



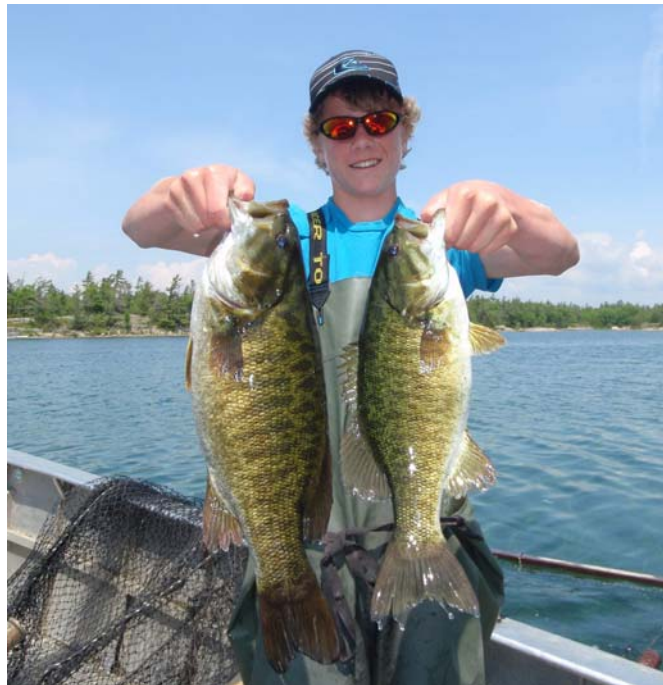
Eastern Georgian Bay Stewardship Council

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2010 Wah-Wah-Taysee End-of-Spring-Trap-Netting (ESTN) Survey Report

November, 2010

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Parry Sound High School Student and Volunteer Adam Logan with a nice pair of Wah-Wah-Taysee Smallmouth Bass

Executive Summary

We captured 12 different species of fish comprising a total of 1,978 fish and 499.9 kilograms. Our Catch-Per-Unit-Effort (CPUE-no.) for all species was 66 fish / net set; almost identical to the mean value of 67 from 10 surveys in our Georgian Bay ESTN reference data set. Over-all CPUE by weight (CPUE-wt) was 16.7 kg. / net set. (At the present time, the Georgian Bay ESTN reference data set does not have a comparative mean for this statistic available.)

Species diversity in the catch was low. Our catch was dominated by rock bass, smallmouth bass and northern pike. Rock bass and smallmouth bass respectively comprised 74% and 22% of the total catch number; the remaining 10 species – 4%. By weight, smallmouth bass comprised 36% of the total catch weight; and both rock bass and northern pike 23% each; the remaining 9 species – 18%.

Relative to 10 surveys in the Georgian Bay reference data set, our CPUE-no for smallmouth bass and rock bass ranked first (i.e. highest) – indicating high relative abundance for these species. Our CPUE-no for northern pike ranked 7th highest and largemouth bass 4th; indicating ‘average’ relative abundance. Walleye, black crappie and brown bullhead ranked either 9th or 10th – indicating low relative abundance. Other species - redbhorse sucker (*Moxostoma* sp.), carp, yellow perch and bowfin are typically caught in such small number that it is unreliable to assign relative abundance according to CUPE-no. ranking.

We used the *Probability of Catch* (POC) statistic to indicate how widely dispersed various species were throughout the study area. Smallmouth bass and rock bass were caught in 80% of our net sets followed by northern pike (53%), walleye (17%), brown bullhead (13%) and all other species at less than 7%.

Size distribution of the catch was excellent for smallmouth bass. A high abundance of juvenile fish indicated recruitment of several successful year classes. Good representation of adult fish suggest moderate mortality rates. Northern pike size distribution also looked good with moderate and balanced rates of recruitment and mortality.

We were particularly concerned with detrimental impacts to near-shore fish populations related to the recent invasion of round goby in Georgian Bay. These impacts should be evident in the Wah-Wah-Taysee area that has been exposed to gobies for several years. No detrimental impacts were observed relating to smallmouth bass and rock bass abundance, which are two species one would assume impacts would be evident.

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1.0 Introduction

The Eastern Georgian Bay Stewardship Council (EGBSC) has received several requests for fish assessment surveys to be conducted throughout Eastern Georgian Bay and inland lakes. In an effort to assist the Upper Great Lakes Management Unit (UGLMU) of the Ministry of Natural Resources in the daunting task of monitoring the status of fish communities along the eastern shore, the EGBSC has endeavoured to conduct an annual fish assessment survey.

The Wah-Wah-Taysee area of Eastern Georgian Bay was selected in 2010 to achieve the following purposes:

1. Act as a “before treatment” assessment survey in order to later evaluate re-introductory walleye plantings in Tadenac Bay.
2. Provide the first standardized, base-line assessment data for this segment of Eastern Georgian Bay. This survey contributes to the Georgian Bay ESTN reference data set.
3. Complements the 2008 ESTN survey conducted on 12-Mile Bay immediately to the north.
4. Provide some assessment of the impacts of round goby on native, near-shore fish populations.

2.0 Methods

2.1 Field Procedures:

Survey procedures were as specified in the Ministry’s Manual of Instructions for End-of-Spring-Trap Netting (ESTN) (Skinner and Ball; 2004), with the exception for set location. The ESTN survey protocol calls for the use of live-capture, 6’ trap-nets that are set overnight (approximate 24-hour duration). Surveys are conducted during the spring when water temperatures range from 12 – 18 degree Celsius. All fish captured were enumerated (Appendix A). Species capture were size sampled – either complete or random (Appendix C - G). All fish were live released at the site of capture. Incidental mortality was negligible.

Note: We experienced considerable difficulties with respect to water temperatures being in excess of the maximum 18 deg. C. as stipulated by the survey protocol. Fourteen (47%) of our 30 net sets were in water that exceeded this temperature (Appendix I). Invariably, these were sets in well-sheltered and shallow bays that are prone to quickly warming up. This problem was exacerbated by the remarkably warm and sunny weather experienced in May of 2010.

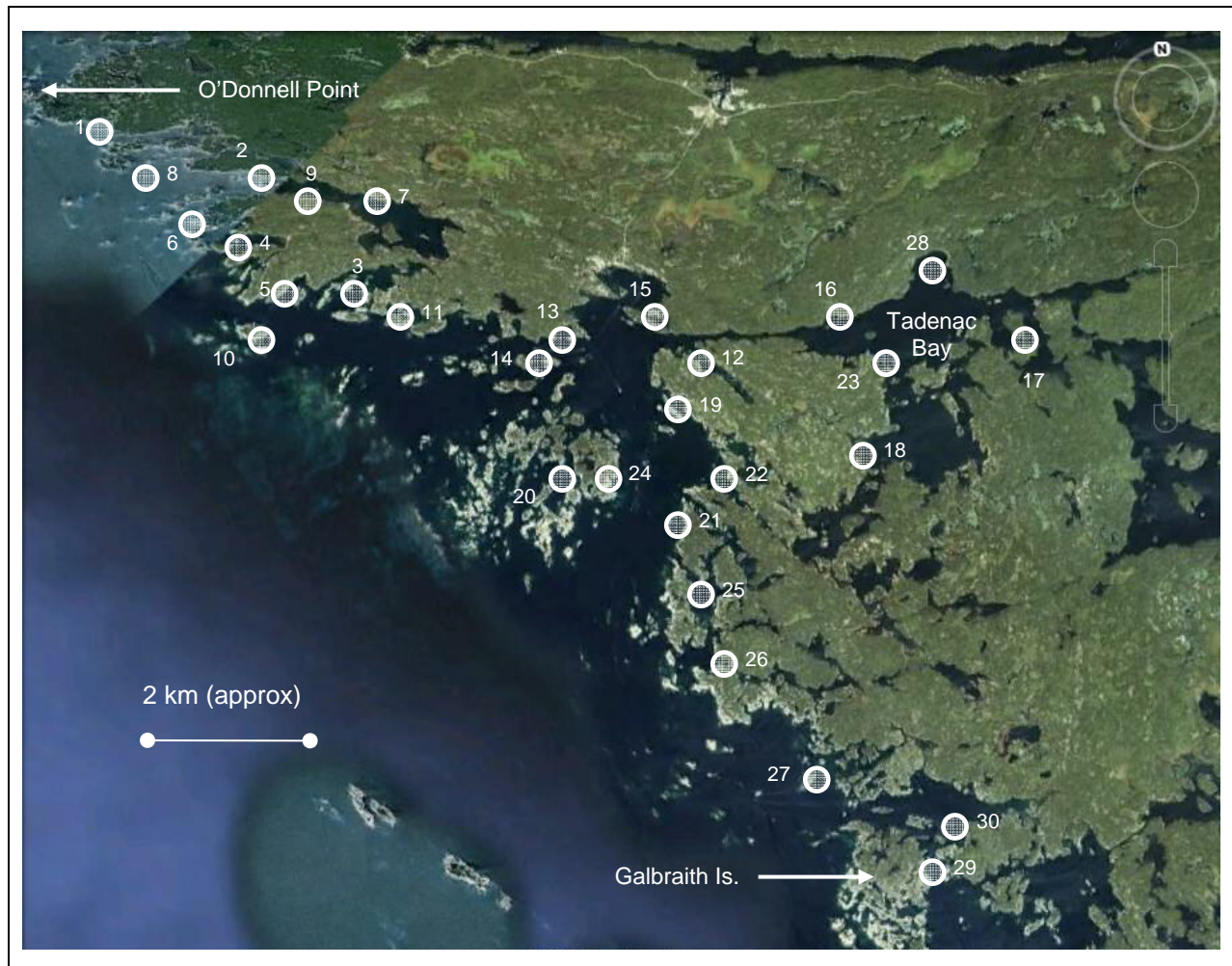
Field operations commenced May 26 and terminated June 3, 2010. Thirty net sets were made.

The study area extended from O'Donnell Point south to Galbraith Island (Figure 1). It also included the waters of Tadenac Bay.

Due to the known difficulties in pre-selecting netting sites according to the ESTN manual, net locations were selected in accordance with the following guidelines:

- Nets were to be approximately evenly dispersed throughout the study in an effort to fish various fish habitats in the proportion to which they occurred. The intention here was that habitats fished would be representative of the whole study area.
- 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 (> 400 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.

Figure 1. Net set distribution (30 sets) for the 2010 Wah-Wah-Taysee ESTN Survey. (Note: Set Numbers indicated; for precise net set location see Appendix H.)



2.2 Data Analysis and Interpretation

Surveys such as the ESTN methodology we employed do not generate estimates of fish density or a finite population estimate for individual species. They do however generate indices of species abundance. These indices include:

- Catch-Per-Unit-Effort (CPUE): The mean number of a particular species caught per net set. CPUE can be expressed either as the number or weight of fish caught per net set. We calculated both, but use only number for comparative purposes as CPUE-weight was not available in our reference data set.
- Probability of Capture (POC), also called frequency of capture: A statistic indicating the probability of at least one fish of a particular species being captured in any net set. (A POC of 1.0 indicates a particular species was captured in 100% of net sets; a POC of 0.5 indicates it was captured in 50% of the net sets; a POC of 0.1 indicates it was captured in 10% of net sets; etc.).

In and of themselves, these indices are of limited value. Their value and utility comes from comparing them to other ESTN surveys conducted in a similar manner on ecologically similar water bodies. It is their ranking in this comparative process that indicates a high, medium or low abundance of a particular species. For this reason, they are referred to as indices of **relative abundance** (i.e. abundance relative to other similar surveys).

We are fortunate that a number of ESTN surveys have been previously conducted at various locations along the Eastern Georgian Bay shoreline. We refer to these surveys as our **reference data set** (Appendix B1-3). These surveys form a benchmark against which indices of abundance for various species generated in our survey can be compared.

Unfortunately however, there are biases within this reference data set. The data set consists of 16 ESTN surveys, including this one, conducted on Georgian Bay waters from 1998 to 2008. Of these 16 surveys, 8 were conducted on the relatively nutrient rich and highly productive waters of Severn Sound (Appendix B-2). The over-representation of Severn Sound has the biasing effect of elevating the mean CPUE for various species in the data set. To mitigate this bias, we combined all eight Severn Sound surveys and used the mean CPUE values generated to represent a single survey in the reference data set (Appendix B-1).

Similarly, there are three surveys from the Moon River area in the reference data set. However, because the water chemistry and aquatic ecosystem of the Moon River area is more typical or representative of Eastern Georgian Bay, the biasing impact of these surveys is much reduced. Furthermore, the habitat of the Moon River area is similar to the Wah-Wah-Taysee area. Consequently, for comparison purposes these surveys were not combined.

Undoubtedly the most effective reference data set is one comprised of similar surveys conducted over time on the same body or water or in the same vicinity. Indeed, Severn Sound is well on their way to having an excellent reference data set. Such a data set does not exist for the Wah-Wah-Taysee area. Indeed, this is the first Provincially standardized netting survey to be conducted in this area of Eastern Georgian Bay.

3.0 Results & Discussion

3.1 Over-all Productivity

We captured 12 different fish species comprising a grand total of 1,978 fish weighing 499.9 kilograms (Appendix A).

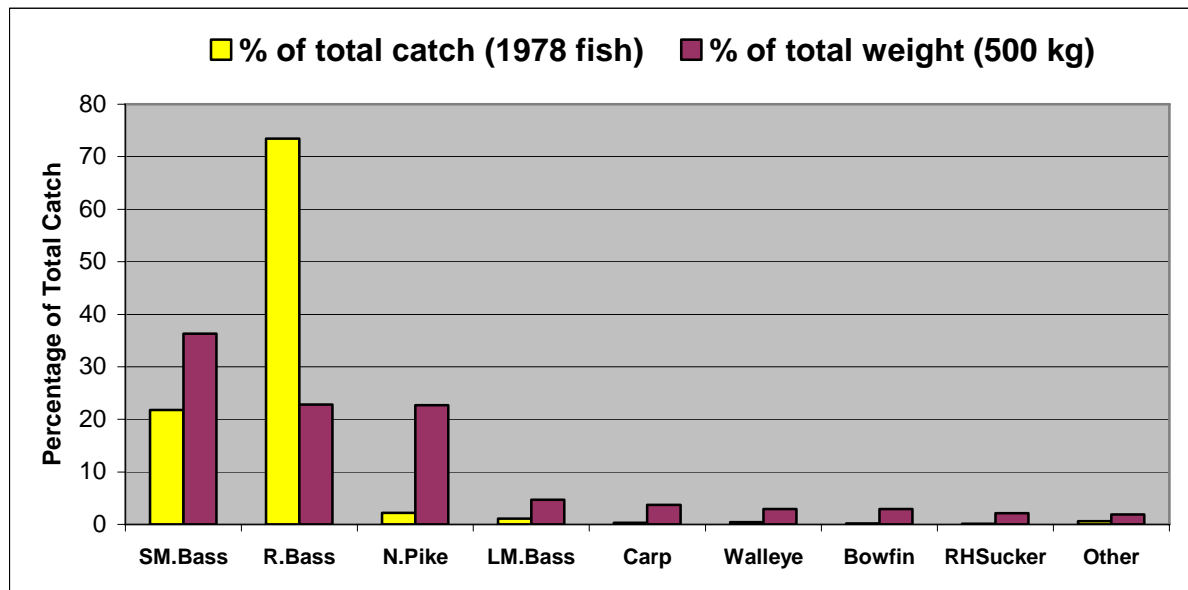
Over-all catch-per-unit-effort in terms of number (CPUE-no) was 65.9 fish per net set. Over-all catch-per-unit-effort in terms of weight (CPUE-wt) was 16.7 kg. per net set (Appendix A). Our over-all CPUE-no was essentially the same as the mean from the Geo. Bay Reference data set – 66.7 fish per set (Appendix B-1); indicating fish abundance in the Wah-Wah-Taysee area is average.

3.2 Catch Composition

Our catch (by number) was dominated by two species – rock bass and smallmouth bass. Of the total catch of 1,978 fish, rock bass accounted for 73.4% and smallmouth 21.8% (Appendix A). All other species combined accounted for the remaining 4.8% (Figure 3 and Appendix A).

Of the total catch weight of 499.9 kg., smallmouth bass accounted 36.3%, rock bass 22.8% and northern pike 22.7% (Appendix A). The remaining seven other species (largemouth bass, carp, walleye, bowfin, redhorse sucker, yellow perch and black crappie) cumulatively accounted for the remaining 18.2% of the total catch weight (Figure 3).

Figure 3. Catch Composition (by number and weight) of 30 trapnet sets from the 2010 Wah-Wah-Taysee ESTN survey.



3.3 Relative Abundance:

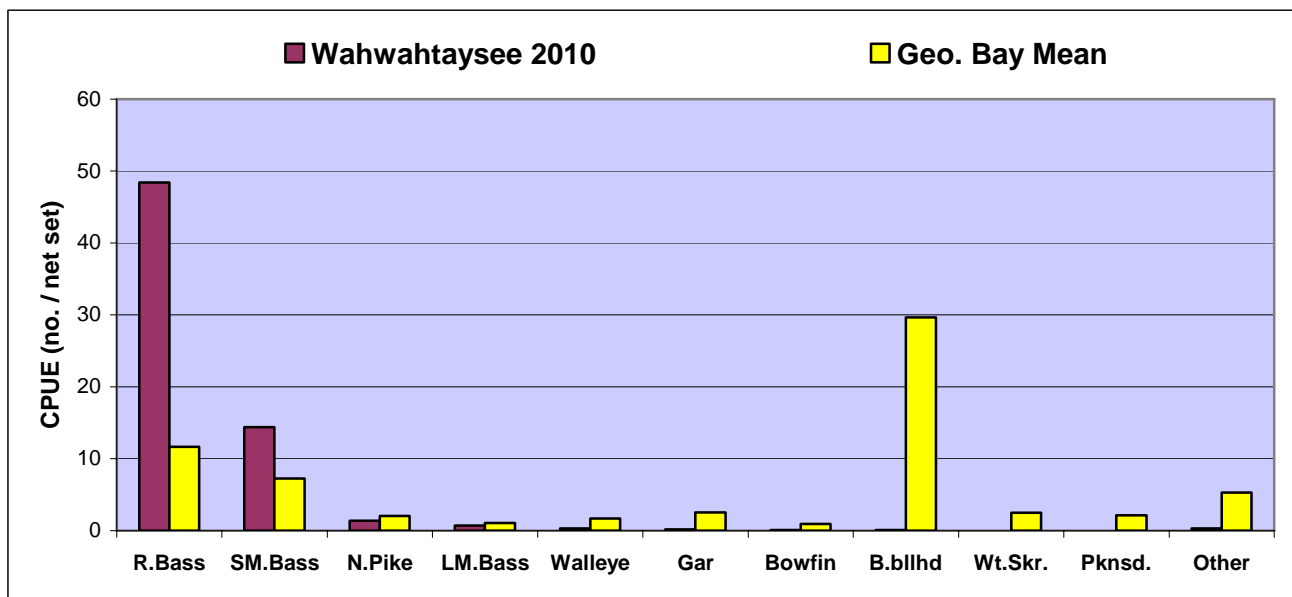
Relative abundance indices (CPUE-no) for smallmouth bass and rock bass were exceptionally high for this survey. Relative to ten surveys in the Georgian Bay ESTN reference data set, our rock bass CPUE-no of 48.4 / set ranked first (i.e. highest); the next closest being 17.2. (Appendix B-1). Likewise, our smallmouth bass CPUE-no of 14.4 also ranked first; the next closest being 12.7 and the data set mean being 7.3.

Our CPUE-no of 1.4 for northern pike ranked 6th and largemouth bass (0.7) ranked 4th (Appendix B-1). We accord these species 'average' abundance relative to their ranking in the middle of CPUE-no values in the reference data set.

CPUE-no values for brown bullhead (0.1), walleye (0.3) and black crappie (0.05) were amongst the lowest in our reference data set, thereby according them low relative abundance.

Other species - redhorse sucker (*Moxostoma sp.*), carp, yellow perch, gar and bowfin are typically caught in such small number that it is unreliable to assign relative abundance according to CUPE-no. ranking.

Figure 4. Comparison of species CPUE-no (relative abundance index) between the 2010 Wah-Wah-Taysee survey and the Eastern Georgian Bay ESTN Reference Data Set



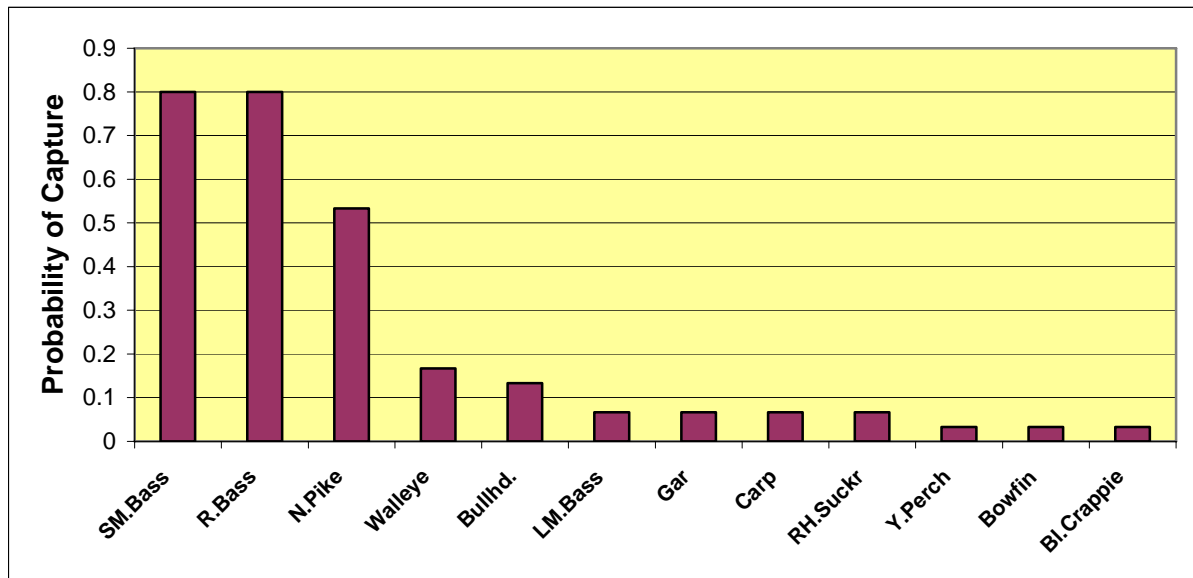
The high abundance of smallmouth and rock bass observed in this survey is largely attributable to the availability of preferred habitat for these species – granite boulder and rocky shorelines. This is also reflected in the *Probability of Capture* (POC), which provides an indication of how widespread a species is throughout the study area. The POC for smallmouth and rock bass was 0.8

(Appendix A) – meaning these species were captured in 80% of net sets and widely distributed throughout the study area.

Conversely, species that prefer warm, protected and vegetated waters with soft substrate (largemouth bass, gar, carp, bowfin, crappie, yellow perch) had lower catch rates (i.e. lower CPUE-no) and were less frequently represented in the catch (i.e. had lower POC) (Appendix A and Figure 5). These species were not widely distributed throughout the study area due to the lower availability of the types of habitat they prefer.

The abundance of northern pike (CPUE-no of 1.4) was average relative to our reference data set (Appendix B-1) and it was caught in just over 50% of our net sets (POC 0.533 – Appendix A).

Figure 5. Probability of Capture for Species Caught During the 2010 Wah-Wah-Taysee ESTN Survey

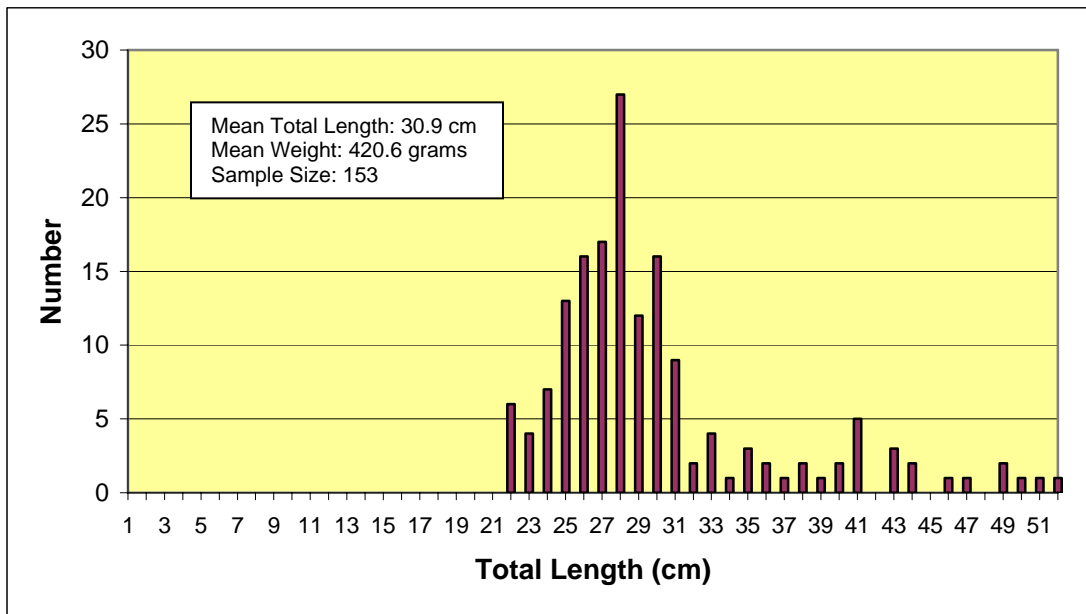


3.4 Species Analysis

3.4.1 Smallmouth Bass

The size distribution of smallmouth bass ranged from 22 to 52 cm in total length. Mean size was 30.9 cm total length and weight 420 grams (Figure 6). This is smaller than the mean in our reference data set of 36.5 cm and 808 grams (Appendix B-2).

Figure 6. Size (Total Length) Distribution of Smallmouth Bass



All size classes were well represented in the catch, but most notably those under 32 cm in total length. The high abundance of young, juvenile smallmouth is indicative of two or three successively strong year classes and good recruitment to the population. Likewise, the good abundance of adult smallmouth bass in excess of 32 cm is indicative of moderate levels of mortality and a strong and healthy population with many experienced spawners present.

The CPUE-no for smallmouth was higher outside of Tadenac Bay (15.2) than inside (10.4); although not statistically significant ($P < 0.05$). The mean size of smallmouth inside Tadenac Bay was 36.5 cm TL and 654 grams; considerably larger than those outside the Bay at 29.0 cm and 344 grams. We presume this is largely attributable to the more restrictive harvest regulations the Tadenac Fishing Club imposes on its members who have exclusive rights to fish in these waters.

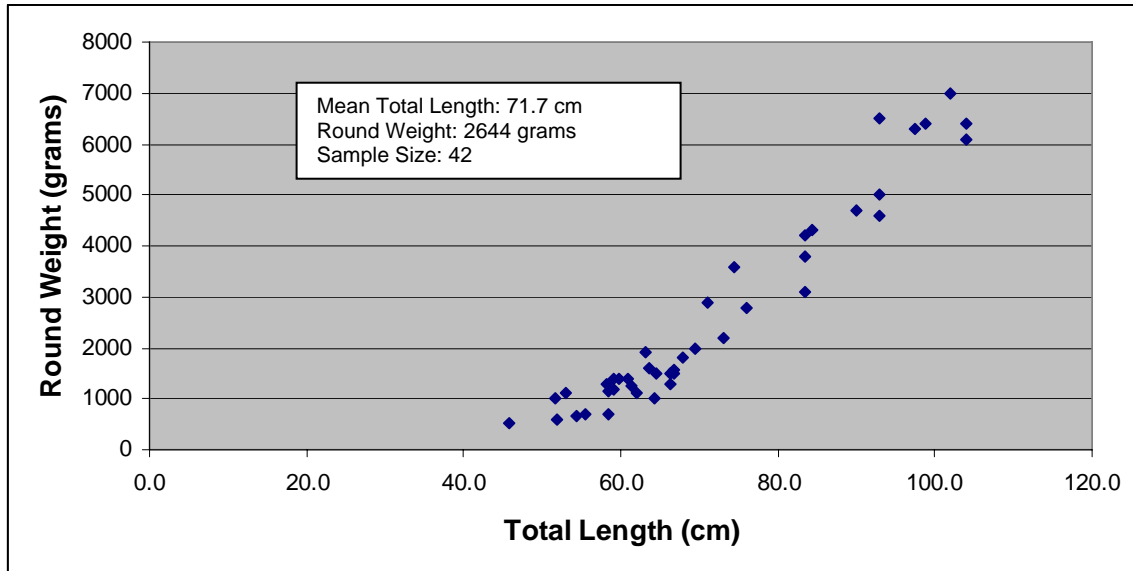
3.4.2 Northern Pike

We captured 42 northern pike over the course of the survey for a CPUE-no of 1.4 fish per net set. This value ranked 7th in our 10 survey reference data set and slightly below the mean of 2.0 (Appendix B-1). We accord pike 'average' relative abundance.

The northern pike CPUE-no was 3.6 inside of Tadenac Bay and 1.0 outside of it. Although different by a magnitude of greater than three, this was not statistically significant ($P < 0.05$).

The size distribution of northern pike suggests moderate and balanced rates of recruitment and mortality (Figure 7 and Appendix D).

Figure 7. Size Distribution of Northern Pike



The mean size of northern pike observed in this survey (71.7 cm and 2643 grams) was larger than the mean in our reference data set (65.0 cm and 1951 grams) (Appendix B-3).

Northern pike from inside Tadenac Bay were larger with a mean size of 74.8 cm and 2993 grams. Those outside of Tadenac Bay had a mean size of 69.5 cm and 2381 grams.

The reasonably good health of the pike population in this portion of Georgian Bay is encouraging. Low water levels that have been present for over a decade are presumed to be having a negative impact on northern pike by reducing the availability and quality of spawning and nursery habitat.

3.4.3 Walleye

Eight walleye were captured during the course of the survey with a low CPUE-no of 0.3 walleye per net set (Appendix A). The correspondingly low probability of capture of 16.7% (i.e. 0.167) indicates walleye were not widely distributed throughout the study area. Five were captured inside of Tadenac Bay, one in Alexander Bay – at the mouth of Tadenac Bay, and two in the vicinity of Bourke Point (opposite Gooseberry Island).

All walleye captured were mature fish – the smallest one being 50.9 cm in total length and 1000 grams. Mean size was 58.4 cm TL and 1794 grams (Appendix E). This is slightly larger than the mean in our reference data set – 53.8 cm and 1750 grams (Appendix B-3).

The smallest walleye captured would probably be in excess of six years of age and predate the earliest fry stocking efforts conducted by the EGBSC in conjunction with the Tadenac Fishing Club – circa 2006.

One interesting point of note is that a walleye was captured in Tadenac Bay bearing tag number 24112. Only weeks prior, this fish had been tagged by Ministry staff at Port Severn.

3.4.4 Largemouth Bass

Twenty-two largemouth bass were captured during the course of the survey for a CPUE-no of 0.7 per net set (Appendix A). This reasonably good CPUE – similar to the mean in our reference data set of 1.1 (Appendix B-1), belies the fact that the probability of capture was exceptionally low at 0.67 (Appendix A). All largemouth bass were captured in two sets in Tadenac Bay: set #18 that captured 21 and set # 28 that captured 1.

Clearly there is negligible habitat for largemouth bass in the Wah-Wah-Taysee area with the exception of Tadenac Bay.

Mean size was 43.8 cm TL and 1067 grams (Appendix F). This was essentially the same as the mean in our reference data set – 40.3 cm and 1058 grams (Appendix B-3).

3.4.5 Rock Bass

We captured a remarkable 1451 rock bass for a CPUE-no of 48.4 per net set (Appendix A). In our reference data set, the closest CPUE-no for rock bass is 17.2 from the 2008 ESTN survey at 12-Mile Bay and the mean value in the data set is 11.6 (Appendix B-3). This was indicative of an unprecedented high abundance of rock bass!

Rock bass were also widely distributed throughout the study area with an 80% (i.e. 0.8) probability of capture (Appendix A and Figure 5). Clearly, habitat in the Wah-Wah-Taysee area is excellent for rock bass.

3.4.6 Brown Bullhead

We captured only four brown bullhead for a remarkably low CPUE-no of 0.1 per net set (Appendix A). This is the lowest value in our reference data set (Appendix B-1) and far below the mean of 29.7.

Bullheads were captured in four different set for a probability of capture of 13.3% (i.e. 0.133), indicating limited distribution throughout the study area.

3.4.7 Other Species -

We also captured 5 gar, 5 carp, 4 bowfin, 2 redhorse sucker, 1 yellow perch and 1 black crappie (Appendix A). Somewhat surprising by their absence was the fact not a single pumpkinseed was captured.

The low catch rate for these species as well as their low *probability of catch* (Appendix A and Figure 5) is related to the scarcity of suitable habitat for them within the study area.

3.5 Other Salient Observations

Like the near-by waters of 12-Mile Bay to the north, on which an ESTN survey was conducted in 2008, we were struck by the amazingly clear water in this portion of Eastern Georgian Bay. For every set in this survey, the secchi reading went to the bottom. Moose Bay and Tadenac Bay were exceptions in that these waters exhibited lower light penetration in heavily stained (yellow-brown) waters.

One stinkpot turtle was captured in set # 16 in Tadenac Bay. One snapping turtle was caught in set # 18 in Tadenac Bay and another one in set #25 in Indian Harbour.

Round Goby

No round goby were captured in this survey. Trapnets are an ineffective gear for capturing this species due to their small size (can pass directly through the mesh) and demersal nature (sedentary on bottom). Nonetheless, we know since their inadvertent introduction to Georgian Bay circa 2000, they have spread completely throughout the Bay and now form a major component of the near-shore fish community.

The earliest reports of round goby originated in the Severn Sound area and it is presumed they spread throughout Eastern Georgian Bay from that point of introduction. Due to the relatively close proximity of Wah-Wah-Taysee to Severn Sound, it is reasonable to believe round gobies have been present in these waters for several years. Consequently, one might expect the detrimental impacts of this invasive species to be evident in this survey.

These detrimental impacts should be evident in smallmouth bass and rock bass populations as they occupy similar habitats. Gobies are feared to be effective predator on the eggs and early life stages of native species in the waters they co-inhabit. We saw no evidence that gobies are having a detrimental impact on these native species.

4.0 Literature Cited

McIntyre, E. 2009. 2008 Twelve-Mile Bay End of Spring Trap Netting (ESTN) Survey Report. Unpublished EGBSC report. 23 p.

Skinner, A. and H. Ball; 2004. Manual of Instructions – End of Spring Trap Netting (ESTN). Queen's Printer for Ontario. 58 p.

5.0 Acknowledgements

The EGBSC would like to thank and acknowledge the tremendous assistance in terms of staff and equipment provided by the Parry Sound District Office of the Ministry of Natural Resources. This survey would not have been possible without their participation and significant contribution. Parry Sound District provided transportation to and from the study area as well as the boat and netting equipment to conduct the survey. MNR manpower assistance included Jim Palmer, Ken Molyneaux, Ron Black, Karrie Bennett, Leanne Leduc and Parry Sound high school co-op student Shawn Payerl. We also enjoyed the volunteer services of another Parry Sound high school student – Adam Logan. We are also appreciative of manpower assistance from Zing-Ying Ho of the Department of Fisheries and Oceans, Parry Sound Office. Eric McIntyre of the EGBSC supervised the project. To all those who worked on the project; we express our sincere thanks.

Also, thanks to Arunas Liskauskas of the Upper Great Lakes Management Unit – Lake Huron Office, for technical guidance and provision of the reference data set.

Appendix A. 2010 Wah-Wah-Taysee ESTN Survey Catch Summary

Net Set No.	SM.Bass	LM.Bass	N.Pike	Walleye	R.Bass	Bullhd.	Gar	Carp	RH.Suckr	Y.Perch	Bowfin	Bl.Crappie	
1	16	0	0	0	62	0	0	0	0	0	0	0	
2	0	0	2	0	0	0	0	0	0	0	0	0	
3	17	0	0	0	89	0	0	0	0	0	0	0	
4	32	0	0	1	64	0	0	0	0	0	0	0	
5	21	0	0	0	132	0	0	0	0	0	0	0	
6	24	0	0	1	131	0	0	0	0	0	0	0	
7	2	0	5	0	0	0	3	0	0	0	0	0	
8	6	0	1	0	52	0	0	0	0	0	0	0	
9	2	0	4	0	15	0	0	0	0	0	0	0	
10	36	0	1	0	197	0	0	0	0	1	0	0	
11	47	0	0	0	115	1	0	0	0	0	0	0	
12	30	0	1	1	37	0	0	0	0	0	0	0	
13	1	0	0	0	6	0	0	0	0	0	0	0	
14	20	0	0	0	113	0	0	0	0	0	0	0	
15	10	0	4	0	21	0	0	0	0	0	0	0	
16	4	0	3	3	5	1	0	3	0	0	0	0	
17	4	0	3	0	1	0	0	0	0	0	0	0	
18	16	21	0	0	0	0	2	2	0	0	4	1	
19	0	0	2	0	10	0	0	0	1	0	0	0	
20	18	0	0	0	107	0	0	0	0	0	0	0	
21	15	0	1	0	136	0	0	0	0	0	0	0	
22	0	0	1	0	1	0	0	0	0	0	0	0	
23	3	0	9	0	0	0	0	0	0	0	0	0	
24	1	0	0	0	4	0	0	0	0	0	0	0	
25	37	0	1	0	68	1	0	0	0	0	0	0	
26	0	0	0	0	0	0	0	0	0	0	0	0	
27	0	0	0	0	5	0	0	0	0	0	0	0	
28	25	1	3	2	0	1	0	0	0	0	0	0	
29	45	0	0	0	76	0	0	0	0	0	0	0	
30	0	0	2	0	4	0	0	0	1	0	0	0	Grand Totals
Total Catch	432	22	43	8	1451	4	5	5	2	1	4	1	1978
% of total catch	21.8	1.1	2.2	0.4	73.4	0.2	0.3	0.3	0.1	0.05	0.2	0.05	100.1
CPUE (no. / net set)	14.4	0.7	1.4	0.3	48.4	0.1	0.2	0.2	0.1	0.0	0.1	0	65.9
Standard Error	2.665	0.700	0.373	0.126	10.192	0.063	0.118	0.118	0.046	0.033	0.133	0.033	
Standard Deviation	14.599	3.832	2.046	0.691	55.824	0.346	0.648	0.648	0.254	0.183	0.730	0.183	
Confidence Level(95.0%)	5.452	1.431	0.764	0.258	20.845	0.129	0.242	0.242	0.095	0.068	0.273	68	
Sample Size (N)	30	30	30	30	30	30	30	30	30	30	30	30	
Probability of Capture	0.8	0.067	0.533	0.167	0.8	0.133	0.067	0.067	0.067	0.033	0.033	0.033	
Total Weight (kg) Caught	181.440	23.474	113.692	14.350	113.789	1.350	8.125	18.250	10.400	0.050	14.268	0.725	499.913
Mean Weight (gr)	420	1067	2644	1794	78	337	1625	3650	5200	50	3567	725	
Samples Size (N)	153	13	42	8	570	4	4	5	2	1	3	1	
% of total weight caught	36.3	4.7	22.7	2.9	22.8	0.3	1.6	3.7	2.1	0.0	2.9	0.0	100.0
CPUE (kg / net set)	6.048	0.782	3.790	0.478	3.793	0.045	0.271	0.608	0.347	0.000	0.477	0.024	16.663

Appendix B-1 Georgian Bay ESTN Reference Data Set of Species Catch-Per-Unit-Effort (CPUE-no.)

ESTN Survey & Yr.	Walleye	Smooth Bass	Lmouth Bass	N. Pike	Musky	Blk. Crappie	Wt. Suckr	Moxo. sp.	Br. Billhead	Pump-kinseed	Rock Bass	Yellow Perch	Bowfin	L.nose gar	Other	All	# species
Key R. 1998	3.1	1.8	0.1	1.4	0.0	9.8	9.0	11.8	91.2	7.3	8.4	0.5	1.9	0.7	0.2	147.2	18
Bay of Islands 2001	2.9	7.2	0.1	1.7	0.5	0.6	0.2	0.0	9.8	0.6	4.1	0.4	1.5	0.2	0.6	30.4	17
Moon River 2008	0.5	5.7	1.6	3.4	0.4	0.1	0.3	0.0	93.2	1.7	5.6	0.0	0.4	0.1	1.0	114.0	15
Moon River 2005	1.4	12.7	2.6	2.0	0.1	0.2	0.1	0.1	18.4	0.4	5.1	0.0	1.0	9.1	4.9	58.1	15
Moon River 2004	1.5	7.5	2.8	2.4	0.5	0.7	0.1	0.1	24.9	0.1	6.8	0.0	0.6	3.5	1.2	52.7	15
Walesback Chnl. 2002	1.5	1.4	0.0	2.0	0.0	0.0	11.4	0.0	5.5	0.0	5.0	1.1	0.3	0.0	0.3	28.5	12
Severn Sound 99-07	2.7	10.1	2.2	3.7	0.2	2.8	2.1	1.8	42.5	10.8	11.2	0.2	2.8	11.4	4.6	109.0	20
12-Mile Bay 2008	0.0	4.2	0.3	1.0	0.3	2.3	0.1	0.0	2.8	0.3	17.2	0.1	0.3	0.1	0.2	29.2	16
Shawanaga Basin 2009	3.2	7.6	0.3	1.3	0.1	2.8	1.4	1.5	8.2	0.3	4.5	0.3	0.5	0.1	0.1	32.2	17
Wahwahtaysee 2010	0.3	14.4	0.7	1.4	0	0	0	0.1	0.1	0	48.4	0	0.1	0.2	0.2	65.9	12
Mean	1.7	7.3	1.1	2.0	0.2	1.9	2.5	1.5	29.7	2.2	11.6	0.3	0.9	2.5	1.3	66.7	15.7
Confidence Level(95.0%)	0.860	3.059	0.797	0.650	0.145	2.142	2.983	2.624	25.205	2.697	9.679	0.248	0.614	3.018	1.313	30.300	1.786
Standard Error	0.380	1.352	0.353	0.287	0.064	0.947	1.319	1.160	11.142	1.192	4.278	0.110	0.272	1.334	0.581	13.394	0.790
Standard Deviation	1.202	4.277	1.115	0.908	0.203	2.994	4.170	3.668	35.234	3.771	13.530	0.347	0.859	4.219	1.836	42.356	2.497
Sample Size	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Appendix B-2 Severn Sound ESTN Surveys in the Georgian Bay ESTN Reference Data Set of Species Catch-Per-Unit-Effort (CPUE-no.)

ESTN Survey & Yr.	Walleye	Smooth Bass	Lmouth Bass	N. Pike	Musky	Blk. Crappie	Wt. Suckr	Other Suckr	Br. Billhead	Pump-kinseed	Rock Bass	Yellow Perch	Bowfin	L.nose gar	Other	All
Severn Sound 2007	2.6	12.8	1.6	1.6	0.2	1.5	1.4	3.4	45.6	9.7	12.4	0.1	3.1	14.3	3.4	113.7
Severn Sound 2005	1.8	9.5	1.7	2.2	0.3	0.7	3.2	1.8	24.3	1.5	9.2	0.1	1.3	5.2	4.1	66.9
Severn Sound 2004	2.1	11.4	2.4	3.2	0.3	3.3	3.6	1.3	33.6	2.8	10.6	0.1	2.3	20.6	6.5	104.1
Severn Sound 2003	3.1	13.2	2.5	3.8	0.1	1.9	2.7	1.5	55.7	8.3	6.8	0.1	2.7	25.8	3.0	131.2
Severn Sound 2002	1.5	6.8	1.7	1.6	0.0	1.0	0.6	0.7	19.3	9.4	2.4	0.0	2.5	8.8	4.3	60.6
Severn Sound 2001	1.7	4.7	1.1	1.0	0.0	2.0	2.0	0.1	40.0	9.7	7.1	0.1	0.8	1.3	2.5	74.1
Severn Sound 2000	3.7	14.0	4.6	14.8	0.3	9.1	2.0	2.4	103.0	10.3	21.3	1.2	6.9	1.2	0.7	195.5
Severn Sound 1999	4.7	8.2	1.8	1.7	0.0	2.9	1.2	3.4	18.5	35.0	19.9	0.1	2.4	13.6	12.1	125.5
Mean	2.7	10.1	2.2	3.7	0.2	2.8	2.1	1.8	42.5	10.8	11.2	0.2	2.8	11.4	4.6	109.0
Standard Error	0.396	1.179	0.381	1.614	0.050	0.952	0.363	0.421	9.797	3.652	2.303	0.140	0.650	3.152	1.223	15.599
Confidence Level(95.0%)	0.935	2.787	0.900	3.816	0.118	2.251	0.859	0.995	23.166	8.636	5.447	0.331	1.536	7.454	2.893	36.886
Standard Deviation	1.119	3.334	1.077	4.564	0.141	2.692	1.027	1.190	27.710	10.330	6.515	0.396	1.838	8.916	3.460	44.121
Count	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Appendix B-3 Georgian Bay ESTN Reference Data Set For Mean Size of Select Game Fish

Survey	N. Pike		Muskellunge		SMBass		LMBass		Walleye	
	TL (mm)	Wt. (gr)	TL (mm)	WT (gr)	TL (mm)	WT (gr)	TL (mm)	Wt (gr)	TL (mm)	Wt (gr)
Key R. 1998	633	1975	633	1700	324	607	308	719	387	607
Bay of Is. 2001	637	2033	1015	8373	358	815	486	1438	568	2117
Moon R. 2008	591	1402	1044	8914					554	1922
Moon R. 2005	672	1977	1055	8375	420	1062	427	1244	539	1719
Moon R. 2004	639	1768	1091	9646	416	1090	413	1195	585	2193
Serpent Hbr. 2002	660	2113			328	699			556	2091
Severn Sound (99-07)	639	1732	1103	8692	402	1033	386	1019	529	1561
12-Mile Bay 2008	658	1918	1174	10680	360	734	360	722		
Wahwahtaysee 2010	717	2643			309	420	438	1067	584	1794
Mean	650	1951	1016	8054	365	808	403	1058	538	1750
Confidence Level(95.0%)	26.240	257.401	163.309	2700.449	36.407	200.615	53.343	246.778	53.518	426.513
Standard Error	11.379	111.622	66.741	1103.615	15.397	84.840	21.800	100.853	22.633	180.372
Standard Deviation	34.136	334.867	176.580	2919.891	43.549	239.964	57.677	266.831	64.015	510.170
Count	9	9	7	7	8	8	7	7	8	8

Appendix C. Smallmouth Bass Biosampling Data from the 2010 Wah-Wah-Taysee ESTN Survey

Appendix C-1. Mean Size Summary of all smallmouth bass captured. (N = 153)

	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)
Mean	29.3	30.9	420.6
Confidence Level(95.0%)	1.02	1.08	54.30
Standard Error	0.52	0.54	27.48
Standard Deviation	6.40	6.74	339.97
Count	153	153	153

Appendix C-2. Size Sampling data and mean size of smallmouth bass captured in Tadenac Bay only. (N=38)

Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)	Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)	Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)
17	34.5	36.7	625	28	41.4	43.9	1200	28	27.1	28.8	250
17	29.2	31.1	325	28	27.2	28.6	250	28	24.4	27.8	250
17	27.1	28.8	275	28	22.6	23.7	175	28	36.8	38.8	650
17	27.8	28.7	300	28	25.6	27.7	225	28	47.1	49.2	1400
18	41.6	44.3	950	28	28.9	30.4	275	28	48.5	50.6	1350
18	43.7	46.4	1100	28	28.4	30.2	250	28	49.5	51.2	1650
18	47.4	49.5	1400	28	26	27.4	225	28	36.9	39.8	750
18	39.4	41.8	850	28	37.9	40.2	700	28	35.4	37.6	550
18	46.6	49.4	1400	28	39.6	41.7	900	28	39.7	41.8	900
18	41.5	43.4	1125	28	33.5	35.1	500	28	41.2	43.9	1000
23	22.2	23.2	175	28	29.1	34.4	325	28	30	31.6	300
23	31.4	33.1	450	28	28.3	29.6	250	28	29.1	28.4	250
23	39	41.3	1100	28	25.1	26.3	200				
Mean	34.5	36.5	653.9								
Confidence Level(95.0%)	2.62	2.73	145.86								
Standard Error	1.29	1.35	71.98								
Standard Deviation	7.98	8.30	443.75								
Count	38	38	38								

Appendix C-3. Size Sampling data and mean size of smallmouth bass captured in the Wah-Wah-Taysee Area excluding Tadenac Bay. (N=115)

Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)	Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)	Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)
1	30.7	32.5	475	6	29.8	31.2	400	25	39.5	41.4	900
1	26.0	27.7	225	6	45.5	47.8	1400	25	21.2	22.7	150
1	25.2	26.0	250	6	23.4	24.8	200	25	26.4	27.4	225
1	24.3	25.4	275	6	22.8	23.9	200	25	28.4	30.2	250
1	24.9	26.7	300	6	24.3	25.6	225	25	25.5	26.7	200
1	26.9	27.4	325	6	25.8	27.2	275	25	29.9	31.4	250
1	29.2	30.4	400	6	24.0	25.0	225	25	28.1	29.4	225
1	30.9	31.8	575	7	34.5	36.5	700	25	26.3	27.7	250
1	33.0	35.1	650	7	36.1	38.2	800	25	27.8	28.8	250
1	28.5	30.1	400	8	27.6	29.0	375	25	24.3	25.5	200
1	27.2	28.9	325	8	26.1	28.3	325	25	23.9	25.0	175
1	22.6	24.3	200	8	27.0	29.2	350	25	26.2	27.8	225
1	32.3	33.4	550	8	24.4	25.7	250	25	28.7	30.3	275
1	28.0	29.4	325	8	27.1	28.5	375	25	27.5	29.1	250
1	27.1	28.3	375	20	25.7	27.1	250	25	27.1	28.5	200
1	23.6	25.0	200	20	27.3	29.0	325	25	25.9	27.6	225
3	29.3	30.8	425	20	36.0	38.3	700	25	28.6	29.9	250
3	33.2	35.4	750	20	36.4	39.0	800	29	28.1	29.8	250
3	29.0	30.6	450	20	23.7	25.2	200	29	29.5	30.7	275
3	24.2	25.7	300	20	21.4	22.6	150	29	28.6	30.2	300
3	27.3	28.6	400	20	21.1	22.5	150	29	26.4	27.8	250
3	20.7	22.0	250	20	24.9	26.4	225	29	25.4	26.3	200
3	23.2	24.5	225	20	22.8	24.1	190	29	30.6	31.7	320
3	23.8	24.6	275	20	24.3	25.5	200	29	27.5	29.2	225
3	50.1	52.3	2200	20	25.6	27.2	225	29	30.1	31.6	350
3	26.7	28.0	350	20	23.0	24.4	200	29	29.1	30.5	280
3	27.8	30.1	425	20	24.6	26.5	225	29	29.8	30.9	300
3	25.4	26.6	275	20	21.7	23.0	175	29	30.3	31.9	300
3	22.0	22.5	175	20	25.3	26.8	225	29	29.0	30.6	350
3	23.3	24.7	225	20	29.0	30.6	325	29	30.0	31.3	275
3	21.5	22.6	150	20	24.9	26.3	200	29	32.0	33.7	400
3	25.4	26.5	275	20	26.3	27.9	300	29	29.0	30.7	300
3	25.5	26.7	300	21	24.2	25.5	250	29	24.8	26.1	225
6	26.1	27.5	250	21	26.5	28.0	325	29	26.5	28.2	225
6	38.2	40.2	925	21	30.5	32.4	550	29	27.7	29.2	250
6	25.2	26.5	225	21	30.9	33.0	475	29	25.5	26.8	300
6	26.7	27.7	300	21	24.5	25.9	225	29	27.8	29.2	220
6	26.4	27.6	325	24	42.3	44.8	730	29	24.9	26.2	180
								29	24.7	25.9	180
		Mean		27.5	29.0	343.5					
		Confidence Level(95.0%)		0.86	0.91	47.47					
		Standard Error		0.44	0.46	23.97					
		Standard Deviation		4.67	4.91	257.00					
		Count		115	115	115					

Appendix D. Northern Pike Biosampling Data from the 2010 Wah-Wah-Taysee ESTN Survey

Appendix D-1. Size Sampling data and mean size of northern pike captured in Tadenac Bay. (N=18)

Set No	Fork Lg (cm)	Total Lg (cm)	Weight (grams)
16	63.1	66.8	1500
16	88	93	5000
16	43.2	45.7	525
17	98.0	104.0	6400
17	55.9	59.2	1200
17	55.0	58.4	1150
23	69.5	73.0	2200
23	79.5	84.3	4300
23	78.3	83.5	4200
23	88.5	93.0	4600
23	79.5	83.4	3800
23	96.0	102.0	7000
23	54.7	58.1	1300
23	92.7	97.4	6300
23	55.6	58.4	700
28	51.6	54.4	650
28	60.3	64.4	1500
28	63.3	66.8	1550
Mean	70.7	74.8	2993.1
Confidence Level(95.0%)	8.521	9.000	1095.577
Standard Error	4.039	4.266	519.276
Standard Deviation	17.134	18.098	2203.103
Count	18	18	18

Appendix D-2. Size Sampling data and mean size of northern pike captured in the Wah-Wah-Taysee Area excluding Tadenac Bay. (N=24)

Set No	Fork Lg (cm)	Total Lg (cm)	Weight (grams)
2	67.6	71.0	2900
2	60.6	64.2	1000
7	62.6	66.4	1500
7	62.4	66.3	1300
7	85.5	90.0	4700
7	59.4	63.1	1900
7	55.8	59.1	1400
8	65.7	69.4	2000
9	49.1	51.8	600
9	58.8	62.1	1100
9	50.0	53.0	1100
10	81.0	83.5	3100
12	52.3	55.6	700
15	72.5	76	2800
15	56.6	59.7	1400
15	57.2	60.9	1400
15	60.6	63.5	1600
19	93.7	98.8	6400
19	69.8	74.5	3600
21	64.4	68.0	1800
22	48.7	51.6	1000
25	57.8	61.3	1250
30	88.0	93.0	6500
30	99.0	104.0	6100
Mean	65.8	69.5	2381.3
Confidence Level(95.0%)	5.939	6.172	764.061
Standard Error	2.871	2.983	369.351
Standard Deviation	14.066	14.616	1809.445
Count	24	24	24

Appendix D-3. Mean Size of all Northern Pike Samples (N=42)

	Fork Lg (cm)	Total Lg (cm)	Weight (grams)
Mean	67.9	71.7	2643.5
Confidence Level(95.0%)	4.815	5.051	618.794
Standard Error	2.384	2.501	306.403
Standard Deviation	15.452	16.209	1985.719
Count	42	42	42

Appendix E. Walleye Biosampling Data from the 2010 Wah-Wah-Taysee ESTN Survey

Set No	Fork Lg (cm)	Total Lg (cm)	Weight (grams)	Location / Comments
4	53.4	52.6	1700	N. of Bourke Pt.
6	58.5	61.1	1750	N. of Bourke Pt.
12	47.6	50.9	1000	Alexander Bay
16	56.3	58.8	1600	Tadenac Bay
16	50.8	54.1	1400	Tadenac Bay
16	55	58.2	1400	Tadenac Bay
28	49.1	51.5	1200	Tadenac Bay
28	75.2	80.2	4300	Tadenac Bay Tag #24112
Mean	55.7	58.4	1793.8	
Confidence Level(95.0%)	7.257	7.986	872.384	
Standard Error	3.069	3.377	368.932	
Standard Deviation	8.680	9.552	1043.496	
Sum			14350	
Samples Size	8	8	8	

Appendix F. Largemouth Bass Biosampling Data from the 2010 Wah-Wah-Taysee ESTN Survey

Set #	Fk Lg (cm)	Tot Lg (cm)	Wt. (gr)
18	37.9	39.6	750
18	45.5	47.5	800
18	45.9	47.8	1300
18	36.6	38.3	700
18	41.2	43.1	1050
18	36.1	37.5	650
18	42.9	44.4	1100
18	46.4	48.8	1600
18	38.8	40.3	750
18	35.2	36.5	725
18	48.4	50.3	1500
18	48.1	49.8	1750
28	43.5	45.4	1200
Mean	42.0	43.8	1067.3
Confidence Level(95.0%)	2.845	2.968	228.065
Standard Error	1.306	1.362	104.674
Standard Deviation	4.708	4.911	377.407
Count	13	13	13

Note: All largemouth bass caught in Tadenac Bay

Appendix G. Biosampling Data for all Other Species caught in the 2010 Wah-Wah-Taysee ESTN Survey

Species	Tot. Lg. (cm)	Weight (grams)	Species	Tot. Lg. (cm)	Weight (grams)
Black Crappie	36.9	725	RH.Sucker	71.5	4000
			RH.Sucker	68.3	6400
Common Wt Sucker	24.5	175	Total Weight		10400
Gar	1005	2300	Bowfin		4000
Gar	1000	1600	Bowfin		3300
Gar	883	1500	Bowfin		3400
Gar		1100	Total Weight		10700
Total Wt.		6500			
Yellow Perch	17	50	Carp		3900
			Carp		4100
Br.Bullhead	26.8	275	Carp		3250
Br.Bullhead	27.3	275	Carp		3700
Br.Bullhead	28.5	300	Carp		3300
Br.Bullhead	34	500	Total Weight		18250
Total Wt.		1350			

Appendix H. UTM Coordinates (NAD-82) for the 2010 Wah-Wah-Taysee ESTN Survey

Set No.	Easting	Northing	Description
1	571358.65	4992607.79	South O'Donnell Point
2	573573.79	4991816.10	Mouth of Moose Bay
3	574413.46	4990651.22	NE of Biblett Is.
4	573355.10	4991053.73	N of Bourke Pt.
5	573851.02	4990824.48	N of Band Is.
6	573053.99	4991211.00	SE of Tyron Is.
7	574909.27	4991578.86	N. Moose Bay
8	572014.40	4992143.97	Hatch Is.
9	574162.90	4991594.85	W Moose Bay
10	573424.52	4990091.44	Gooseberry Is.
11	575169.17	4990342.01	N of Tully Is.
12	578174.67	4989512.99	Alexander Bay
13	576625.94	4990120.76	W of King Pt.
14	576532.64	4989723.58	S Geraldine Is.
15	577612.22	4990198.06	S King Bay
16	579523.48	4990083.44	W Tadenac Bay
17	581568.02	4989760.90	E Tadenac Bay
18	579896.67	4988417.42	SW Tadenac Bay
19	577648.21	4989186.45	Gillespie Is.
20	576640.60	4988461.40	W of Peacock Is.
21	577789.49	4987818.98	Steers Island
22	578455.90	4988114.87	NE of Steers Is.
23	579981.97	4989499.67	Tadenac Bay
24	577083.10	4988520.05	E Peacock Is
25	577946.76	4986848.03	Indian Harbour
26	578226.65	4986575.51	E of Gunn Is.
27	579046.07	4985196.00	Near N Entrance Monument Chnl.
28	580653.71	4990702.00	N. Tadenac Bay
29	580118.72	4984362.19	NE Galbraith Is.
30	580632.65	4984571.18	N. Starr Is.

**Appendix I. Net Set Data Relating to Timing (date/time set and lifted), Site Characterization and Environmental Conditions
(Note: For substrate and wave code – see Skinner and Ball, 2004).**

Set No.	Set Date	Set Time	Lift Date	Lift Time	Substrate Code	Lead lg. Lg. (m)	Angle to shore	Mid Depth (m)	Gap Depth (m)	Water Temp (C.)	Secchi Depth (m)	Cloud Cover	Wind & Speed	Wave Ht. Code
1	May-26	11:00	May-27	14:15	5 & 1	46	90	8	13'	17	Bottom	0	W-15	2
2	May-26	11:45	May-27	13:00	4	46	90	8	8	19	Bottom	0	W110	2
3	May-26	13:00	May-27	9:50	1	46	90	7'	9'	19	Bottom	8	SW-5	1
4	May-26	13:30	May-27	11:05	3 & 4	46	90	8'	10'	21	Bottom	0	SW- 10-15	2
5	May-27	11:00	May-28	12:30	4	46	90	10'	14'	18	Bottom	8	SW 5-10	1
6	May-27	12:15	May-28	13:45	3	46	70	5'	6'	19	Bottom	1	W-20	1
7	May-27	13:40	May-28	10:15	4	46	90	6'	7'	24	Bottom	0	S-10	1
8	May-27	14:50	May-28	11:00	2 & 5	46	90	6'	10'	19	Bottom	0	S-5	1
9	May-28	10:45	May-29	10:00	2	46	90	8'	10'	18	Bottom	1	NE-5	1
10	May-28	11:50	May-29	11:15	2	30	90	6'	7'	18	Bottom	1	NE-5	1
11	May-28	13:30	May-29	12:30	2	46	90	6'	8'	18	Bottom	1	NE-20	1
12	May-28	15:00	May-29	13:45	2	46	90	6'	9'	19	Bottom	0	W-10	1
13	May-29	10:45	May-30	12:30	4	46	90	12'	15'	15	Bottom	5	W-10	1
14	May-29	12:00	May-30	13:30	3 & 5	46	90	8'	14'	15	Bottom	0	S-10	1
15	May-29	13:20	May-30	9:30	4	46	90	8'	12'	21	Bottom	0	Calm	1
16	May-29	14:15	May-30	nr	3	46	90	8'	10'	21	Bottom	0	W-5	1
17	May-30	10:30	May-31	13:00	4	46	90	8'	12'	23	Bottom	5	SE-10	1
18	May-30	11:45	May-31	14:30	1	46	80	6'	8'	23	Bottom	8	S-10	1
19	May-30	13:00	May-31	11:15	2	46	90	6'	6'	14	Bottom	1	E-15	1
20	May-30	14:00	May-31	10:00	4	46	90	8'	9'	15	Bottom	2	SE-10	1
21	May-31	11:00	Jun-01	9:45	4	46	90	8'	12'	17	Bottom	1	W-15	2
22	May-31	12:00	Jun-01	11:00	4	46	90	8'	8'	16	Bottom	1	NW-15	1
23	May-31	13:45	Jun-01	13:50	4	46	90	8'	10'	22	Bottom	0	NW-10	1
24	May-31	15:30	Jun-01	12:30	4	46	70	8'	10'	15	Bottom	1	W-25	1
25	Jun-01	10:40	Jun-02	9:45	4	46	70	8'	9'	18	Bottom	8	Calm	1
26	Jun-01	11:45	Jun-02	13:00	5 & 2 & 1	46	80	8'	10'	17	Bottom	8	SW-5	1
27	Jun-01	13:00	Jun-02	11:00	5	46	80	8'	8'	17	Bottom	8	W-10	1
28	Jun-01	15:00	Jun-02	13:35	4	46	90	8'	12'	21	Bottom	8	Calm	1
29	Jun-02	11:00	Jun-03	10:50	2	46	90	8'	13'	17	Bottom	8	Calm	1
30	Jun-02	12:00	Jun-03	10:00	5 7 2	46	90	8'	8'	17	Bottom	8	Calm	1

Note: Temperatures in grey boxes indicate readings are outside the prescribed maximum limit of 18 deg. C.