that the catch would reflect the 'whole lake' as accurately as possible.
- The site had to be suitable for the net to fish effectively. (Consequently – factors such as: contour of the lake bottom, absence of obstructions, depth, sufficient lead length, etc. were considered.)
- Nets were to be set far enough apart (> 500 m) such that they were not competing with each other.
- Avoid areas of potential conflict where there is human habitation.
- Avoid areas where nets could act as a navigational hazard.

Nets set locations are indicated in Figures 1a – 1d.

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

Biosampling data consisting of total length, fork length and round weight determination was conducted for all game fish (Appendix D – H). Mean weights were determined for non-game fish species (Appendix A).

Age determination for walleye was by the scale reading method. As there are no *known-age* walleye in Manitouwabing 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. Due to possible errors associated with age assessment, we have minimized our analysis related to this parameter.

2.2 Data Analysis

The intention of using standard netting methods such as ESTN, is that diagnostic indicators of abundance, growth, mortality, maturity and reproduction are collected in a consistent manner and can be compared with provincial benchmarks or reference values. This allows the population

status of walleye on any one lake in Ontario to be assessed in relation to a large suite of lakes elsewhere in Ontario which have similar characteristics.

Notwithstanding the theory is sound, the Provincial ESTN database is still in its infancy with numerous growing pains that confounded our analysis of Manitouwabing Lake. We used information from 62 ESTN surveys conducted throughout Ontario from 1993 to 2004 (Appendix B). There was insufficient information on individual lake characteristics to fine-filter the dataset such that those used to calculate reference values were similar to Manitouwabing Lake.

Furthermore, most disappointing was the fact that only the diagnostic benchmark of walleye abundance (Catch-Per-Unit-Effort) was available to us as a reference value. Other diagnostic benchmarks (growth and mortality) were not available for walleye, and none of these benchmarks were available for other species. As a consequence, we were forced to make comparisons with other datasets that were not consistent in methodology. This considerably compromises the legitimacy of such comparisons. We felt forced to do this however, because without some comparison context, the data collected for Manitouwabing Lake becomes meaningless. Fortunately for us, two previous trapnet surveys conducted on Manitouwabing Lake in 1982 (McIntyre, 1983) and 1988 (Sober, 1989), used 4', 6' and 8' trapnets. We re-analyzed the 6'-trapnet data from these surveys (Appendix C-1 and C-2) to make direct comparisons with this survey.

Periodically, we also use reference data from the Ministry's *Nearshore Community Index Netting* (NSCIN) database to make comparisons with Manitouwabing Lake. The survey methodology for NSIN is almost identical to ESTN, except the timing window is from August 1st to whenever the surface water temperature cools to 13^{o} Celcius (Stirling, 1999). We also periodically make comparisons with the *Parry Sound Area Synoptic 8'-Trapnet Survey* (PSSTNS) database. The main inconsistency with this comparison is gear type (i.e. 6'-trapnet data vs. 8'-trapnet data).

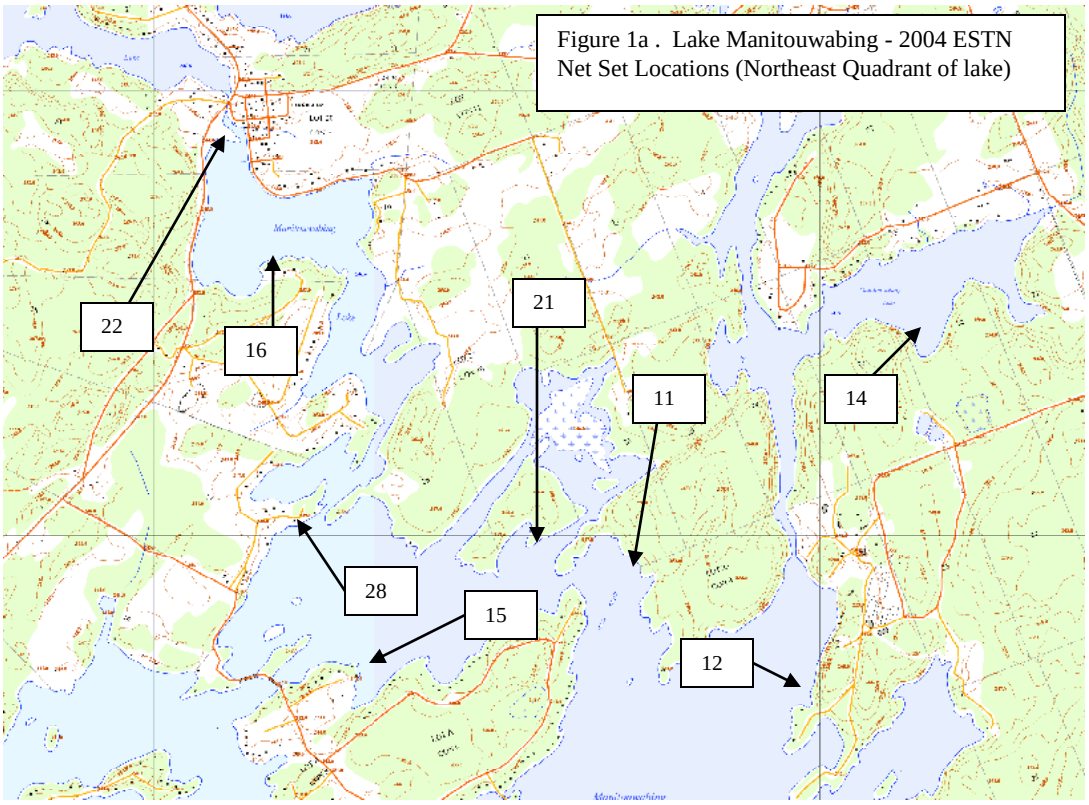


Figure 1a . Lake Manitouwabing - 2004 ESTN Net Set Locations (Northeast Quadrant of lake)

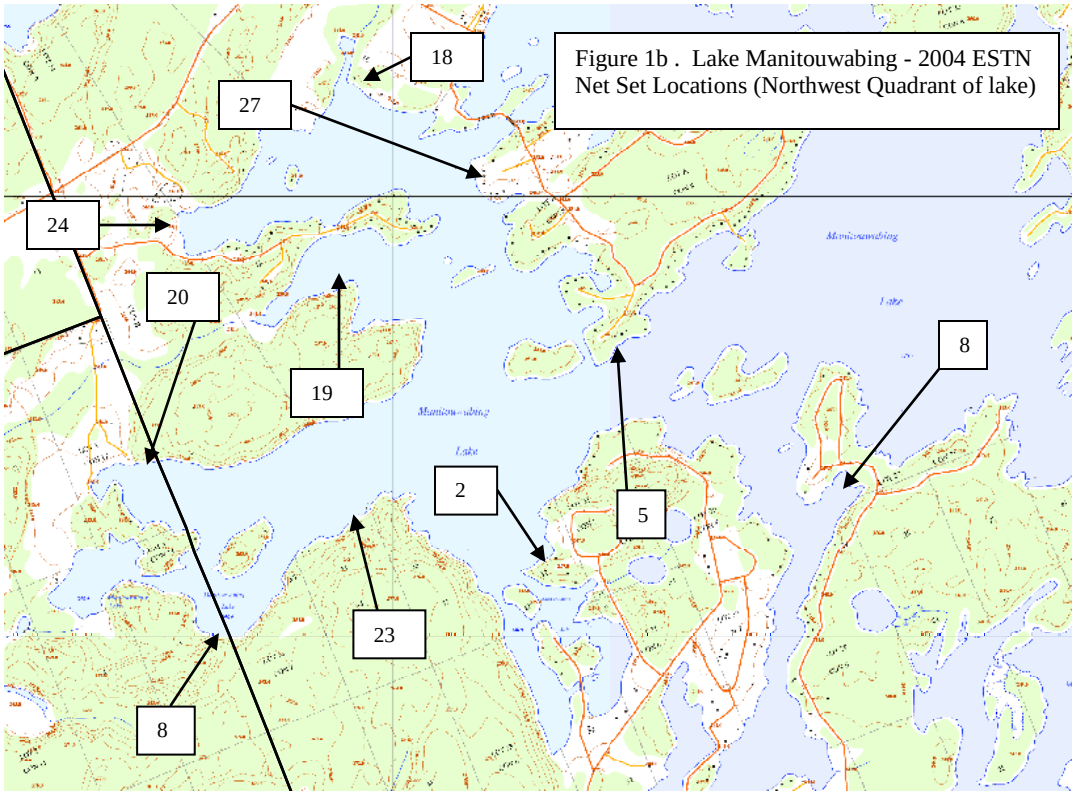


Figure 1b . Lake Manitouwabing - 2004 ESTN Net Set Locations (Northwest Quadrant of lake)

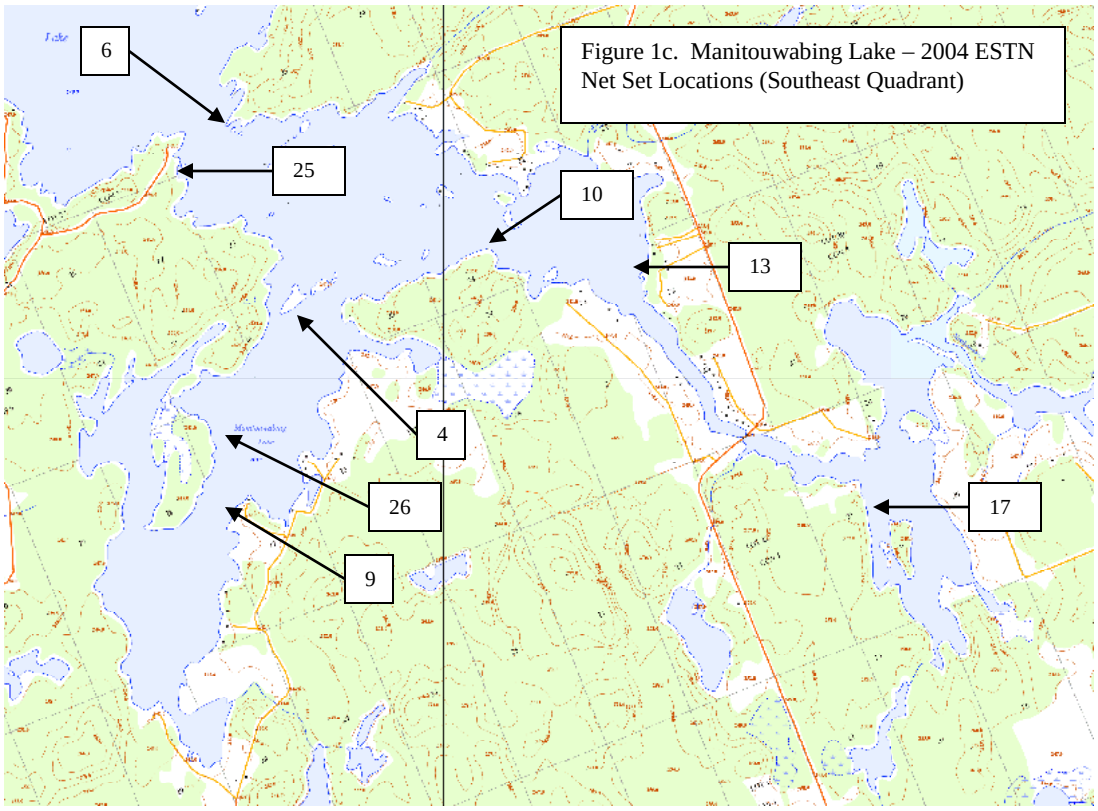


Figure 1c. Manitouwabing Lake – 2004 ESTN Net Set Locations (Southeast Quadrant)

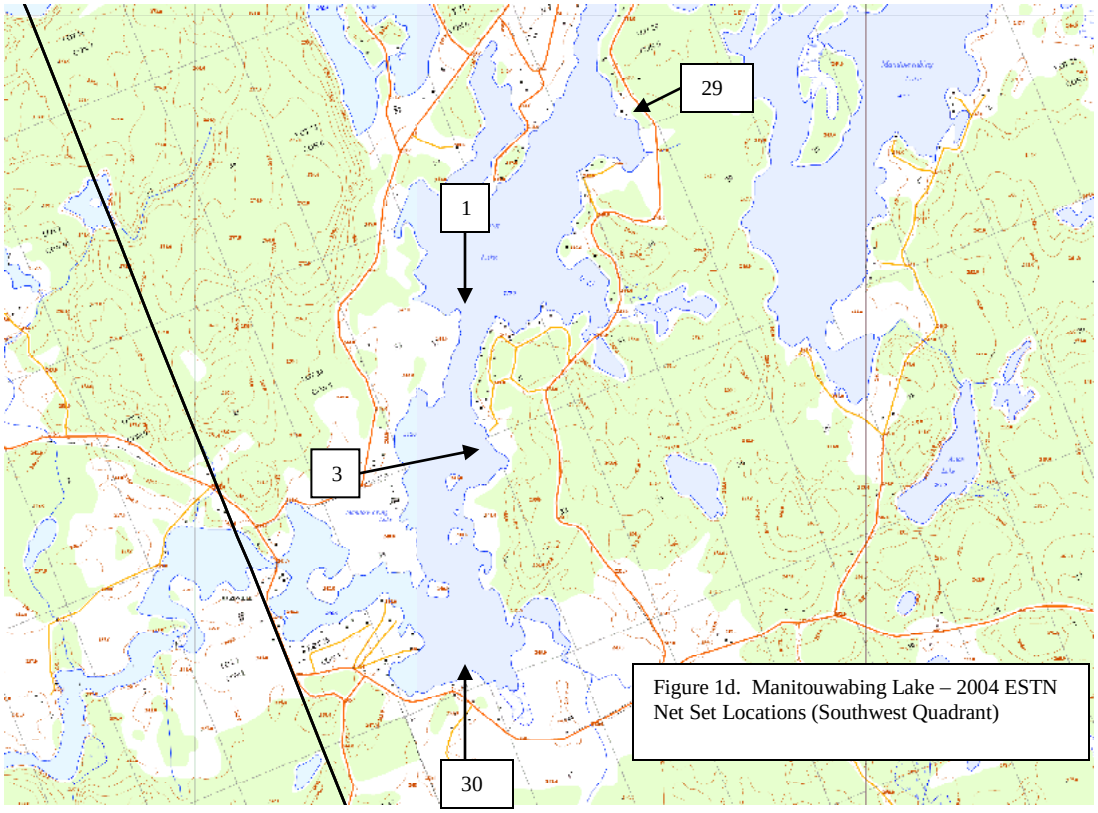


Figure 1d. Manitouwabing Lake – 2004 ESTN Net Set Locations (Southwest Quadrant)

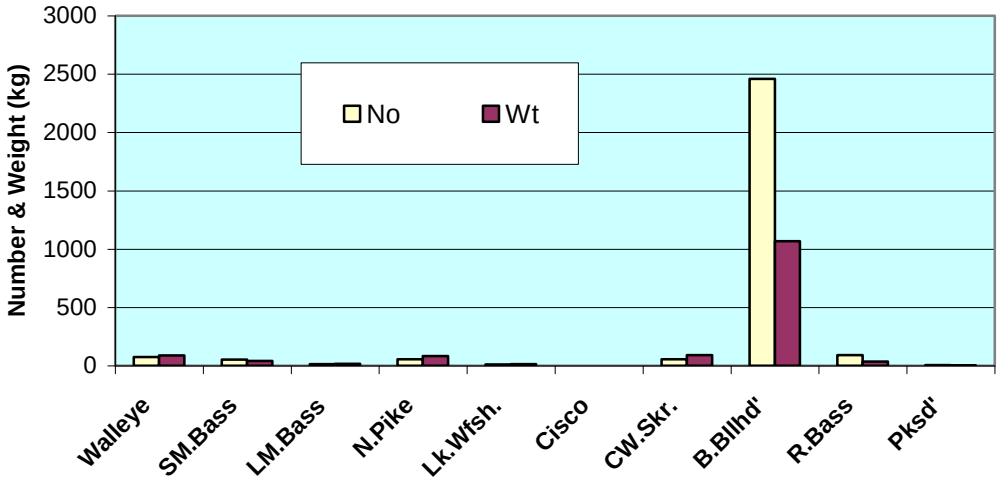
3.0 Results

3.1 Catch Results, Community Composition and Productivity

From 30 over-night trapnet sets we captured: 2459 brown bullhead, 90 rock bass, 74 walleye, 56 northern pike, 56 common white sucker, 52 smallmouth bass, 15 largemouth bass, 11 lake whitefish, 6 pumpkinseed and 1 cisco (lake herring) (Appendix A).

Catch by weight was: 1066.8 kg. brown bullhead, 91.0 kg. common white sucker, 86.5 kg. walleye, 81.5 kg. northern pike, 40.8 kg. smallmouth bass, 36.0 kg. rock bass, 15.3 kg. largemouth bass, 15.1 kg. lake whitefish, 2.1 kg. pumpkinseed and 0.5 kg cisco (Figure 2 and Appendix A).

Figure 2. Catch Composition by Number (No) and Weight (kg)

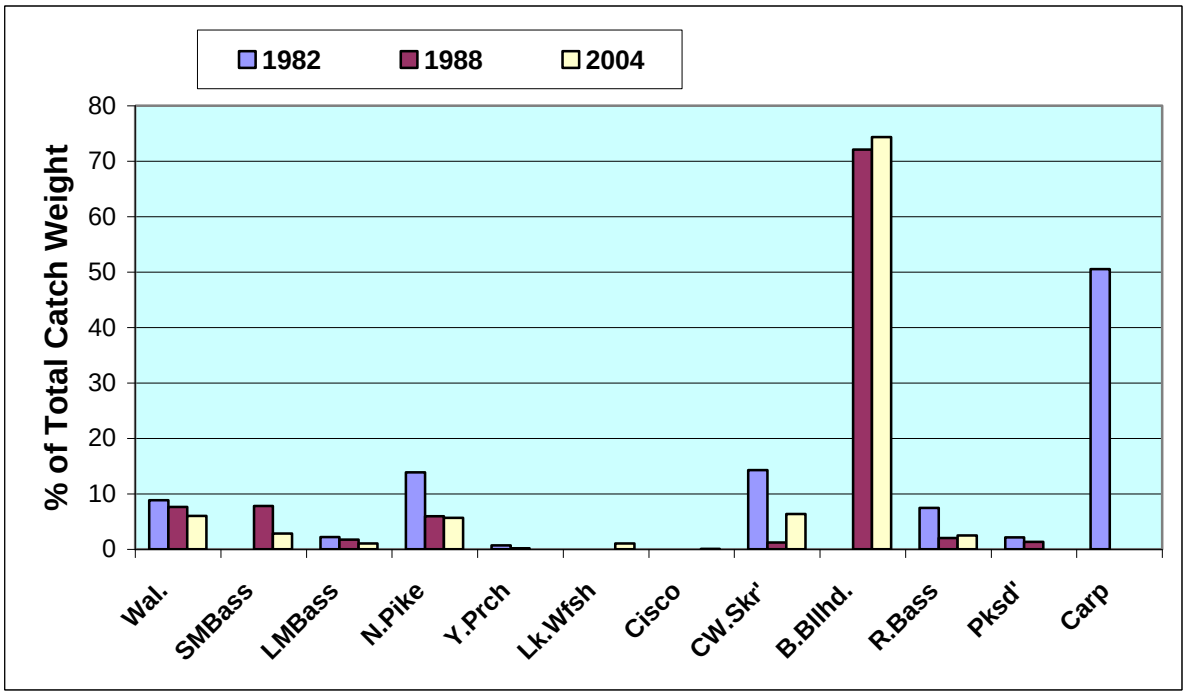


Our catch, both in terms of number and weight, was remarkably dominated by brown bullhead. They comprised 87.2% of all fish caught and 74.3% of the total catch weight of 1,435 kilograms (Appendix A and Figure 2).

To what extent our catch is representative of the composition of the nearshore fish community is difficult to say. There are biases in terms of both *gear* and *timing of the survey* that influence the catch. Unfortunately the Provincial ESTN data base does not have data analysis for catch composition; probably for the foregoing reasons.

We compared the catch composition of our results with those of similar surveys conducted on Manitouwabing Lake in 1982 (McIntyre, 1983) and 1988 (Sober, 1989). For the 1982 and 1988 surveys, we filtered the data to use only that from 6'-trapnet sets (Appendix C-1 and C-2). Because the effort expended in each survey was quite different, we converted the species composition to its percentage of the total catch weight for each survey, in order to make our comparison consistent between surveys.

Figure 3. Catch Composition by Species (% of Total Catch Weight) for the 1982, 1988 and 2004 trapnet surveys conducted on Manitouwabing Lake. (Six-foot trapnet gear used in all surveys; 1982 N=9, 1988 N=24 and 2004 N=30)



There are two obvious and significant observations from Figure 3:

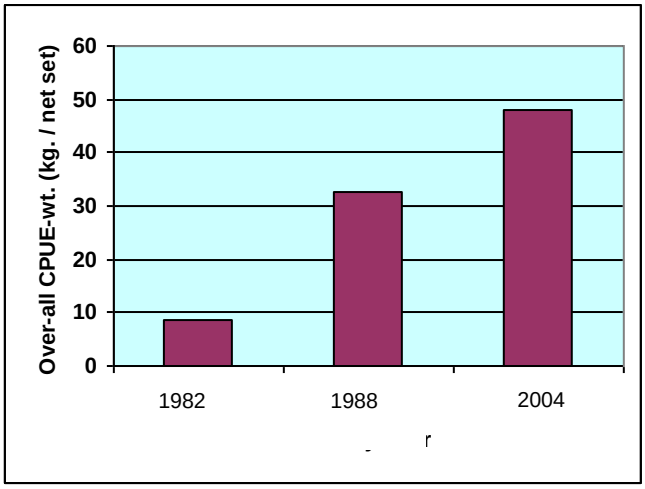
1) Brown bullhead were not even caught in the nine, 6'-trapnet sets made in the 1982 survey, but in 1988 and 2004 they account for over 70% of the total catch weight for each survey!

2) In 1982, there was a seemingly anomalous catch of 5 large carp in one trapnet set (Appendix C-1). This alone accounted for 50% of the total catch weight in the 9-set survey. This truly seemed to be an anomalous event because no carp were caught in any of the other 40-trapnet sets using a combination of 4', 6' and 8'-trapnets in the 1982 survey (McIntyre, 1983). No carp were captured in the 1988 survey (Sober, 1989) or this one.

As an index of lake productivity, we also compared the over-all *Catch-Per-Unit-Effort by weight (CPUE-wt)* between the three surveys (Figure 4 - adjacent).

What we see is a steady increase in fish productivity between surveys as measured by the mean weight of fish caught per net. Also noteworthy is the overall 2004 CPUE-wt of 47.852 kg / set for this survey (Appendix A and Figure 4). This is a remarkably high catch rate. It exceeds those observed for all previous Parry Sound Area 8'-Synoptic Trapnet Surveys (PSSTNS) conducted from 1994 to 2003. The mean catch by weight for the PSSTNS dataset is 16.404 kg / set with the highest being 35.756 kg / set, from the 1998 survey on Doe Lake.

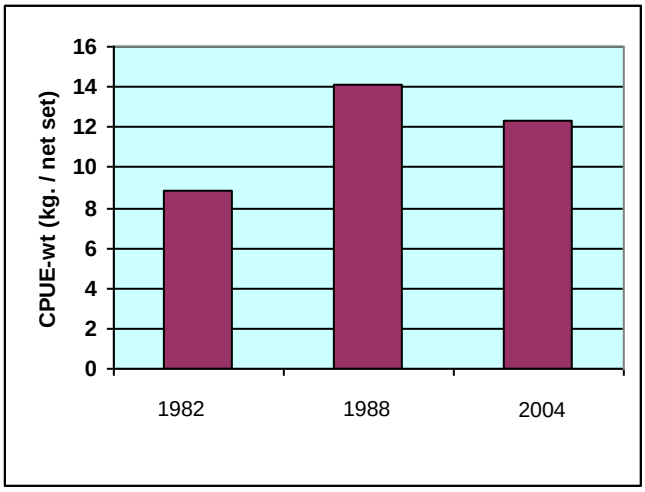
Figure 4. Comparison of Overall CPUE-wt between surveys conducted on Manitouwabing Lake



Admittedly, we find the increase in fish productivity (as measured by the overall CPUE-wt for all species) over these surveys a perplexing phenomenon. A lake's productivity is largely controlled by abiotic factors such as nutrient level, lake morphology (shape and size) and climate. Although a lake's fish community may change drastically between years, we would expect its productivity level to remain fairly consistent, unless one of the abiotic factors is changed significantly; which is not the case for Manitouwabing Lake. We are at a loss to explain the above overall increase in CPUE-wt between surveys.

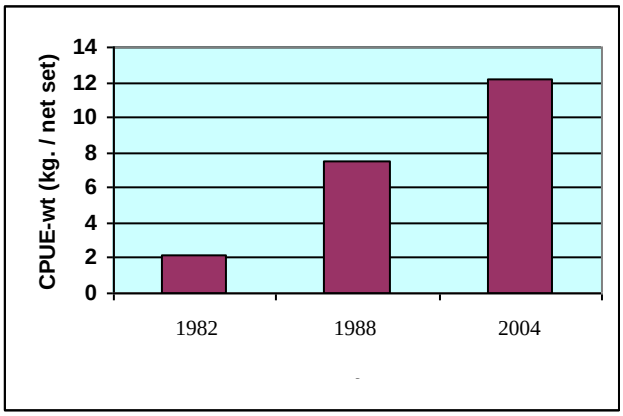
We do note however, the overall increase in productivity on Manitouwabing Lake is almost entirely due to expansion of the brown bullhead population. The mean catch weight for all species – excluding brown bullhead, has remained fairly consistent between surveys (Figure 4B).

Figure 5. Comparison of Overall CPUE-wt for all species excluding brown bullhead, between surveys conducted on Manitouwabing Lake



Rather surprisingly, the mean catch weight of game fish (walleye, smallmouth bass, largemouth bass and pike) has actually increased between surveys (Figure 5). It was 2.192 kg. / set in 1982 (Appendix C-1), 7.551 in 1988 (Appendix C-2) and 12.201 in our 2004 survey (Appendix A). This small increase in game fish production has been effectively masked by the tremendous increase in brown bullhead production.

Figure 5. Comparison of CPUE-wt for game fish only, from three trapnet surveys conducted in 1982, 1988 and 2004 on Manitouwabing Lake



3.2 Relative Abundance Indices (CPUE and Probability of Capture):

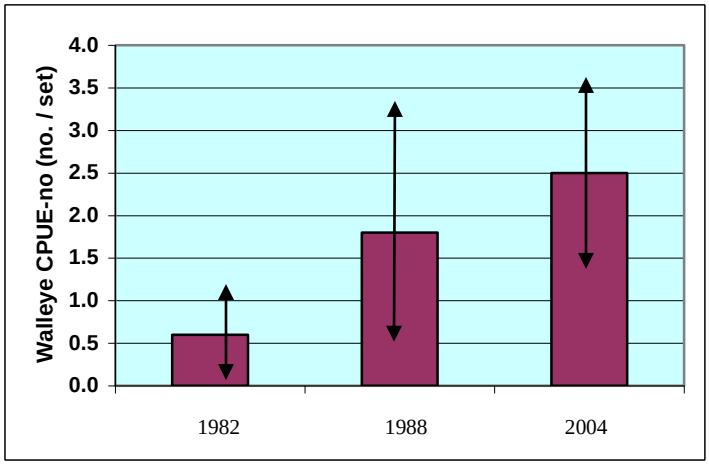
3.2.1 Walleye

Our walleye Catch-Per-Unit-Effort (CPUE) was 2.5 walleye per net set ± 1.1 ($p<0.05$) (Appendix A). Relative to the Provincial ESTN data base, this ranks 44th out of 62 surveys, and well below the mean value of 9.7 and median value of 5.5 (Appendix B). It is however within the median 50% of values, which is generally considered to represent a moderate or 'average' abundance of walleye on a Provincial basis.

Although this index of walleye abundance is well below the Provincial ESTN average, it is only slightly below the average of 3.5 walleye per set for recent surveys (1994 – 2003) in the Parry Sound Area Synoptic 8'-Trapnet Survey (PSSTNS) database (Appendix I). Furthermore, if we consider all 6'-trapnet data available for the Parry Sound Area (Appendix C-3) from 1982 to the present, the mean walleye CPUE for those surveys is only 1.4, which our survey exceeds by a considerable amount (2.5 vs. 1.4). Consequently, we suspect that walleye abundance in Manitouwabing Lake is probably equivalent to or better than other surveyed populations in the Parry Sound Area.

In the 1982 survey, the walleye CPUE-no was 0.6 ± 0.7 ($p<0.05$) (Appendix C-1). In the 1988 survey it was 1.8 ± 1.4 (Appendix C-2); and 2.5 ± 1.1 for this survey in 2004 (Figure 6). Although there is a seemingly apparent increasing trend in walleye CUE amongst these surveys, variability within all three data sets is too high to make this conclusion. Comparing walleye CPUE-no between surveys, there has been no statistically significant change. This is not to say that improvement has not occurred, but if so, it is not large enough to be statistically significant given the variability of our data.

Figure 6. Walleye CPUE-no for three trapnet surveys conducted in 1982, 1988 and 2004 on Lake Manitouwabing. Arrows represent 95% confidence interval.

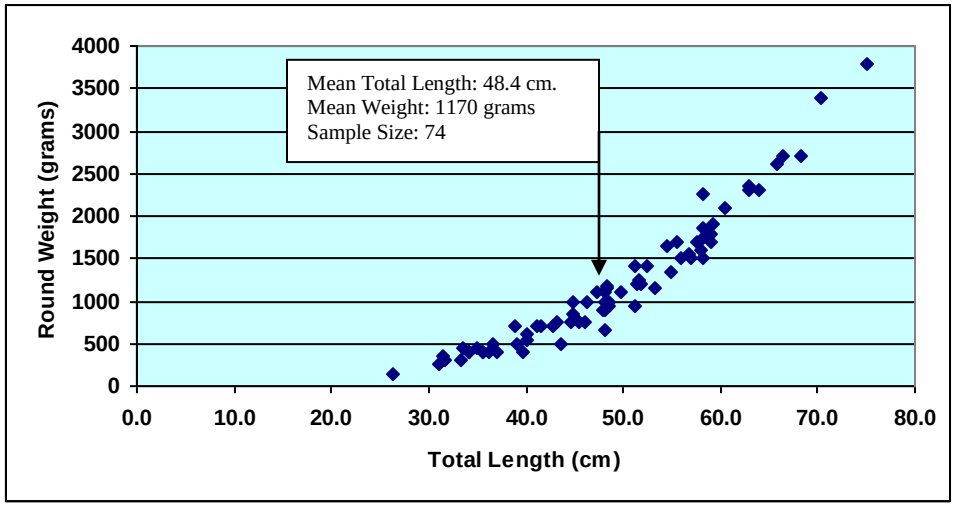


Walleye were captured in 22 of 30-trapnet sets for a probability of capture (POC) of 73.3% (i.e. 73.3% of all nets caught at least one walleye) (Appendix A). POC was 33.3% in the 1982 survey and 41.7% in 1988 (Appendix C1 and C2). Although this index lacks statistical rigor, it is an encouraging trend that suggests walleye abundance may have improved since 1982.

Walleye Size Distribution:

The size distribution of walleye we captured showed a wide range with good representation of all size classes (Figure 7). The mean size of walleye caught was 48.4 cm (19 inches) total length and mean weight of 1170 grams (2.6 lbs.) (Appendix D). We interpret this as suggesting recruitment has been consistent and mortality (including angling mortality) has not been excessive. Certainly the population is quite sustainable, albeit at a lower population level than anglers would like.

Figure 7. Walleye Size Distribution - 2004 ESTN Survey Conducted on Manitouwabing Lake.



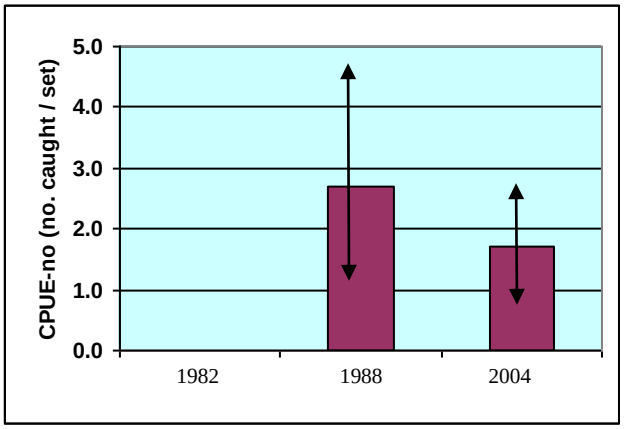
3.2.2 Smallmouth Bass

Our smallmouth bass CPUE was 1.7 smallmouth per net set ± 1.0 ($p<0.05$) (Appendix A). The ESTN survey methodology probably provides a biased underestimate of smallmouth abundance due to the timing of the survey which usually coincides with bass spawning activities. Because bass movements are more restricted due to courting, spawning and guarding the nest, smallmouth are not as susceptible to capture at this time of year.

Notwithstanding the above noted bias, we strongly suspect that our CPUE of 1.7 ± 1.0 is probably indicative of a "below average" abundance of smallmouth bass. The Provincial NSCIN database has a mean smallmouth CPUE of 6.4 (Brunton, 2000) and the Parry Sound Synoptic 8'-Trapnet Survey (PSSTNS) database has a mean of 4.8 (Appendix I). Parry Sound's 6'-trapnet database has a mean of 2.7 (Appendix C-3); so our survey mean is below all 3 of these datasets. The low abundance of smallmouth is probably most attributable to marginal habitat conditions, particularly high turbidity (Kerr and Grant; 2000), and possibly heavy predation on early life stages by brown bullhead.

In the 1982 trapnet survey on Manitouwabing Lake, the smallmouth bass CPUE-no was zero (Appendix C-1), although 36 were captured in 32 sets using 4' and 8'-trapnets (McIntyre, 1983). In the 1988 Manitouwabing survey, the smallmouth bass CPUE-no was 2.7 ± 1.7 ($p<0.05$) (Appendix C-2). Although smallmouth bass abundance is not significantly different between 1988 and 2004, both these years represent an appreciable improvement over 1982 (Figure 8).

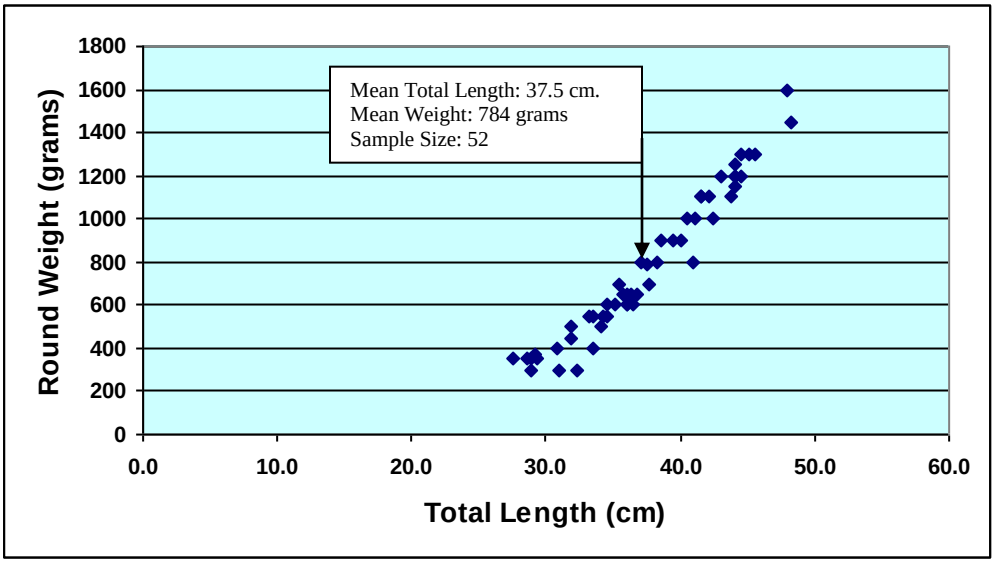
Figure 8. CPUE-no for Smallmouth Bass from three trapnet surveys conducted in 1982, 1988 and 2004 on Manitouwabing Lake. Arrows indicate 95% confidence interval.



Smallmouth bass Probability of Capture (POC) was 0.0 in the 1982 survey (Appendix C-1), 0.583 in 1988 (Appendix C-2) and 0.500 for this survey (Appendix A). There is little difference between the 1988 and 2004 surveys, but both are appreciably better than 1982.

Our size distribution of smallmouth bass showed a good range as well as reasonably good representation of all size classes within that range (Figure 9). This good representation of all size classes suggests that recruitment is consistent; and the good representation of larger size smallmouth, suggests that mortality is not excessive. Albeit rather small, the population appears healthy in terms of continued sustainability.

Figure 6. Smallmouth Bass Size Distribution, Manitouwabing Lake - 2004 ESTN Survey



3.2.3 Largemouth Bass

Our largemouth bass CPUE-no was 0.5 fish per net set ± 0.4 ($p<0.05$) (Appendix A). As with smallmouth bass, the ESTN methodology probably provides a biased underestimate of largemouth abundance due to the timing of the survey. The ESTN database also does not track largemouth bass CPUE (Rawson, pers. comm.).

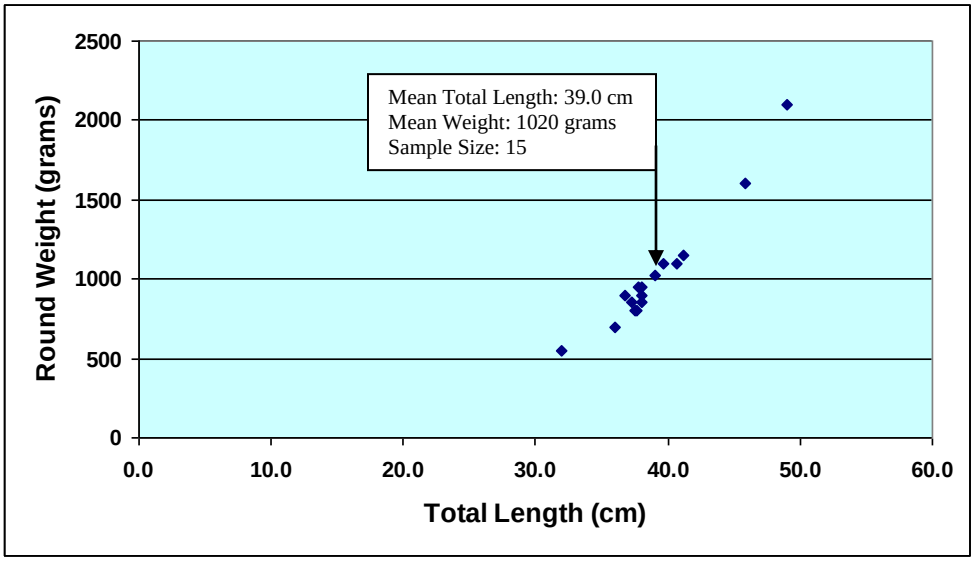
Because largemouth bass have very specific habitat requirements, they are generally only caught when a trapnet just happens to be set in the appropriate habitat, which is usually in or close to aquatic vegetation. Because of the low and variable catch numbers for this species, CPUE-no is not a particularly reliable index of abundance.

In the 1982 trapnet survey on Manitouwabing Lake, the largemouth bass CPUE-no was a mere 0.1 (Appendix C-1), and for the 1988 survey it was only 0.3 (Appendix C-2). The Provincial NSCIN database has a mean largemouth CPUE of 2.2 (N=24) and the Parry Sound Synoptic 8'-Trapnet Survey database has a mean of 1.2 (Appendix I). Parry Sound's 6'-trapnet database has a mean of 1.8 (Appendix C-3). We suspect our CPUE of 0.5 is probably indicative of a low abundance of largemouth bass and this abundance has not changed appreciably from the 1982 and 1988 surveys.

As with smallmouth bass, the low abundance of largemouth bass is probably attributable to marginal habitat conditions (high turbidity) and predation on early life stages by brown bullhead.

We only captured 15 largemouth bass (Appendix A). The mean size was 39.0 cm total length and mean weight 1020 grams (Appendix F). The size distribution was very concentrated between 35 and 42 cm in total length (Figure 7). This sample size is probably too small to give a reliable representation of recruitment and mortality rates impinging on this population.

Figure 7. Largemouth Bass Size Distribution, Manitouwabing Lake – 2004 ESTN Survey



3.2.4 Northern Pike

Our northern pike CPUE was 1.9 pike per net set ± 0.9 ($p<0.05$) (Appendix A). The ESTN data base does not track the CPUE for northern pike (Rawson, pers. comm.). However, the NSCIN database has a mean pike CPUE of 1.2 (N=35) and the Parry Sound Synoptic 8'-Trapnet Survey database has a mean of 1.1 (N=43). The Parry Sound 6'-trapnet database has a mean of 0.9 (Appendix C-3). Our pike CPUE exceeded the means from all these databases, suggesting pike abundance on Manitouwabing Lake is above average relative to surveys conducted within the Parry Sound Area and the Province of Ontario.

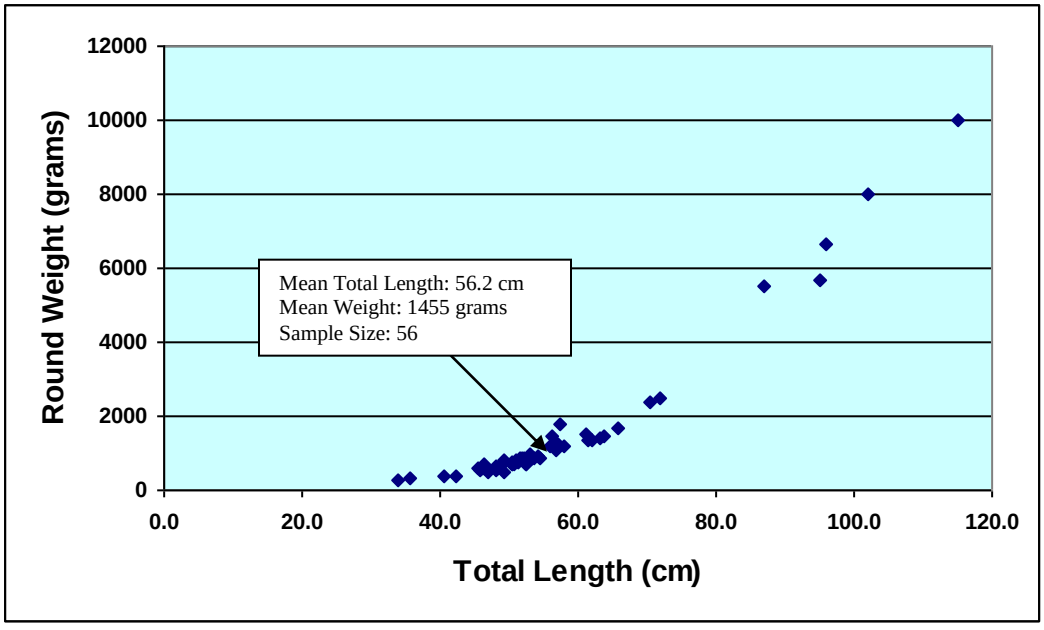
In the 1982 trapnet survey on Manitouwabing Lake, pike CPUE-no was 1.2 ± 1.0 ($p<0.05$) (Appendix C-1) and in the 1988 survey it was 1.7 ± 1.5 ($p<0.05$) (Appendix C-2). Our pike CPUE-no of 1.9 ± 0.9 (Appendix A) suggests pike abundance is approximately equivalent or slightly better than what it was in the 1980s.

Our northern pike probability of capture (POC) was rather high at 0.733 (Appendix A). This is higher than the POC observed in 1982 and 1988 which was 0.666 and 0.625 respectively (Appendix C-1 and C-2). The Parry Sound Synoptic 8'-Trapnet Survey database has a mean pike POC of 0.573% (N=23).

The size distribution of 56 pike we captured had an exceptionally wide range (Figure 8). This was due to a small number of exceptionally large pike being captured. Most of our samples were concentrated in the 40 – 70 cm total length range. Mean total length was 56.2 cm and mean weight 1455 grams (Appendix G).

The reasonably high representation of smaller size pike suggests recent recruitment is very good. Despite some absent size classes (i.e. between 75 and 85 cm), exceptionally large pike were present. We suspect mortality is not excessive, and certainly the population is in a healthy and sustainable condition.

Figure 8. Northern Pike Size Distribution, Manitouwabing Lake – 2004 ESTN Survey.



3.2.5 Common White Sucker:

Our common white sucker CPUE-no was 1.9 fish per net set ± 0.8 ($p<0.05$) (Appendix A). The mean CPUE for sucker in the NSCIN database is 12.2 (N=47), but only 3.1 for the Parry Sound Synoptic 8'-Trapnet Survey data base (Appendix I). We're not sure why Parry Sound Area lakes seem to have a lower abundance of common white sucker than lakes sampled elsewhere throughout the province. Hence, from a provincial perspective (i.e. relative to the NSCIN database), the abundance of common white sucker is well below average, but it is approximately average or perhaps slightly lower than Parry Sound Area lakes.

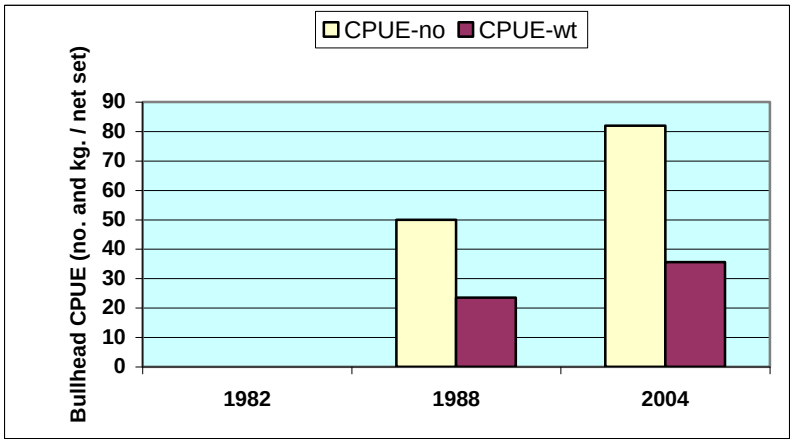
In the 1982 Manitouwabing trapnet survey, sucker CPUE-no was only 0.1 (Appendix C-1) and in 1988 it was only 0.3 (Appendix C-2). Consequently, sucker abundance in 2004 was considerably higher than the 1980s.

3.2.6 Brown Bullhead:

Our brown bullhead CPUE-no was 82.0 fish per net set ± 70.0 ($p<0.05$) (Appendix A). Our exceptionally wide 95% confidence limits is a result of the high variability in the brown bullhead catch. The mean bullhead CPUE-no in the Provincial NSCIN database is 11.7 (Brunton, 2000). Clearly, the abundance of brown bullhead in Manitouwabing Lake is much higher than the 48 lakes in the Provincial NSCIN database.

In the 1982 Manitouwabing trapnet survey, no brown bullhead was caught in the nine, 6'-trapnet sets made during that survey. However, 53 were caught in 32 sets by 4 and 8'-trapnets (McIntyre, 1983). Nonetheless, bullhead abundance was very low. In the 1988 survey, the bullhead CPUE-no skyrocketed to 49.9 bullhead caught per 6'-trapnet set (Sober, 1989); and by 2004 has further increased to 82.0 (Figure 9). The increase in bullhead abundance is similarly reflected in the CPUE-wt (kg. / net set) for the three surveys 9 (Figure 9).

Figure 9. A Comparison of Brown Bullhead CPUE-no and CPUE-wt, for three trapnet surveys conducted on Manitouwabing Lake in 1982, 1988 and 2004.



Frankly, we are rather perplexed at the phenomenal increase in brown bullhead on Manitouwabing Lake since 1982. In particular, is the inexplicable and dramatic increase in

bullhead number between the 1982 and 1988 surveys. We describe this phenomenon as "inexplicable", because it is hard to believe the number of bullhead could increase so dramatically over the period of only 6 years. That trend has seemingly continued to present day, although at a much slower rate.

It should be acknowledged, the tremendous increase in the abundance of brown bullhead on Manitouwabing Lake has seemingly not been at the expense of resident game fish. Indeed, the CPUE-wt for game fish has actually increased between the 1982, 1988 and 2004 (Figure 5).

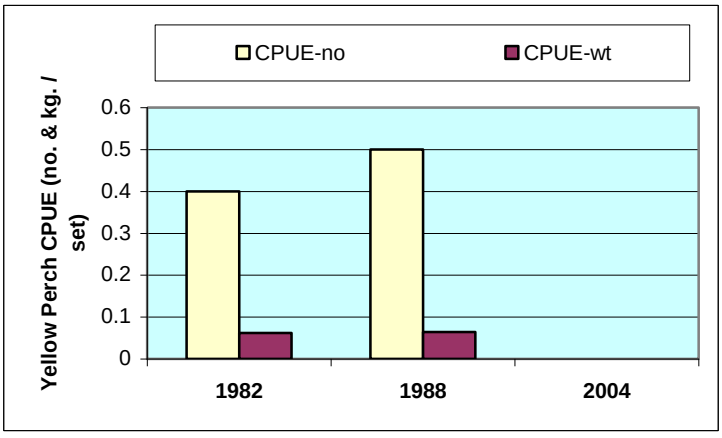
3.2.7 Yellow Perch

We failed to capture any yellow perch in this survey. Yellow perch have never been super-abundant on Manitouwabing Lake, but there are a number of studies that indicate they were certainly more abundant than present-day.

In 1974, an *aquatic habitat inventory survey* (more commonly know as a 'lake survey') captured 43 yellow perch in 9-overnight gillnet sets (OMNR, 1974). In a 1978 fish collection for contaminant analysis, 27 perch were caught in 14 overnight gillnet sets (OMNR, 1978). An intensive creel survey conducted during the summer of 1983 estimated a perch harvest of 362 (MacMillan, 1985a), and the following winter another creel survey estimated a perch harvest of 109 fish (MacMillan, 1985b).

In the 1982 trapnet survey, only 4 perch were caught in nine, 6'-trapnet sets (CPUE-no 0.4 ± 0.4, $p<0.05$; Appendix C-1) (Figure 10). And in the 1988 trapnet survey, 11 perch were caught in 24, 6'-trapnet sets (CPUE-no: 0.5 ± 0.4; Appendix C-2). For none to be caught in 30-trapnet nets in 2004, there has probably been a considerable reduction in their number in Lake Manitouwabing.

Figure 10. Comparison of Yellow Perch CPUE-no and CPUE-wt (kg. / net set) for three trapnet surveys conducted on Manitouwabing Lake in 1982, 1988 and 2004.

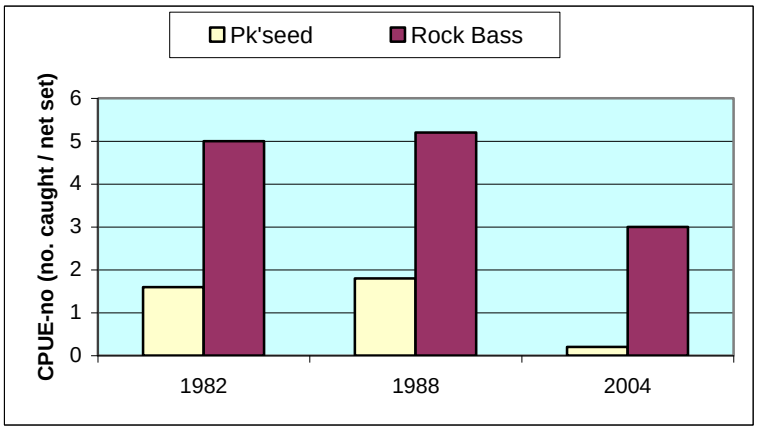


We suspect the reduction in yellow perch is to some degree related to the phenomenal increase in brown bullhead, as these are predators on early life stages of perch.

3.2.8 Rock Bass and Pumpkinseed

Because rock bass and pumpkinseed are nearshore and shallow water inhabitants as are yellow perch, we expected they too might show a similar decrease in abundance. However, the statistical sensitivity of our data is too low to clearly demonstrate a significant reduction in the abundance of these species. However, we do note the CPUE-no for these species in 2004 was much lower than those observed in 1982 and 1988 (Figure 11).

Figure 11. Comparison of Rock Bass and Pumpkinseed CPUE-no from three trapnet surveys conducted on Lake Manitouwabing in 1982, 1988 and 2004.



3.2.9 Lake Whitefish and Cisco

We captured 11 lake whitefish and one cisco (a.k.a. lake herring) during this survey. None were caught in either the 1982 or 1988 surveys. These species prefer cold-water and are usually found at considerable depths below the thermocline during the summer. Our ESTN survey was conducted early in the year (May 17 – June 9), prior to high surface temperatures being established. As a result, we suspect these fish were inhabiting shallower water at this time of year and were therefore more susceptible to our gear. We do not think their capture reflects an increase in the abundance of these species.

3.2.10 Carp

We caught no carp during this survey, nor were any caught in the 1988 trapnet survey (Appendix C-2). However, 5 large carp were caught in a single 6'-trapnet set during the 1982 survey (Appendix C-1). We suspect this was an anomalous catch, as no carp were caught in any of the other 40-trapnet sets comprised of 4, 6 and 8'-trapnets used during that survey (McIntyre, 1983). The absence of any carp being caught in any survey since 1982 suggests the abundance of this species is very low in Manitouwabing Lake. Incidentally, this is the only lake in the Parry Sound area that contains carp.

3.3 Results Summary (Report Card):

We present a hypothetical 'report card' for Manitouwabing Lake (Table 1) in which we accord it an overall grade of "C+".

Productivity as measured by CPUE-wt is quite high and has increased relative to surveys conducted in the 1980s, but most of this (i.e. > 70%) is being directed at brown bullhead production. Abundance and size distribution indices for walleye are encouraging relative to past surveys. Smallmouth and largemouth bass abundance indices are somewhat low compared to Provincial and Parry Sound Area lakes, but similar or perhaps slightly better than those observed during the 1982 and 1988 surveys. Although not overly abundant, these populations are healthy in terms of being self-sustaining. Pike abundance appears higher than both the Provincial and Parry Sound 'reference values' and has increased relative to that observed in the 1980s. The abundance of yellow perch appears to be further reduced from the low levels observed in the 1982 and 1988 surveys. The same may be true for rock bass and pumpkinseed populations.

The only highly negative aspect of our survey results is the super-abundance of brown bullhead in Manitouwabing Lake. An inordinately large amount of fish productivity is currently being directed at this low-value species. It would be preferable if much of this productivity could be redirected towards higher-value game fish or even the forage base. Conversely, perhaps the opportunity exists for a splendid brown bullhead sport fishery?

Table 1. Hypothetical 'Report Card' for Manitouwabing Lake based on comparison of diagnostic indicators with other Provincial and Parry Sound Area Databases.

	Diagnostic Indicator	Manitouwabing Lake 2004 Survey Value	Reference Value	Grade	Comment
General	Over-all Productivity CPUE-wt (all species)	47.852 kg / set	1982 survey: 8.796 kg / set 1988 Survey: 32.615 kg / set PSSTNS mean: 16.404	A+	Highest productivity index in Parry Sound trapnet data, but mostly directed at brown bullhead
	Game Fish CPUE-wt	12.201 kg / set	1982 survey: 2.192 1988 survey: 7.551	B	Increasing productivity of game fish relative to 1980's surveys
Walleye	CPUE-no	2.5 walleye / set	ESTN mean: 9.7 PSSTNS mean: 3.5 PS 6'-trapnet mean: 1.4 1982 survey: 0.6 1988 survey: 1.8	C+	Below the Provincial benchmark, but above Parry Sound
	Probability of Capture	0.733	1982 survey: 0.333 1988 survey: 0.417	B	High and increasing POC
	Size Distribution	As per Figure 5		B	Good recruitment; reasonable mortality
Smallmouth Bass	CPUE-no	1.7	NSCIN mean: 6.4 PSSTNS mean: 4.8 PS 6'-TN Surveys: 2.7 1982 survey: 0.0 1988 survey: 2.7	C-	Below Provincial and Parry Sound Area benchmarks
	Probability of Capture	0.500	1982 survey: 0.0 1988 survey: 0.583	C	Unchanged from 1988
	Size Distribution	As per Figure 6		B	Good recruitment; reasonable mortality
Largemouth Bass	CPUE-no	0.5	NSCIN mean: 2.2 PSSTNS mean: 1.2 PS 6'-TN Mean: 1.8 1982 survey: 0.1 1988 Survey: 1.2	C-	Below Provincial and Parry Sound Area benchmarks
	Size Distribution	As per Figure 7			Sample size too small to comment
Northern Pike	CPUE-no	1.9	NSCIN mean: 1.2 PSSTNS mean: 1.1 PS 6'-TN mean: 0.9 1982 survey: 1.2 1988 survey: 1.1	B	Above Provincial and Parry Sound Area benchmarks; above 1980's surveys
	Size Distribution	As per Figure 8		C+	Good recruitment; reasonable mortality; one size class weak
Non-Game Fish	CPUE-no	82.0 bullhead / set 1.9 sucker / set 3.0 rock bass / set 0.2 pumpkinseed / set 0.0 yellow perch / set		F	Exceptionally high and increasing brown bullhead abundance. Panfish abundance low.
Overall Grade: C+					

4.0 Management Implications:

4.1 Regulations:

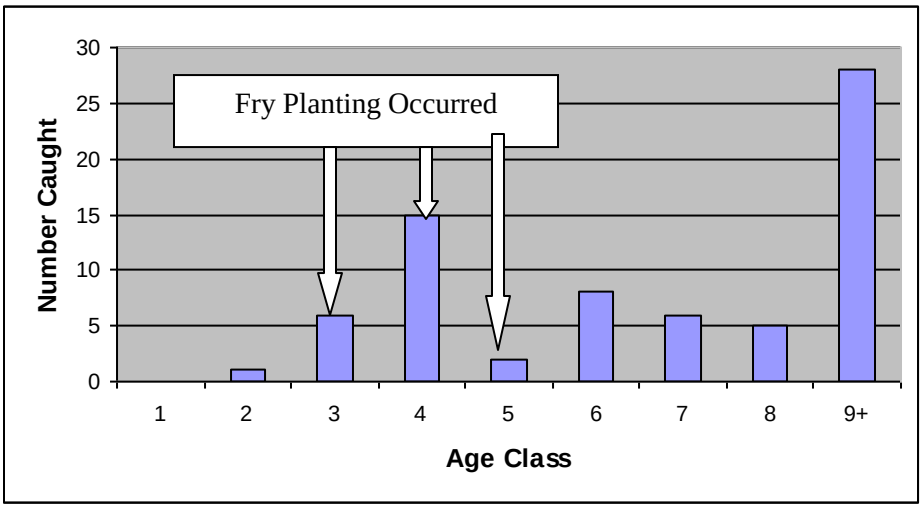
In 1998, walleye regulations were changed on Manitouwabing Lake. The daily catch limit was reduced to 2 fish per day and a maximum size limit of 35.6 cm (14") was imposed (i.e. fish over 14" had to be released). These regulations had been in effect for six years prior to completion of this ESTN survey. These regulations changes have not resulted in a statistically significant increase in walleye abundance. However, based on abundance indices generated by this survey, there are positive indications of improvement relative to earlier surveys. We draw this conclusion based on the assumption that walleye abundance in the 1982 and 1988 surveys is representative of that which existed prior to the regulation change (1998).

We anticipate that new regulations coming from the on-going Southern Region Walleye Review are likely to be much more onerous and conservation minded than those currently in effect. Depending on what the final regulation proposal is, it may be quite appropriate that the existing exception regulations on Manitouwabing Lake be revoked and the new Division-wide regulations adopted.

4.2 Stocking

Under the auspices of the Ministry's Community Fisheries Involvement Program (CFIP), the Manitou-Seguin Game and Fish Club have planted over one million fry into Manitouwabing Lake between 1999 and 2004. Products from the 1999 fry planting (unknown number), the year 2000 planting of 300,000 fry and the 2001 planting of 400,000 fry, would be vulnerable to capture in this survey. They would now be 3, 4 and 5-year old fish. Twenty-three of 74 walleye captured (3l.1%) were in these age classes (Figure 12). This is not a high proportion of the catch for these age classes, especially considering they should be the most abundant year classes.

Figure 12. Walleye Age-Class Distribution on the 2004 ESTN Survey Conducted on Manitouwabing Lake. (Data from Appendix D)



This observation, in conjunction with the fact that there has not been a significant change in walleye abundance, suggests that walleye fry plantings have not had a significant impact on year class production. Notwithstanding the foregoing, we cannot conclusively prove that the percieved (non-statistically significant) improvement in walleye abundance indices is correlated to walleye fry plantings.

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6.0 Acknowledgements

We wish to acknowledge the generous contribution by Department of Fisheries and Oceans (DFO) staff, namely: D'arcy Campbell, Phil Curtis, Jim Huston, Bruce Richards and Lisa Perry, in assisting with field operations. Ministry of Natural Resources staff who assisted included: Dean Timson, Eric McIntyre, Kirt Nelson, Sid Larson, Carl Woods and Bart Brown. Field operations were supervised by Jim Palmer.

Also, special thanks to Mr. Wilf Monette, owner of *Will-O-Bend Cottage Resort* who provided a safe and convenient location to store our equipment and boat.

Appendix A.

Catch Summary for the 2004 ESTN Survey Conducted on Lake Manitouwabing.

				Catch (number by species)									
Set No.	Date Set	Date Lifted	Effort	Walleye	SM.Bass	LM.Bass	N.Pike	Lk.Wfsh.	Cisco	CW.Skr.	B.Bllhd'	R.Bass	Pksd'
1	May-17	May-18	1	3	0	1	10	2	0	3	127	5	0
2	May-17	May-18	1	2	0	0	1	2	0	0	2	3	0
3	May-18	May-19	1	5	6	0	1	0	0	2	193	20	1
4	May-18	May-19	1	3	5	0	4	0	0	1	176	5	0
5	May-18	May-19	1	0	1	0	0	0	0	1	4	3	0
6	May-19	May-20	1	2	0	0	1	0	0	0	5	4	0
7	May-19	May-20	1	1	3	0	0	2	0	2	7	2	0
8	May-25	May-26	1	0	0	0	2	0	0	0	13	3	0
9	May-25	May-26	1	0	1	2	3	0	0	1	25	0	0
10	May-25	May-26	1	3	0	0	0	0	0	4	957	5	0
11	May-26	May-27	1	0	2	0	0	0	0	2	13	2	0
12	May-26	May-27	1	1	1	0	1	2	0	0	1	1	0
13	May-26	May-27	1	0	3	2	0	1	1	2	66	2	0
14	May-26	May-27	1	2	0	0	0	0	0	0	4	0	2
15	May-27	May-28	1	1	2	0	0	0	0	6	58	6	1
16	May-27	May-28	1	11	1	0	1	1	0	6	13	0	0
17	May-27	May-28	1	1	0	0	3	0	0	0	464	3	0
18	May-27	May-28	1	10	0	0	1	0	0	0	58	9	1
19	Jun-07	Jun-08	1	1	0	0	1	0	0	0	11	2	0
20	Jun-07	Jun-08	1	1	0	0	1	0	0	2	23	0	0
21	Jun-07	Jun-08	1	0	0	0	1	0	0	2	0	0	0
22	Jun-07	Jun-08	1	4	7	5	8	0	0	4	31	3	0
23	Jun-08	Jun-09	1	0	0	0	1	0	0	0	2	1	0
24	Jun-08	Jun-09	1	0	0	0	0	1	0	9	0	1	0
25	Jun-08	Jun-09	1	1	0	0	1	0	0	0	2	2	0
26	Jun-08	Jun-09	1	7	2	1	3	0	0	0	16	1	1
27	Jun-09	Jun-10	1	5	1	0	2	0	0	2	9	4	0
28	Jun-09	Jun-10	1	6	12	1	7	0	0	5	128	2	0
29	Jun-09	Jun-10	1	0	0	0	1	0	0	0	7	0	0
30	Jun-09	Jun-10	1	4	5	3	2	0	0	2	44	1	0
	Total			74	52	15	56	11	1	56	2459	90	6
	CPUE (no)			**2.5**	**1.7**	**0.5**	**1.9**	**0.4**	**0.0**	**1.9**	**82.0**	**3.0**	**0.2**
	Confidence Level(95.0%)			1.100	1.037	0.425	0.919	0.268	0.068	0.848	70.937	1.435	0.181
	Standard Error			0.538	0.507	0.208	0.449	0.131	0.033	0.414	34.684	0.701	0.088
	Standard Deviation			2.945	2.778	1.137	2.460	0.718	0.183	2.270	189.972	3.842	0.484
	Sample Variance			8.671	7.720	1.293	6.051	0.516	0.033	5.154	36089.5	14.759	0.234
	Median			1	0.5	0	1	0	0	1.5	13	2	0
	Sample Size			30	30	30	30	30	30	30	30	30	30
	Probability of Capture			**0.723**	**0.500**	**0.233**	**0.733**	**0.233**	**0.033**	**0.6**	**0.967**	**0.8**	**0.167**
	Mean Weight (kg)			1.168	0.784	1.020	1.455	1.368	0.550	1.625	0.434	0.350	0.350
	CPUE (wt)			**2.883**	**1.359**	**0.510**	**2.717**	**0.502**	**0.018**	**3.033**	**35.559**	**1.201**	**0.070**
	Catch Weight			86.500	40.775	15.300	81.500	15.050	0.550	91.000	1066.772	36.031	2.100
	% of total catch weight			6.02	2.84	1.06	5.68	1.05	0.04	6.34	74.31	2.51	0.01

Total Catch Weight: 1435.578 kg.
Over-all CPUE(wt): 47.852 kg. / set

Appendix B. Summary of Provincial ESTN Database, filtered for lakes greater than 100 hectares and excluding Great Lakes surveys.

LAKE	Survey YEAR	MNR DISTRICT	MNR REGION	AREA ha.	Walleye CUE (no/set)	Walleye CUE Geo.Mean	Walleye Transformed log(c+1)	CUE Rank	CUE Sorted Ascending		
Borden	1998	Chapleau	NE		13.15	9.28	1.012	62nd	0.00		
George	1999	Cochrane	NE		0.71	0.48	0.170	61st	0.47		
Tweed	1999	Cochrane	NE		0.62	0.34	0.128	60th	0.56		
Upper Kesagami	1999	Cochrane	NE		7.53	5.78	0.831	59th	0.62		
Douglas	2000	Hearst	NE		10.88	4.22	0.718	58th	0.71		
Douglas	2001	Hearst	NE		7.44	3.13	0.616	57th	0.93		
Guilfoyle	2000	Hearst	NE		2.40	1.07	0.316	56th	1.00		
Guilfoyle	2001	Hearst	NE		3.94	3.04	0.606	55th	1.25	bottom 25%	
Remi	2002	Hearst	NE		3.73	1.69	0.429	54th	1.50		
Davis	1999	Kirkland Lake	NE		12.30	6.52	0.876	53rd	1.88		
Hubert	1999	Kirkland Lake	NE		3.75	1.62	0.419	52nd	2.00		
Kenogami	1998	Kirkland Lake	NE		2.44	1.48	0.395	51st	2.07		
Margaret	1999	Kirkland Lake	NE		16.50	13.55	1.163	50th	2.13		
Sesekinika	1998	Kirkland Lake	NE		1.88	1.17	0.336	49th	2.13		
Wildgoose	1999	Kirkland Lake	NE		18.90	15.22	1.210	48th	2.16		
Geike	1999	Timmons	NE		2.13	0.87	0.273	47th	2.40		
Horwood	2000	Timmons	NE		17.00	10.56	1.063	46th	2.44		
McPhail	1999	Timmons	NE		10.73	6.05	0.848	45th	2.44		
Night Hawk	1999	Timmons	NE		11.63	8.44	0.975	**44th**	**2.47**	**Manitouwabing**	
Porcupine	1999	Timmons	NE		18.53	13.09	1.149		2.60		
Reid	2000	Timmons	NE		0.93	0.79	0.253		2.72		
Three Nations	2000	Timmons	NE		12.47	8.95	0.998		3.73		
Timmichie	2001	Timmons	NE		17.71	10.22	1.050		3.74		
Bernadine	1993	QMLFAU	NW	384	1.25				3.75		
Crooked Pine	1998	QMLFAU	NW	1604	4.03				3.85		
Henderson	1997	QMLFAU	NW	151	9.40				3.94		
Mille Lacs	1994	QMLFAU	NW	24113	19.75				4.00		
Nioba	2000	QMLFAU	NW	317	25.52				4.03		
Savanne	1997	QMLFAU	NW	364	25.00				4.55		
Savanne	2001	QMLFAU	NW	364	20.56				4.71		
Savanne	2002	QMLFAU	NW	364	13.58				4.78		
Whitefish	1995	QMLFAU	NW	3015	8.18				5.53	Median	
Whitefish	1996	QMLFAU	NW	3015	21.71				5.77		
Whitefish	2001	QMLFAU	NW	3015	25.00				6.06		
Bay	2001	Parry Sound	SC	133	6.56	3.89	0.689		6.33		
Three Mile	2000	Parry Sound	SC	929	58.69	42.65	1.640		6.56		
Manitouwabing	**2004**	**Parry Sound**	**SC**		**2.47**	**1.55**	**0.406**		7.53		
Clear	2001	Pembroke	SC		6.06	2.78	0.577		8.18		
Round	1998	Pembroke	SC	3069	2.44	1.71	0.433		9.40		
Little	2000	Midhurst	SC	188	5.53	3.30	0.633		10.59		
Matchedash	2001	Midhurst	SC		4.00	2.60	0.556		10.73		
St. John	2000	Midhurst	SC	619	30.79	20.93	1.341		10.88		
Clear	2003	Ptbo	SC	1054	2.13	1.63	0.420		11.63		
Stoco	2001	Ptbo	SC	503	0.56	0.42	0.153		12.30		
Stony	2003	Ptbo	SC	2825	2.07	1.15	0.333		12.47		
Upper Rideau	2002	Kemptville	SC	1363	0.47	0.12	0.048		13.15		
Balsam	2000	KLFAU	SC	4665	2.60	1.64	0.422		13.57		
Balsam	2002	KLFAU	SC	4665	3.85	2.72	0.570		13.58		
Balsam	2003	KLFAU	SC	4665	4.55	2.74	0.573		16.50		
Buckhorn	1998	KLFAU	SC	3191	6.33	4.33	0.727		17.00		
Buckhorn	2001	KLFAU	SC	3191	4.71	3.80	0.681		17.71		
Buckhorn	2004	KLFAU	SC	3191	2.72	1.88			18.53		
Chemung	2001	KLFAU	SC	2280	2.00	1.77	0.442		18.90	Top 25%	
Chemung	2004	KLFAU	SC	2280	2.16	1.61	0.417		19.75		
Pigeon	2001	KLFAU	SC	5349	4.78	3.57	0.660		20.56		
Pigeon	2004	KLFAU	SC	5349	3.74	2.74			21.71		
Rice	2001	KLFAU	SC	10018	13.57	9.92	1.038		25.00		
Rice	2004	KLFAU	SC	10018	5.77	3.98			25.00		
Scugog	2000	KLFAU	SC	6374	32.50	22.09	1.363		25.52		
Scugog	2002	KLFAU	SC	6374	9.54	6.88	0.897		30.79		
Scugog	2003	KLFAU	SC	6374	10.59	6.71	0.887		32.50		
Couchiching	2003	Aurora	SC	4868	1.00	0.73	0.238		58.69		
			Mean		**9.733**	5.635	0.666				
		Standard Error			**1.306**	1.022	0.053				
		Standard Deviation			**10.280**	7.300	0.365				
		Confidence Level(95.0%)			**2.611**	2.053	0.106				
		Skewness			**2.250**	3.152	0.534				
			Count		**62**	51	48				

Appendix C-1

Catch Summary for 6'-trapnet Catch Data Filtered from the 1982 Trapnet and Gillnet Survey Conducted on Lake Manitouwabing. (Raw Data from McIntyre, 1983)

Set No.	Wal	SMB	LMB	NP	CWS	BBr	RB	Pksd	Carp	Y.Perch
1	0	0	1	2	0	0	1	2	5	0
5	2	0	0	1	1	0	15	0	0	0
10	0	0	0	4	0	0	11	3	0	1
16	2	0	0	1	0	0	15	1	0	0
18	0	0	0	0	0	0	2	5	0	1
25	0	0	0	0	0	0	0	2	0	1
27	0	0	0	1	0	0	1	0	0	1
29	0	0	0	0	0	0	0	0	0	0
32	1	0	0	2	0	0	0	1	0	0
CPUE (no./net set)	**0.6**	**0.0**	**0.1**	**1.2**	**0.1**	**0.0**	**5.0**	**1.6**	**0.6**	**0.4**
Confidence Level(95.0%)	0.678	0.000	0.256	1.001	0.256	0.000	5.099	1.281	1.281	0.405
Standard Error	0.294	0.000	0.111	0.434	0.111	0.000	2.211	0.556	0.556	0.176
Standard Deviation	0.882	0.000	0.333	1.302	0.333	0.000	6.633	1.667	1.667	0.527
Median	0	0	0	1	0	0	1	1	0	0
Prob. Of Capture %	33	0	11.1	66.6	11.1	0	66.6	66.6	11.1	44.4
Sum	5	0	1	11	1	0	45	14	5	4
Count	9	9	9	9	9	9	9	9	9	9
Prob. Of Capture	**0.333**	**0.000**	**0.111**	**0.666**	**0.111**	**0.000**	**0.666**	**0.666**	**0.111**	**0.444**
Mean Weight	1.400	0.000	1.725	1.000	1.300	0.000	0.131	0.120	8.000	0.140
CPUE (wt)	**0.778**	**0.000**	**0.192**	**1.222**	**1.256**	**0.000**	**0.655**	**0.187**	**4.444**	**0.062**
Catch Weight	7.000	0.000	1.725	11.000	11.300	0.000	5.895	1.680	40.000	0.560
% of total Catch Wt.	8.84	0.00	2.18	13.90	14.27	0.00	7.45	2.12	50.53	0.71

Total Weight Caught: 79.160 kg.
Over-all CPUE (wt): 8.796 kg / net set

Appendix C-2

Catch Summary for 6'-trapnets Filtered from the 1988 Trapnet and Gillnet Survey Conducted on Lake Manitouwabing.

Set No.	Wal	SMB	LMB	NP	CWS	BBr	RB	Pksd	Carp	Y.Perch
1	0	0	0	0	0	30	9	13	0	2
2	0	0	0	1	0	0	2	0	0	0
3	8	1	3	1	1	378	0	0	0	0
4	0	0	0	0	1	4	0	0	0	0
5	1	3	2	0	0	133	6	0	0	0
6	1	0	0	1	2	7	3	0	0	0
7	0	0	0	0	0	0	3	0	0	0
8	0	6	0	0	0	1	1	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	4	1	0	0	0	12	7	0	0	0
11	0	0	0	6	0	426	1	0	0	0
12	0	0	0	2	0	1	4	1	0	0
13	1	1	0	1	0	19	2	19	0	0
14	0	1	0	1	0	9	8	2	0	1
15	0	2	0	1	1	16	8	3	0	4
16	0	1	1	0	1	6	3	0	0	0
17	7	6	0	1	2	16	2	0	0	0
18	0	1	0	1	0	2	6	0	0	0
19	14	4	1	18	0	24	37	1	0	0
20	4	15	0	2	0	6	3	1	0	0
21	1	0	0	0	0	0	0	0	0	0
22	1	5	0	1	0	18	7	1	0	3
23	0	12	0	3	0	13	1	2	0	0
24	0	6	1	1	0	77	12	1	0	1
CPUE (no / net set)	**1.8**	**2.7**	**0.3**	**1.7**	**0.3**	**49.9**	**5.2**	**1.8**	**0.0**	**0.5**
Confidence Level(95.0%)	1.453	1.673	0.322	1.568	0.269	47.529	3.184	1.912	0.000	0.449
Standard Error	0.703	0.809	0.155	0.758	0.130	22.976	1.539	0.924	0.000	0.217
Standard Deviation	3.442	3.962	0.761	3.712	0.637	112.557	7.541	4.527	0.000	1.062
Median	0	1	0	1	0	10.5	3	0	0	0
Sum	**42**	**65**	**8**	**41**	**8**	**1198**	**125**	**44**	**0**	**11**
Count	24	24	24	24	24	24	24	24	24	24
Prob. Of Capture	**0.417**	**0.583**	**0.208**	**0.625**	**0.250**	**0.845**	**0.833**	**0.416**	**0.000**	**0.208**
Mean Weight	1.422	0.939	1.725	1.139	1.212	0.471	0.126	0.234	0	0.140
CPUE (wt)	**2.488**	**2.543**	**0.575**	**1.945**	**0.404**	**23.511**	**0.656**	**0.429**	**0**	**0.064**
Catch Weight (kg)	59.724	61.035	13.800	46.699	9.696	564.258	15.750	10.296	0.000	1.540
% of total Catch Wt.	7.63	7.80	1.76	5.97	1.24	72.08	2.01	1.31	0.00	0.20

Total Catch Weight: 782.798 kg.

Over-all CPUE(wt): 32.615 kg. / net set

Appendix C-1

Catch-Per-Unit-Effort (CPUE) Summary of the Parry Sound 6'-Trapnet Database, 1982 to Present (2004).

Survey	No. Sets	Area (ha)	MEI	Secchi (m)	MNR Dist	Catch-Per-Unit-Effort (CPUE) Wal	SMB	LMB	Bl.Cp.	NP	CWS	BBr	RB	Pksd	Y.Perch	Other
Ahmic Lk ('83)	17	1567	3.3	3.5	PSound	2.4	3.5			0.2	2.6	3.6		6.7	1.7	0.1
Ahmic Lk ('87)	18	1567	3.3	3.5	PSound	3.9	2.7			0.4	0.5	4.2		2.3	0.4	
Bear Lk ('86)	8	325	8.2	2.3	PSound	0.4				1.5	3.9	3.3	18.1	4.3	0.5	
Cecebe Lk ('83)	15	770	6.0	2.6	PSound	0.9	0.9			0.1	1.3	0.1		2.7	2.3	0.5
Cecebe Lk ('89)	16	770	6.0	2.6	PSound	2.4	5.2			0.4	1.8	2.9	2.1	13.1	1.1	
Doe Lk ('82)	11	1188	4.3	2.1	PSound	0.9	2.2			0.7	0.5	2.9	0.0	2.6	0.1	0.1
Doe Lk ('88)	12	1188	4.3	2.1	PSound	3.5	6.2			1.5	1.2	18.8	2.1	11.5	1.4	
Harris Lk ('94)	11	363			PSound	1.4	2.5	4.8		2.8	13.5	31.5	1.3	4.6	0.0	
Healey Lk ('83)	20	763	3.4	3.9	PSound		1.6	2.7		0.3	0.3	0.0	2.3	3.4	0.0	
Kapikog ('83)	5	317	3.1	5.4	PSound		1.0	4.6		0.0		0.0	4.2	5.4	4.4	0.2
Manitouwabing ('82)	9	1250	4.8	2.3	PSound	0.6	0.0	0.1		1.2	0.1	0.0	5.0	1.6	0.4	0.6
Manitouwabing ('88)	24	1250	4.8	2.3	PSound	1.8	2.7	0.3		1.7	0.3	49.9	5.2	1.8	0.5	
Mill Lk ('90)	8	619	1.4	2.0	PSound	0.1	2.4		0.2	0.4	0.4	0.7	1.0	0.1		
Portage Lk ('86)	3	59		1.8	PSound	0.0	0.0	2.0		1.5	3.9	3.3	18.1	4.3	0.5	
S. Magnetawan R ('94)	16				PSound	1.2	3.6	0.7		1.2	2.6	2.7	2.9	4.9		0.1
U. Moon R. ('85)	80				PSound	1.0	1.2	0.0	0.0	0.4	0.5	0.0	2.2	1.0	0.1	0.2
U. Pickerel R. ('89)	28				PSound	1.1	2.9	0.9		0.4	1.0	1.5	2.4	2.9		0.7
Whiteston Lk ('82)	12	698	6.0	2.4	PSound	0.9	0.6	0.0		1.8	0.3		0.8	0.5	0.2	
Wahwashkesh Lk ('87)	32	1721	2.2	3.7	PSound	0.2	4.4	0.0		0.6	0.2	0.7	3.9	0.8	0.0	
Manitouwabing ('04)*	30	1250	4.8	2.3	PSound	2.5	1.7	0.5		1.9	1.9	82.0	3.0	2.0	0.0	0.4
Salmon Lk ('04)	16	68	2.5	3.7	PSound		7.2	3.1		0.1	0.4	0.1	0.6	0.3		
Shebeshekong ('04)	16	158	4.9	2.5	PSound	1.3	2.9	1.1	8.4	0.6	4.4	34.9	1.3	0.5		
Whitestone Lk ('04)	30	698	6.0	2.4	PSound	1.3	4.0	5.6	9.4	1.4	0.9	1.3	2.8	2.8	0.3	0.4
	Parry Sound Mean					**1.4**	**2.7**	**1.8**	**4.5**	**0.9**	**1.9**	**11.1**	**4.0**	**3.5**	**0.8**	**0.3**
	Confidence Level(95.0%)					0.502	0.837	1.076	8.112	0.319	1.286	9.252	2.355	1.429	0.555	0.158
	Standard Error					0.240	0.402	0.502	2.549	0.154	0.618	4.449	1.125	0.689	0.263	0.070
	Standard Deviation					1.072	1.888	1.943	5.098	0.738	2.900	20.867	5.032	3.305	1.117	0.221
	Median					1.15	2.6	0.9	4.3	0.6	0.95	2.8	2.35	2.7	0.4	0.3
	Count					20	22	15	4	23	22	22	20	23	18	10

Appendix D

Walleye Biosampling Summary

Set No.	Fish No.	Fk. Lg. (cm)	Tot. Lg. (cm)	Weight (grams)	Assessed Age	Set No.	Fish No.	Fk. Lg. (cm)	Tot. Lg. (cm)	Weight (grams)	Assessed Age
1	1	50.4	52.4	1400	9	18	38	31.7	34.1	400	4
1	2	54.0	58.1	1750	13	18	39	43.0	47.3	1100	8
1	3	50.6	53.3	1150		18	40	52.3	55.5	1700	13
2	4	52.8	56.9	1500	11	18	41	32.1	34.2	400	4
2	5	42.0	44.6	750	6	18	42	33.4	35.5	400	4
3	6	43.3	46.0	750	7	18	43	33.1	35.5	400	4
3	7	28.5	31.0	250	3	18	44	34.2	36.6	500	4
3	8	29.0	31.5	350	3	18	45	62.9	65.9	2600	14
3	9	35.0	37.0	400	4	19	46	32.9	35.0	450	3
3	10	60.0	62.9	2300	14	20	47	42.4	44.8	850	6
4	11	43.4	46.3	1000	7	22	48	64.2	68.3	2700	16
4	12	48.6	51.8	1200	9	22	49	63.5	66.5	2700	17
4	13	67.1	70.3	3400	16	22	50	45.3	48.2	1100	5
6	14	51.2	54.4	1650	9	22	51	40.6	43.1	750	4
6	15	54.6	58.3	2250	13	25	52	55.5	58.2	1500	8
7	16	54.5	58.0	1600	12	26	53	24.2	26.3	150	2
10	17	37.8	40.2	550	4	26	54	46.4	48.3	1150	9
10	18	38.8	41.2	700	6	26	55	43.4	44.8	1000	8
10	19	45.3	48.6	950	8	26	56	48.8	51.5	1200	10
12	20	37.2	39.6	400	4	26	57	57.8	60.4	2100	15
14	21	49.0	51.7	1250	9	26	58	56.0	59.1	1700	14
14	22	31.5	33.5	450	3	26	59	56.5	59.2	1900	11
15	23	52.3	55.9	1500	10	27	60	45.4	48.6	1000	7
16	24	59.5	63.0	2350	11	27	61	36.6	39.0	500	4
16	25	53.9	57.5	1700	13	27	62	42.7	45.4	750	6
16	26	51.1	54.9	1350	8	27	63	40.1	42.8	700	4
16	27	48.2	51.3	1400	9	27	64	40.0	43.7	500	4
16	28	37.9	40.1	600	4	28	65	55.4	59.1	1800	12
16	29	45.2	48.3	1000	6	28	66	41.1	38.8	700	6
16	30	45.5	48.2	1000	6	28	67	47.6	51.2	950	7
16	31	47.1	49.7	1100	6	28	68	42.6	45.0	800	7
16	32	53.5	56.7	1550	9	28	69	45.2	48.0	900	9
16	33	54.4	58.3	1850	12	28	70	45.1	48.2	650	9
16	34	60.5	63.9	2300	14	30	71	33.4	36.1	400	3
17	35	38.9	41.5	700	5	30	72	70.7	75.0	3800	17
18	36	31.6	33.4	300	4	30	73	29.4	31.6	300	3
18	37	31.9	34.1	400	4	30	74	45.1	48.2	900	7

Mean	45.6	48.4	1168.9	7.9
Standard Error	1.188	1.243	88.812	0.469
Standard Deviation	10.218	10.692	763.988	4.008
Confidence Level(95.0%)	2.367	2.477	177.002	0.935
Median	45.3	48.2	1000	7
Sum			86500	579
Sample Size	74	74	74	73

Appendix E

Smallmouth Bass Biosampling Summary

Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)	Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)
3	1	38.3	40.5	1000	22	26	41.5	44.1	1250
3	2	37.0	38.5	900	22	27	31.7	33.2	550
3	3	42.3	44.5	1300	22	28	40.9	43.0	1200
3	4	35.0	36.5	600	22	29	42.1	44.5	1200
3	5	29.0	31.0	300	22	30	40.9	43.8	1100
3	6	31.0	32.3	300	22	31	37.2	39.4	900
4	7	45.5	48.0	1600	22	32	41.8	44.0	1150
4	8	39.2	41.6	1100	26	33	32.8	34.6	550
4	9	32.4	34.5	600	26	34	40.5	41.5	1100
4	10	30.1	31.9	500	27	35	27.6	29.2	375
4	11	29.2	30.8	400	28	36	41.8	44.0	1200
5	12	26.2	27.6	350	28	37	43.4	45.6	1300
7	13	27.0	28.6	350	28	38	32.2	34.1	500
7	14	31.6	33.5	400	28	39	30.0	31.9	450
7	15	31.4	33.5	550	28	40	27.4	28.9	350
9	16	33.8	35.5	700	28	41	34.5	36.4	650
11	17	38.0	40.1	900	28	42	35.7	37.6	700
11	18	40.1	42.2	1100	28	43	34.5	36.8	650
12	19	27.5	28.9	300	28	44	40.3	42.5	1000
13	20	45.5	48.2	1450	28	45	35.9	38.2	800
13	21	33.3	35.1	600	28	46	33.8	36.0	650
13	22	33.9	35.7	650	28	47	34.0	36.0	600
15	23	42.5	45.1	1300	30	48	34.0	36.0	600
15	24	38.6	41.1	1000	30	49	38.7	41.0	800
16	25	32.5	34.3	550	30	50	27.8	29.3	350
					30	51	35.4	37.0	800
					30	52	41.6	44.0	1200

Mean	35.6	37.5	784
Standard Error	7.289	7.677	48.342
Standard Deviation	52.561	55.357	348.598
Confidence Level(95.0%)	14.633	15.411	97.050
Sum			40775
Sample Size	52	52	52

Appendix F

Largemouth Biosampling Summary

Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)
1	1	40.0	41.2	1150
9	2	38.7	39.7	1100
9	3	39.5	40.7	1100
13	4	47.0	49.0	2100
13	5	35.4	36.7	900
22	6	36.5	37.8	950
22	7	44.6	45.9	1600
22	8	36.7	38.0	950
22	9	30.6	32.0	550
22	10	34.6	36.0	700
26	11	35.3	37.2	850
28	12	36.5	38.0	850
30	13	36.6	38.0	900
30	14	36.1	37.5	800
30	15	36.1	37.7	800
Mean		37.6	39.0	1020
Standard Error		10.346	10.482	98.778
Standard Deviation		40.071	40.596	382.567
Confidence Level(95.0%)		22.191	22.482	211.858
Sum				15300
Count		15	15	15

Appendix G

Northern Pike Biosampling Summary

Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)	Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)
1	1	53.1	56.7	1100	18	28	47.5	50.6	700
1	2	48.4	51.5	850	19	29	57.4	61.2	1500
1	3	48.4	51.3	750	20	30	45.0	48.1	600
1	4	49.4	52.6	700	21	31	34.0	35.7	300
1	5	47.3	50.5	700	22	32	46.1	49.0	700
1	6	58.4	61.9	1350	22	33	44.2	46.5	700
1	7	47.0	50.4	700	22	34	52.8	56.0	1200
1	8	49.3	52.6	700	22	35	59.6	63.7	1450
1	9	90.0	95.0	5700	22	36	46.0	49.0	700
1	10	111.0	115.0	10000	22	37	51.0	54.3	900
2	11	49.6	52.3	850	22	38	53.2	57.0	1250
3	12	49.5	53.5	850	22	39	43.2	46.3	650
4	13	99.0	102.0	8000	23	40	46.4	49.4	500
4	14	85.0	87.0	5500	25	41	53.5	57.3	1800
4	15	45.6	49.0	700	26	42	45.0	48.1	550
4	16	32.0	34.0	250	26	43	50.6	53.1	950
6	17	48.0	50.5	750	26	44	42.6	45.7	550
8	18	43.9	46.4	600	27	45	50.3	53.3	850
8	19	46.5	49.3	800	27	46	44.3	47.1	500
9	20	59.5	63.1	1400	28	47	93.0	96.0	6650
9	21	66.4	70.3	2400	28	48	51.5	54.6	850
9	22	66.9	72.0	2500	28	49	62.3	65.7	1700
12	23	48.2	51.3	750	28	50	48.9	51.9	850
16	24	48.1	51.1	800	28	51	57.8	61.5	1350
17	25	37.9	40.5	400	28	52	45.1	48.4	600
17	26	40.0	42.4	400	28	53	42.6	45.4	600
17	27	43.1	46.0	600	29	54	43.5	46.4	600
					30	55	54.3	58.0	1200
					30	56	45.5	48.2	650

Mean	53.0	56.2	1455
Standard Error	20.394	20.778	257.428
Standard Deviation	152.618	155.489	1926.412
Confidence Level(95.0	40.871	41.640	515.896
Sum			81500
Count	56	56	56

Appendix H

Lake Whitefish Biosampling Summary

Set No.	Fish No.	Fk. Lg. (mm)	Tot. Lg. (mm)	Weight (grams)
1	1	504	56	2000
1	2	496	547	1800
2	3	507	556	1800
2	4	415	464	1100
7	5	488	539	1600
7	6	496	549	1750
12	7	316	359	550
12	8	234	262	250
13	9	406	451	900
16	10	528	580	1900
24	11	460	505	1400
Mean		441	443	1368
Standard Error		27.780	48.311	177.517
Standard Deviation		92.135	160.231	588.758
Confidence Level(95.0%)		61.897	423.564	395.533
Sum				15050
Sample Size		11	11	11

Appendix I

CPUE-no for Parry Sound Area Synoptic 8'-Trapnet Surveys (PSSTNS) Conducted from 1994 – 2003.

Survey	Walleye	S.M. Bass	L.M. Bass	Black Crappie	N. Pike	C.Wt. Sucker	Brown Bullhead	Rock Bass	Pump-kseed	Yellow Perch
Bear Lake (2001)	9.9	1.6			2.6	2.1	4.5	2.6	0.2	
Bolger L. (1999)	9.5	9.5	0.1		0.7	0.1	1.0	3.1	0.6	
Buck Lake (2002)	1.8	1.3	0.1	0.8	0.9					
Cecebe Lk. (2000)	11.9	5.2			2.5	3.4	6.4	2.3	5.3	
Crane Lk (1997)	1.6	7.1			0.1			0.7	0.1	
Doe Lk. (1998)	11.3	13.0			0.7	4.5	3.9	17.8	11.1	
Dollar's Lake (2000)	1.3	3.1	2.3	1.9	0.8	2.4	23.8	1.2	1.1	0.8
Dollars Lake (2003)	1.5	5.0	1.5	4.8	0.6	3.2	3.6	1.7	1.7	
Gibson Lake (2001)	3.1	6.7	0.9	9.1	1.0	2.3	12.7	0.7	0.1	
Giroux Lake (2001)	6.8	1.8			2.1	3.5	3.7	0.3		0.1
Go Home Lk. (2003)	1.0	3.7	0.9		0.6	2.8	1.4	3.9	3.7	
Harris Lk. (1994)	1.9	1.1	0.5		0.7	7.8	1.8	1.0	2.3	0.0
Isabella Lake (1997)	0.3	7.0			1.2	5.1	1.5	5.7	0.2	
Kashegaba L. (1999)	0.9	10.9	0.9		0.7	0.0	1.9	10.3	3.0	
McKellar Lake (2003)	1.3	0.3	0.1		1.3	2.8	0.8	2.0		
McDougall L. (2000)	2.2	1.5		0.8	1.3	1.5	1.6	0.4		
Moffat Lake (2002)	0.8	0.4			1.6	5.7	1.7	0.1		0.1
Pakeshkag Lk (2001)	0.1				2.0	1.8	13.5	0.8	0.3	0.1
Poverty Bay (1999)	2.3	12.1	4.6		0.3	7.0	3.8	2.4	1.4	
Rock Is / Bl Oak (2003)	5.8	1.6	0.3		1.0	5.3	0.6	0.8	0.2	
S. Mag. R. (1994)	1.9	2.3	0.1		0.7	2.6	1.5	1.3	2.1	0.0
Six-Mile L. (1999)	0.6	5.9	4.6	4.7	0.8	1.7	9.4	2.0	4.4	
Wahwashkesh L. (02)	3.1	4.0	0.2	0.5	1.3	0.3	4.6	2.4	0.6	
CPUE-no (no. / net set)	3.5	4.8	1.2	3.2	1.1	3.1	4.9	2.9	2.1	0.2
Standard Error	0.775	0.822	0.419	1.197	0.136	0.464	1.238	0.855	0.647	0.125
Confidence Level(95.0%)	1.607	1.708	0.904	2.929	0.283	0.967	2.583	1.779	1.365	0.321
Standard Deviation	3.716	3.853	1.566	3.167	0.654	2.125	5.674	4.012	2.745	0.306
Count	23	22	14	7	23	21	21	22	18	6
CPUE-wt.	4.101	2.854	0.814	1.094	1.952	3.701	1.714	0.272	0.319	16.404
Standard Error	0.838	0.505	0.243	0.415	0.248	0.509	0.435	0.073	0.137	1.677
Standard Deviation	4.019	2.367	0.911	1.097	1.192	2.278	1.993	0.342	0.579	8.043
Confidence Level(95.0%)	1.738	1.05	0.526	1.015	0.515	1.066	0.907	0.152	0.288	3.478
Count	23	22	14	7	23	20	21	22	18	23

Over-all (all species) CPUE-wt: 33.225 kg. / set