Poverty Bay
(Of the Magnetawan River),
Croft Geographic Township

Synoptic Trapnet Survey, 1999.

Eric McIntyre
Parry Sound Area Fisheries Biologist

March 2000.

Executive Summary

A synoptic trapnet survey consisting of seven sets was conducted on Poverty Bay of the Magnetawan River from July 27 - 30, 1999. The primary purpose of this project was to assess the status of the walleye and smallmouth bass populations in the resident fish community.

The catch averaged 13.31 kilograms of fish per net set. This level of productivity is considered "average" relative to similar synoptic trapnet surveys conducted throughout the Parry Sound Area.

Game fish (walleye, northern pike, smallmouth and largemouth bass) comprised approximately 70% of the total catch weight of 98.285 kilograms. Coarse fish (common white sucker and brown bullhead) comprised approximately 29% and pan fish (pumpkinseed and rock bass) 1%. This catch composition is also "average" for similar Parry Sound Area surveys.

Even though the catch was dominated by smallmouth bass in terms of number (37.5%), the biomass or weight of walleye (19.6%), smallmouth bass (30.6%), largemouth bass (22.2%) and white sucker (22.4%) in the catch were fairly similar.

Community composition appears to have changed considerably since the last synoptic trapnet survey conducted in 1979. Largemouth bass were non-existent in the '79 survey, but a major component of the catch in 1999. Rock bass were also common in '99 but absent in the '79 survey. Conversely, yellow perch were common in the '79 survey but absent in '99. A single burbot was also caught in '79 but none in this survey.

Walleye abundance in Poverty Bay is low (C.U.E. 2.3 walleye per trapnet set) relative to 25 similar surveys conducted in the Parry Sound Area (average walleye C.U.E. 4.1). Walleye abundance may have decreased marginally relative to the 1979 survey. Differences in methodology prevent direct comparisons between the two studies however. Biosampling data indicate 'fair' levels of recruitment in recent years.

Smallmouth bass abundance is among the highest in the Parry Sound Area (C.U.E. 13.1). Recruitment levels are very high and the population appears in 'excellent' condition. Although not directly comparable, there appears to be a considerable increase in the number of smallmouth bass relative to the 1979 survey.

Largemouth bass abundance is 'good'; also with 'good' recruitment levels.

Northern pike abundance is 'very low' and probably down from those observed in 1979. (Again – data from the two surveys is not directly comparable.)

Table of Contents

Page

1.0 Introduction …….. 4

2.0 Methods …… 4

3.0 Results

3.1 Total Productivity ……. 6
3.2 Catch Composition …….. 7
3.3 Catch-Per-Unit-Effort and Relative Abundance …….. 7
3.4 Biosampling Analysis …….. 10

4.0 Literature Cited ……. 12

Appendix A Trapnet Catch summary for Poverty Bay (Magnetawan River), Summer, 1999 …….. 13

Appendix B Walleye Biosampling Data, Poverty Bay (Magnetawan River) Synoptic Trapnet Survey Summer, 1999 ……. 14

Appendix C Smallmouth Bass Biosampling Data, Poverty Bay (Magnetawan River) Synoptic Trapnet Survey, Summer, 1999 …… 15

Appendix D Largemouth Bass Biosampling Data, Poverty Bay (Magnetawan River) Synoptic Trapnet Survey, Summer, 1999 …… 16

Appendix E Poverty Bay – Synoptic Trapnet Catch Summary, **Summer, 1979** ……. 17

Appendix F Biosampling Summary – Poverty Bay Trapnet Survey, **1979** ……. 18

1.0 Introduction

Poverty Bay comprises a small portion of the Magnetawan River, approximately 3 kilometers downstream from Ahmic Lake in the Geographic Township of Croft. It loosely comprises approximately 150 acres of surface area and has approximately 40 cottages (1978 aerial photography building count).

This portion of the Magnetawan River has not been surveyed using the Ministry's standard *Aquatic Habitat Inventory Protocol*, which is generally a 'first step' inventory survey of water chemistry, physical characteristics and fish community. Water characteristics for Poverty Bay are undoubtedly similar to Ahmic Lake which is immediately upstream. Ahmic Lake and the Magnetawan River have dystrophic water (brownish colour with much dissolved humic matter) with average secchi readings of 3.3 metres (OMOE, 1998). Water characteristics are typical of Canadian Shield rivers and lakes: pH is slightly acidic, alkalinity is low as is conductivity (OMNR, 1971). Ahmic Lake is classified as oligotrophic with total phosphorus readings averaging 0.009 mg/l.

During the summer of 1979, the first – and only biological work that predates this survey was conducted. This consisted of a trapnet survey that appears to be related to a contaminant-monitoring program for smallmouth bass. Unfortunately the results of this survey have never been summarized in a technical report. We conducted an abbreviated analysis of the raw data for the purposes of this report. The results are further discussed in this report. The survey consisted of eight over-night, 4' trapnet sets at four different locations and eight over-night, 6' trapnets sets at five different locations.

Probably concurrent with the above survey was the collection of smallmouth bass samples for contaminant analysis. Bass in the 20 – 45 centimeter size class had mercury levels between 0.5 and 1.0 ppm. (Limited consumption recommendations are provided in the MOE publication – *Guide to Eating Ontario Sport Fish* that is published annually.)

Early in 1999, the Ministry of Natural Resources heard concerns voiced by the Poverty Bay Cottage Association that fishing quality had decreased considerably in recent years. In response to these concerns the Ministry of Natural Resources conducted a *synoptic trapnet survey* to assess the population status of the Poverty Bay fish community and walleye and smallmouth bass populations in particular.

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 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.

Net set locations is indicated in Figure 1.

Figure 1 goes on this page

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). Only fish captured in the "house" of the net were included in the catch. Fish caught in the wings or gilled in the lead were not considered part of the catch.

Biosampling data (total length, fork length, round weight) was conducted for all game fish species (walleye –Appendix A; smallmouth bass - Appendix B, largemouth bass – Appendix C and northern pike - Appendix D). For non-game fish, round weights were randomly recorded in order that a mean weight and total catch weight could be determined for these species (Appendix A).

Age determination for walleye was by the scale reading method. As there were no known-age walleye in Poverty Bay – 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. We experienced a great deal of difficulty in assigning walleye age and suspect a high degree of error in our assessment. For this reason, we ascribed more credibility to size distribution than age distribution in our biosampling analysis. The reader should bear in mind, that our mean age determinations probably underestimate the true mean age of fish that we sampled.

3.0 RESULTS:

Fisheries managers use various types of surveys and fishing gear to evaluate the status of fish communities and individual populations that comprise them. There is no one survey design or type of sampling gear that gives a true and unbiased reflection of a fish community. Consequently, sampling results need to be carefully interpreted in light of sampling biases. The 8-foot, trapnetting gear used in this survey samples the near-shore component of the fish community – but most effectively targets fish in waters ranging in 8 – 16' of depth. These nets are particularly effective at capturing walleye and smallmouth bass that have large home ranges and actively seek prey in near-shore areas. They are much less effective at capturing northern pike that are "ambush feeders" and wait for prey to come to them. Similarly, largemouth bass catches are typically low as this species inhabit shallow waters with heavy aquatic vegetation where the gear is often unsuitable or ineffective. Catches of rock bass, pumpkinseed, brown bullhead are often disproportionately low, as these species are more common in waters shallower than where the' house' of an 8' trapnet is located. Catches of common white suckers are highly variable and often dependent on the specific type of habitat and depth that a particular net is set at. For all the above reasons, the catch should not be considered an accurate reflection of fish community composition.

3.1 Total Productivity

The average catch (weight) per trapnet for all species combined can be used as a general indicator of fish productivity. Relative to nine other similar synoptic trapnet surveys recently conducted in the Parry Sound Area (post 1994), Poverty Bay with an average catch of 13.31 kilograms per net set, would rank 6th out of 10 surveys. The average weight of fish caught per 8' trapnet set for these 10 surveys is 15.6 kilograms. Consequently, the productivity of Poverty Bay appears to be 'about average' for similar surveyed waterbodies in the Parry Sound Area.

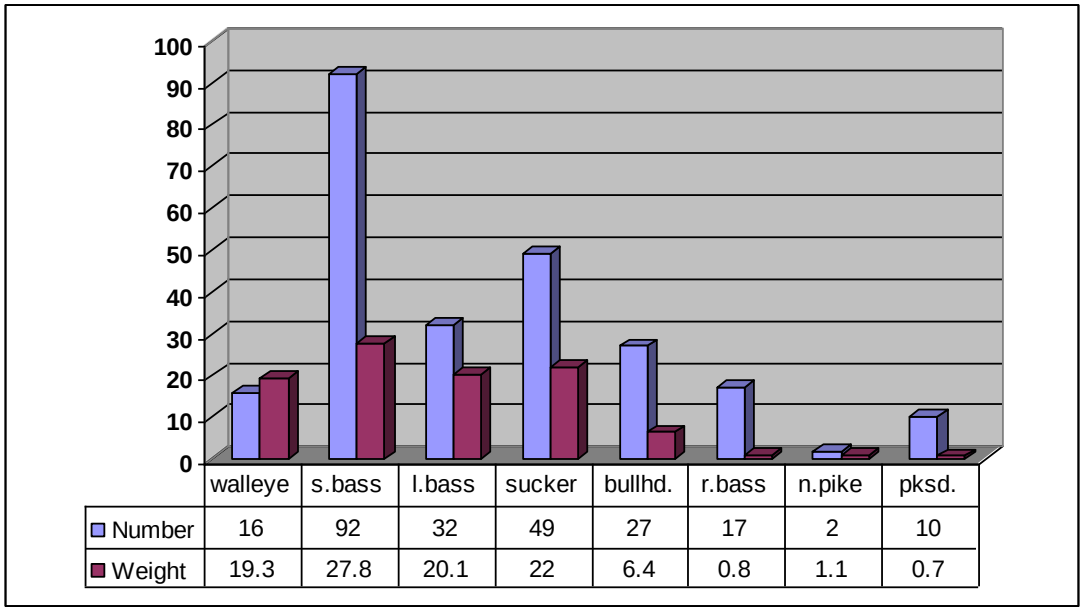
3.2 Catch Composition

Smallmouth bass were the most frequently caught species (92) followed by common white sucker (49), largemouth bass (32), brown bullhead (27), rock bass (17), walleye (16), pumpkinseed (10) and northern pike (2) (Figure 2 and Appendix A).

A total of 98.285 kilograms of fish were captured in 7 trapnet sets (Appendix A). Almost 70% of the catch weight was dominated by game fish (walleye 19.6%, smallmouth bass 30.6%, largemouth bass 22.2% and northern pike 1.2%) (Figure 2 and Appendix A). Coarse fish (common white sucker and brown bullhead) comprised 29.0% of the catch weight and pan fish (rock bass and pumpkinseed) 1.5%. Relative to nine other synoptic trapnet surveys that have recently (post 1994) been conducted in the Parry Sound Area, these percentages are very similar to the over-all average (game fish 69.1%, coarse fish 26.1% and pan fish 4.8%).

Readers are cautioned that due to biases in the sampling gear, the catch should not be considered an accurate indicator of species abundance in the fish community.

Figure 2. Catch (presented by both number and weight) composition from the 1999 Poverty Bay synoptic trapnet survey.



	walleye	s.bass	l.bass	sucker	bullhd.	r.bass	n.pike	pksd.
Number	16	92	32	49	27	17	2	10
Weight	19.3	27.8	20.1	22	6.4	0.8	1.1	0.7

3.3 Catch-Per-Unit-Effort and Relative Abundance

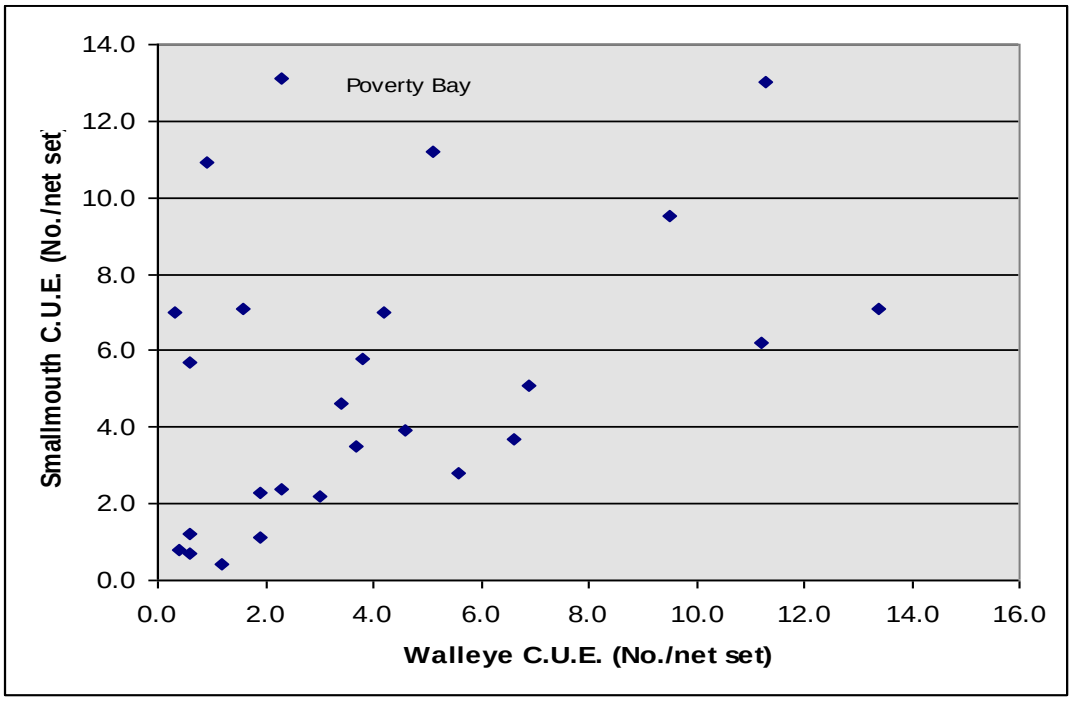
Anglers and Lake Residents alike have a keen interest in the abundance of game fish species inhabiting a lake. Ideally, monitoring changes in the abundance of fish species in a particular lake is best achieved by multiple years, indexing surveys. Such surveys use the same gear fished at the same location and similar times such that changes in species abundance become evident when catch results are compared between surveys. Such data comparisons are made within the individual lake but between years.

Unfortunately, the Ministry does not have the capability to conduct such regular 'indexing surveys' on the multitude of inland lakes that it manages. As a practical alternative, it conducts 'synoptic surveys' on a variety of lakes that provide a 'snapshot in time' of the status of the fish community and the individual fish populations that comprise it. Catch data can be compared between lakes (and between years) to accord the abundance of fish species relative to other lakes. Comparison of relative abundance ***between lakes*** is much less desirable than comparisons ***within a lake but between years***. This is because each lake is unique in its productivity characteristics (size, volume, littoral area, total dissolved solids, mean depth, shoreline length, physical habitat features, etc.) as well as the compliment of species in the fish community. Also for numerous reasons, it is often difficult to precisely standardize netting methodology used on different lakes without introducing biases. Consequently, direct ***between lake*** comparisons are seldom statistically valid. Nevertheless, with these shortcomings in mind, between lake comparisons can provide a **'gross measure'** of species abundance in any one particular lake relative to a host of others for which similar synoptic surveys have been completed. This measure can convey to anglers and residents alike, as well as fish managers, if particular fish populations are doing well or poorly. The reader should bear in mind that in many instances this 'gross measure' (i.e. species C.U.E. comparisons between lakes) is not statistically defensible.

Mean catch by species (also referred to as the "catch-per-unit effort or C.U.E) is the statistic most commonly used to indicate species abundance. It is referred to as an index of "relative abundance", because the values are compared relative to one another either within a fish community or between lakes. CUE is a direct calculation based on number caught per net set and therefor in Poverty Bay is highest for smallmouth bass at 13.1 ± 11.6 ($P > .05$) fish per net set followed by common white sucker (CUE: 7.0 ± 3.0 $P>.05$), largemouth bass (4.6 ± 6.7), brown bullhead (3.8 ± 3.8), rock bass (2.4 ± 3.2), walleye (2.3 ± 2.0), pumpkinseed (1.4 ± 2.4) and northern pike (0.2 ± 0.4) (Appendix A). Noteworthy however, is the high degree of variability for most species caught between individual trap net catches as indicated by the wide confidence limits at the 95% level. This is especially prevalent for smallmouth and largemouth bass as well rock bass, brown bullhead and pumpkinseed. It suggests that concentrations of these populations may be highly localized according to habitat and this habitat may be quite variable.

Synoptic trapnet surveys using a similar methodology to this one have routinely been conducted in the Parry Sound Area since the early 1980s. Relative to 25 similar surveys that included walleye and smallmouth bass in the catch, Poverty Bay would rank first in smallmouth bass abundance, but 15th in terms of walleye abundance (Figure 3). (*We again caution readers that this is a "gross ranking" system that gives a general impression of species abundance relative to a host of other lakes in the Parry Sound Area. Allocating a specific position to a lake in this ranking system is not statistically defensible.)* **We conclude that smallmouth bass appear to be quite abundant in Poverty Bay relative to other Parry Sound Area lakes, but walleye abundance is 'below average'.** (Note: Average walleye CUE for 26 surveys shown in Figure 3 was 4.1 ± 1.5 walleye per net set.)

Figure 3. Walleye and smallmouth bass catch-per-unit-effort (number caught per 8' trapnet set) from numerous synoptic trapnet surveys conducted in the Parry Sound Area, 1982 – present. (Data for 8' trapnet sets only. Each data point represents CUE results from a separate synoptic survey.)



A synoptic trapnet survey of different design was also conducted on Poverty Bay in 1979. Although it is unclear, we presume it was conducted in conjunction with an MOE program to monitor contaminant levels in smallmouth bass. The primary purpose of the survey appears to have been directed at fish community assessment however as the survey continued long after the required number of fish samples were obtained for contaminant analysis. The survey used 4 and 6' trapnets. There were 8 net nights of fishing effort using four foot nets (the equivalent of two four foot nets set for four nights) and 8 net nights of fishing effort using the six foot nets. Unfortunately, the results of the survey were never summarized in a technical report. We conducted an abbreviated analysis of the data (Appendix B) for the purposes of this report. Clearly, the two surveys are not comparable due to significant difference in methodology, but they do present some interesting observations.

Most notable is the relatively high abundance of largemouth bass in this survey, whereas they were non-existent in the 1979 survey. It would appear that this species has been introduced in the intervening time period. Likewise, rock bass are also common in this survey but completely absent in '79. Conversely, yellow perch were common in the 1979 survey, but are completely absent in this survey. A single ling (burbot) was also caught in '79 but none in 1999.

Walleye appear to have been slightly more abundant in 1979 (walleye CUE of 4.1 for 4 and 6' nets combined in 1979 – Appendix B vs. 1999 CUE for 8' nets of 2.3 – Appendix A). Admittedly this conclusion cannot be substantiated by the data which is not comparable. Perhaps more conclusive however, is the appearance that smallmouth bass abundance has increased since 1979 (CUE of 3.2 for 4 and 6' trapnets combined in 1979 – Appendix B; vs. CUE of 13.1 for 8' trapnets in 1999 – Appendix A). (*We again caution the reader that these conclusions represent 'generalities' and should not be taken, as being proven by the data which is not comparable*.)

Largemouth bass are not particularly vulnerable to 8' trapnet gear and are typically under-represented in the catch. Our CUE of 4.6 largemouth per net set (Appendix A) is among the highest of 20 similar surveys with largemouth bass present. We consequently believe that largemouth bass abundance is well 'above average' for Poverty Bay relative to these other surveys.

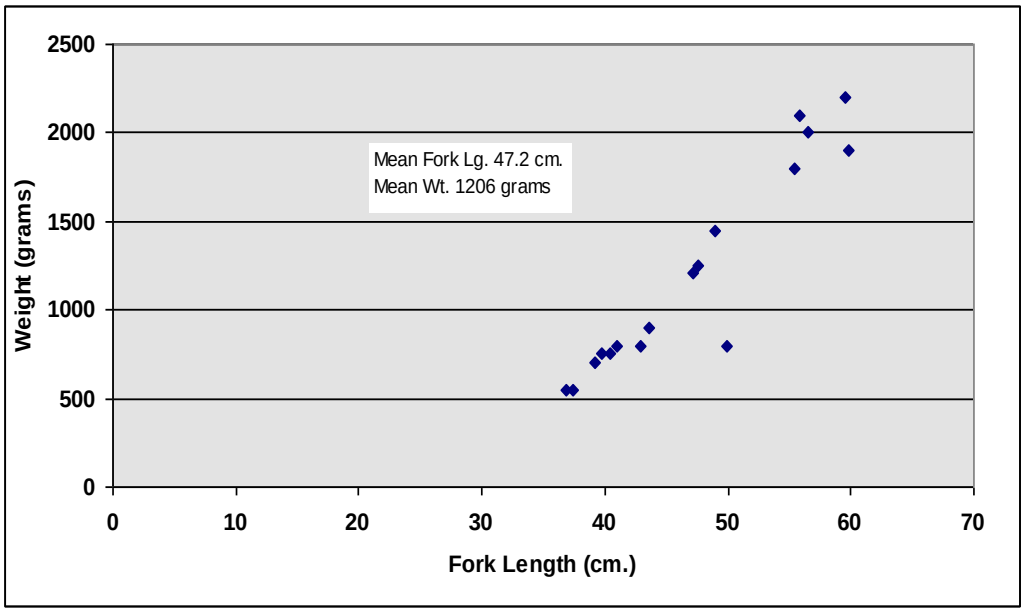
Our meagre CUE of 0.3 northern pike per trapnet set (Appendix A) may suggest a low abundance of this species. Again however, pike are not particularly vulnerable to trapnet gear and are generally under-represented in the catch. It is interesting though that in 1979, the CUE was a 'respectable' 1.5 (Appendix E). In a very tentative and inconclusive manner, it would appear that northern pike abundance is presently low and down from that observed in 1979.

3.4 Biosampling Analysis

Walleye

Our observed sample of 16 walleye had a mean size of 1206 grams, total length 49.3-cm. and fork length of 47.2 cm. (Appendix B and Figure 3).

Figure 3. Fork length vs. round weight for walleye captured during the 1999 Poverty Bay synoptic trapnet survey. (Each data point represents the size of an individually caught walleye.)



This size is not statistically different ("t test" at 95% confidence interval) from the walleye mean size of 1599 grams and fork length of 51.0 cm. from 66 walleye sampled in the 1979 survey. *(Note: The raw data in the 1979 survey did not indicate if lengths recorded were total or fork lengths. We presumed they were fork lengths based on the convention of the day.)* The fact that the mean size of walleye has remained similar between surveys suggests that there probably has not been a significant shift in mortality or recruitment in the intervening years.

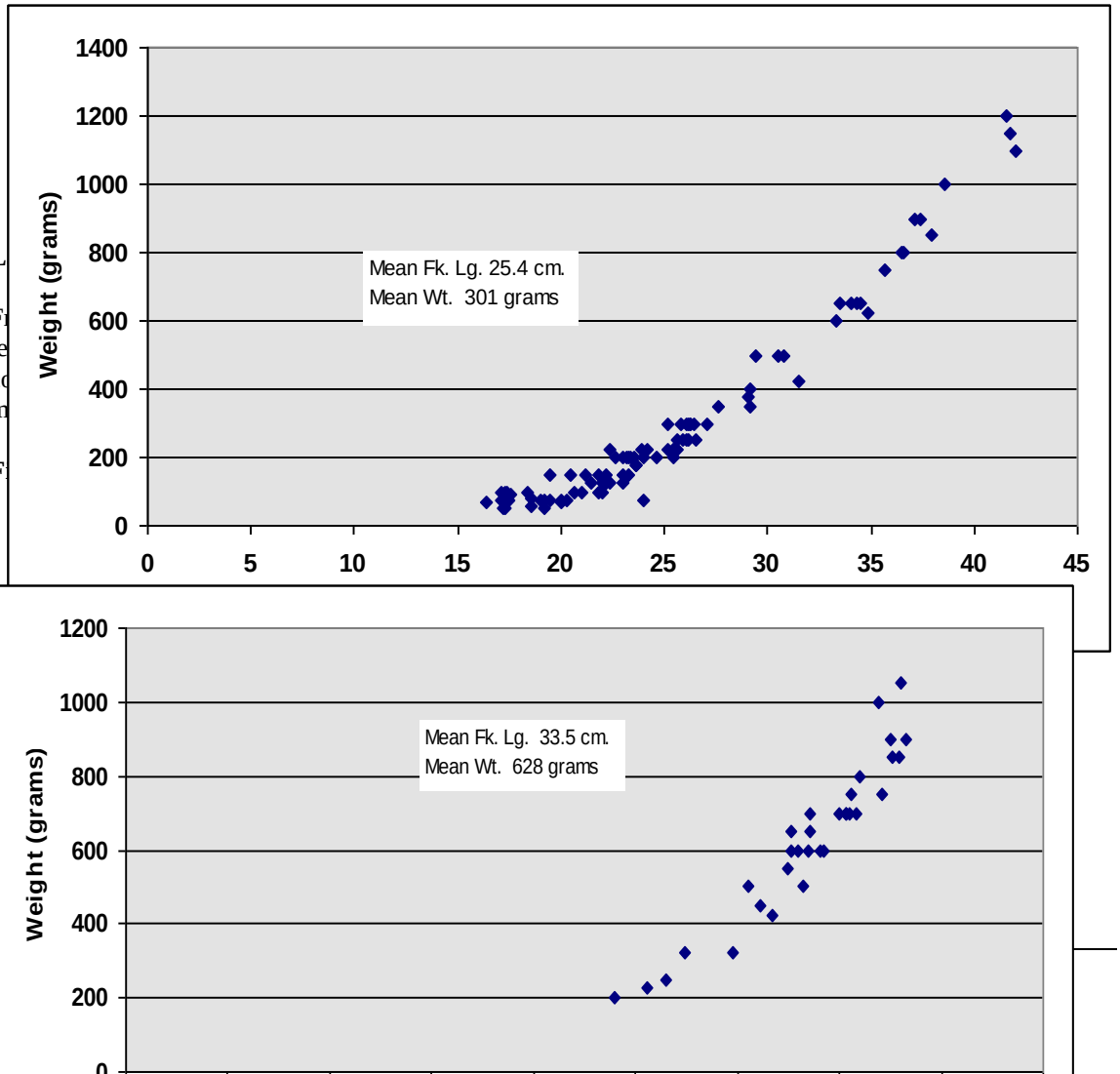
The size distribution of walleye observed in 1999 suggests 'reasonable' levels of mortality – in that a good portion of the sample have obtained a reasonably large size – in excess of 55 cm. fork length. Recruitment appears 'not bad' – in that there is a 'fair' representation of small walleye below 45-cm. fork length.

Admittedly, 'age analysis' is more suited to assessing recruitment and mortality than is *mean size*. We determined that our sample had a mean age of 6.2 years (Appendix B). Our aging was conducted by the scale reading method. This technique is known to underage fish, especially older year classes (Campbell and Babaluk, 1979). We feel that our calculated mean age of 6.2 years may considerably underestimate the true mean age of our sample.

Smallmouth Bass

From our sample of 92 smallmouth bass we determined mean size to be 301 grams, total length 26.8 cm. and fork length 25.4 centimeters (Appendix C). This mean size is significantly smaller ("Z test" at 95% confidence interval) that that observed in 1979: mean weight: 521 grams and mean fork length of 29.1 centimeters (Appendix E). We suspect that this is may be due to the high recruitment rate observed in this survey as indicated by the abundance of small fish (Figure 4).

Figure 4. Fork length vs. weight for smallmouth bass caught during the 1999 Poverty Bay synoptic trapnet survey.



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 and Marine Service Technical Report No. 849, Department of Fisheries and the environment, Winnipeg, Manitoba. 23p.

OMNR, 1971. Aquatic habitat inventory (lake survey) summary. Parry Sound District Office fisheries files.

OMOE, 1998. Lake partner focus area – Parry Sound District Lakes. Three-year (1996-'98) summary of MOE's Lake Partner Program summarizing secchi readings, average total phosphorus and trophic status of lakes in the Parry Sound Area.