



# Eastern Georgian Bay Stewardship Council

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## Musquash River of Eastern Georgian Bay

### Index Walleye-Spawners Survey and Radio Telemetry Study

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Musquash Chutes of E. Geo. Bay

## **Executive Summary**

An index-spawners survey was conducted at the Musquash Chutes (first navigable barrier upstream from Georgian Bay) from April 18 – 29, 2011. Thirty-eight (38) walleye were captured from nine (9) net-nights of fishing effort. Walleye catch-per-unit-effort (CPUE) was 4.2 in 2011; compared to 2.3 in 2005. Walleye CPUE values of this magnitude are indicative of low spawning population abundance.

Mean size of male and female walleye captured in 2011 were smaller than those captured in 2005. We attribute this to recent recruitment of one or more year classes. Evidently, some measure of successful reproduction and recruitment is occurring in this population.

Radio-telemetry tags were implanted into five spawning walleye. Subsequent tracking of these tags suggested none of them advanced upstream past the Musquash Chutes (first navigable barrier upstream from Georgian Bay). Under current low Georgian Bay water levels, we conclude that few if any walleye are by-passing the Musquash Chutes.

The above results support the proposal the Musquash Chutes is a highly desirable site for walleye spawning bed enhancement work. Lake sturgeon are also known to spawn at this location. Efforts to improve walleye production through habitat enhancement are likely to have a highly beneficial impact on sturgeon also.

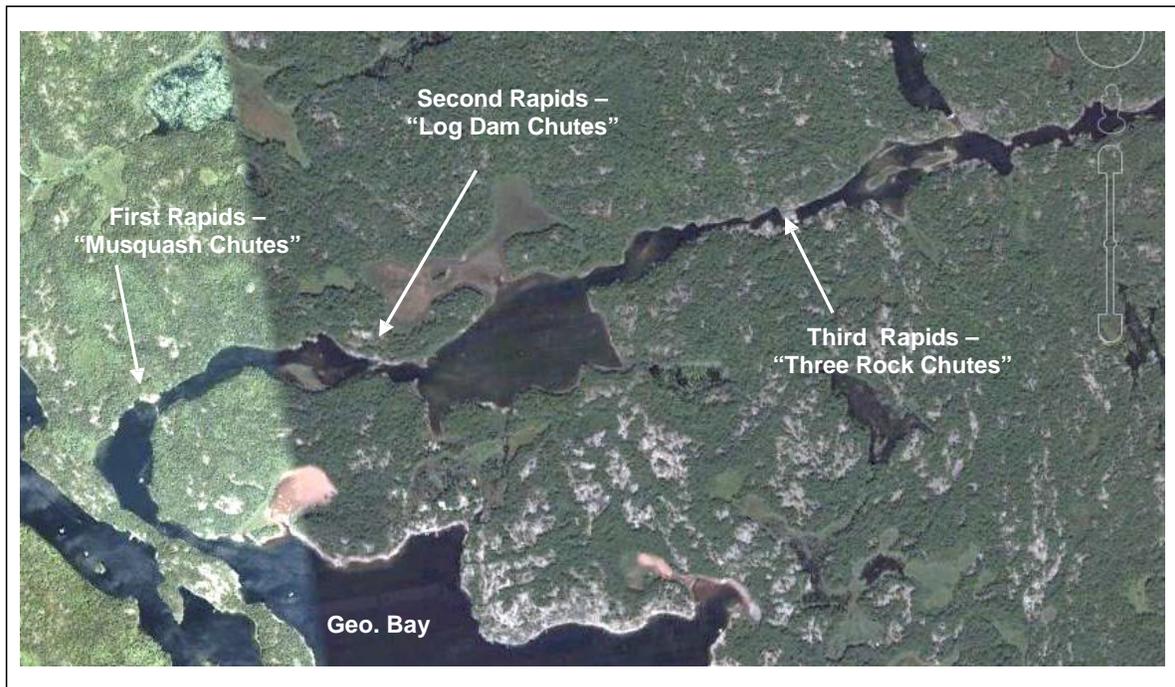
## **1.0 Introduction**

The Musquash River of eastern Georgian Bay contains a remnant walleye population. The historical magnitude of this population is unknown. However, anecdotal accounts suggest the population once numbered in the 'several hundreds' several decades ago (Venard Robitaille, pers. com.).

The Eastern Georgian Bay Stewardship Council (EGBSC) in partnership with the Ministry of Natural Resources (MNR) has embarked on a project to rehabilitate this walleye population. The cornerstone of the rehabilitation project is the provision of high quality and accessible spawning habitat.

The lower portion of the Musquash River has a series of three sets of rapids (see Figure 1). Due to low Georgian Bay water levels that have persisted for over a decade, the EGBSC contend spawning walleye are unable to bypass the first set of rapids and proceed to further upstream spawning areas. The Council contends spawning enhancement work should be conducted at the first set of rapids that walleye can readily access, but not bypass.

**Figure 1. Lower reaches of the Musquash River adjacent to Georgian Bay, showing three sets of rapids.**



Whether walleye can actually by-pass this site has largely been a matter of speculation. We implanted five walleye with radio transmitters and followed their movements during the spawning period to more conclusively answer this question.

The implantation of radio transmitters also provided the opportunity to concurrently conduct an index-spawners survey.

## **2.0 METHODS**

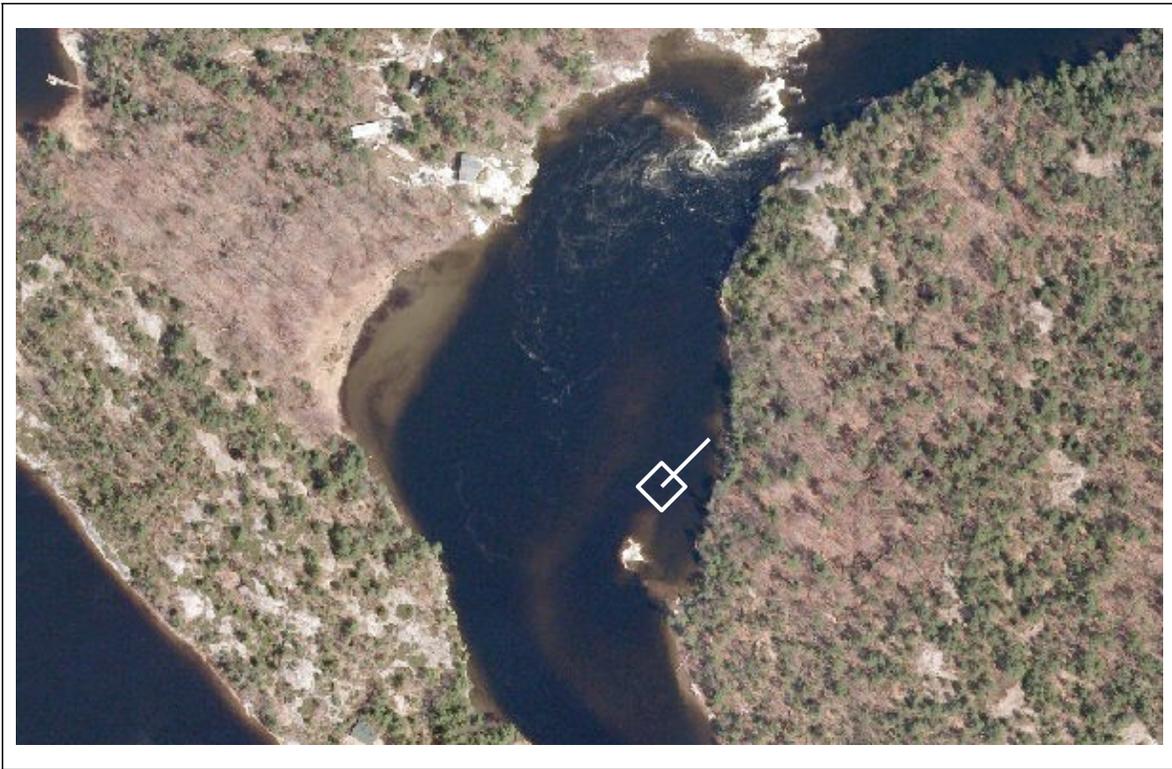
### **2.1 Index-Spawners Survey**

We essentially duplicated the index-spawners survey conducted by the Upper Great Lakes Management Unit (UGLMU) of the Ministry of Natural Resources (MNR) in 2005.

A six-foot trap-net was set in the same location – where all walleye were captured in 2005 (see Figure 2). It was intended the net was to be lifted and re-set daily, however on two occasions the net fished for two nights due to limited manpower availability.

The catch was completely enumerated (Appendix A). All walleye captured were biosampled (length and weight determined; sex and condition recorded, scale and caudal fin tissue sample extracted). The removal of a small portion of the upper caudal fin also acted as a mark to ascertain the presence of a recaptured fish.

**Figure 2. Trap-net set location; 2011 Musquash River Index-spawners Survey.**  
(Note: same location as that used during the 2005 survey.)



### **3.0 RESULTS and DISCUSSION**

#### **3.1 Catch Results of Index-Spawners Survey:**

We captured 38 walleye, 152 common white sucker, 2 redhorse sucker, 7 northern pike and 5 rock bass in 9 net-nights of fishing effort (Appendix A). (Note: 2 walleye were recaptures.)

Our walleye catch-per-unit-effort (CPUE) was 4.2 walleye per net night. In 2005 the walleye CPUE was 2.3 (Arunas Liskauskas, pers. comm.). We attribute the seemingly higher abundance of walleye to the recent recruitment of one or more year-classes (see Section 3.2). Walleye CUE values of this magnitude are indicative of low walleye abundance and a small spawning population.

#### **3.2 Biosampling Results from Index-Spawners Survey**

We captured 17 female and 19 male walleye (excluding recaptures).

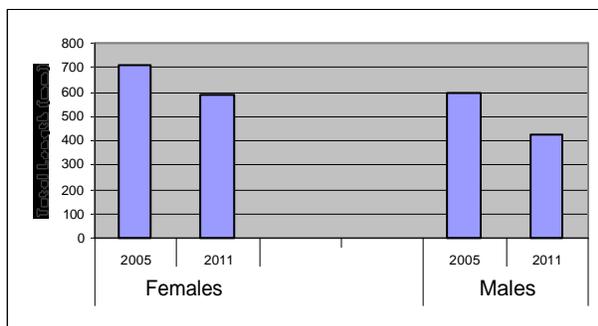
Mean size of 17 female walleye captured was: total length – 585 mm; round weight – 2388 grams (Appendix B).

Mean size of 19 male walleye captured was: total length – 426 mm; round weight – 753 grams (Appendix C).

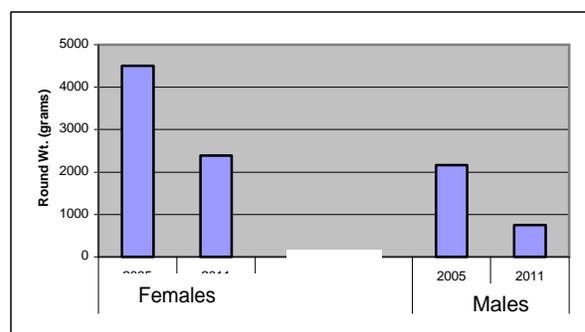
There was an over-all reduction in the mean size of male and female captured in 2011 compared to 2005 (Figures 3a and 3b). We attribute this largely to the recent recruitment of one or more year-classes. Evidently, some measure of successful reproduction and recruitment is currently occurring in this small population.

Male walleye captured in both 2005 and 2011 were smaller than their female counterparts.

**Figure 3a. Relative Total Length (mm) of Male and Female Walleye between 2005 and 2011**



**Figure 3b. Relative Round Weight (grams) of Male and Female Walleye between 2005 and 2011**



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It is very interesting that in 2005, Floy tags (a.k.a. spaghetti tags) were applied to all 25 walleye captured. None of the 36 individual walleye captured in 2011 were previously tagged; suggesting none were recaptures from the 2005 survey.

We were also surprised and perplexed by one walleye that had a severe gash on its side, which we attributed to a spear wound. To the best of our knowledge, no fish harvest by Natives occurs at this location. The closest location where Native fish harvest is known to occur is Port Severn; approximate 25 – 30 kilometers to the south.

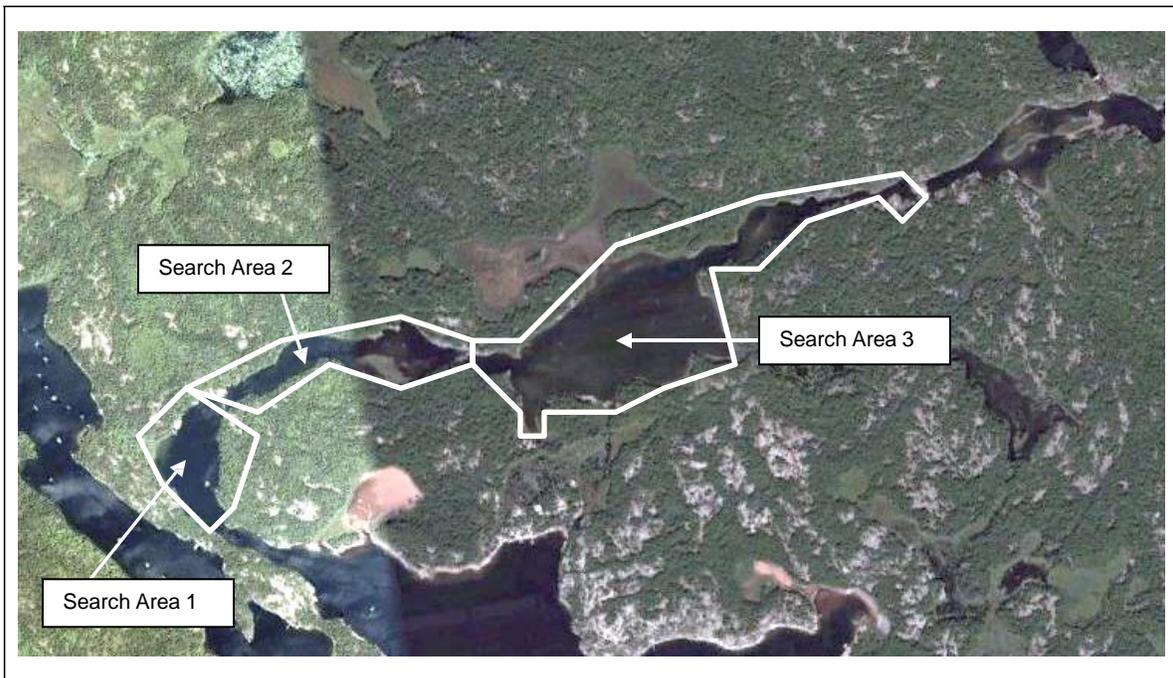
### 3.3 Radio-Telemetry Results

Radio-tags were implanted into five walleye. All walleye were captured in the lowest reach (Search Area #1) of the Musquash River below the first set of rapids.

We segmented the Musquash River into three search areas (Figure 4):

- Search Area #1: The lowest reach of river between Georgian Bay and the first set of rapids – which we call “Musquash Chutes”.
- Search Area #2: Between Musquash Chutes and the next upstream set of rapids, which we call “Log Dam Chutes” (at one time a logging dam was present at this site, of which remnants are still evident).
- Search Area #3: Between Log Dam Chutes and the next upstream set of rapids, called “Three Rock Chutes.”

**Figure 4. Search areas for radio-telemetry study.** (Note: All 5 tags were applied in Search Area #1 – below the Musquash Chutes)



Area 1 was searched on seven occasions; with a total of 13 ‘hits’ comprising four of the five tags implanted (Table 1).

**Table 1. Results of radio-tag searching conducted in Area 1.**

| Date Searched | No. of radio-tags detected                  | Tag No. detected |
|---------------|---|------------------|
| Apr. 21       | 1   | Tag #2           |
| Apr. 22       | 3   | Tag # 1, 2 and 4 |
| Apr. 23       | 3   | Tag # 1, 2 and 5 |
| Apr. 25       | 3   | Tag # 1, 4 and 5 |
| Apr. 26       | 2   | Tag # 1 and 2    |
| Apr. 27       | 1   | Tag # 5          |
| Apr. 28       | 0 (miserable day; short duration of search) |                  |

(Tag #1 – frequency: 172.106; Tag#2 – 172.116; Tag #3 – 172.127; Tag #4 – 172.137; Tag #5 – 172.146)

Note: At one time or another, all radio-tags were detected in Search Area #1 with the exception of tag #3. Once applied – this tag was never heard from again.

Area 2 was searched on four occasions (Apr. 21, 22, 25 and 27); no “hits” were observed. Area 3 was searched on one occasion (Apr. 25); no “hits” were observed.

From the foregoing results, we are of the opinion that few if any walleye are by-passing the Musquash Chutes. These results support the contention that most - if not all walleye

spawning activity is occurring below the Musquash Chutes. This conclusion is reinforced by the opinion of Scott Finucan, Fisheries Science Specialist with the Northeast Science and Information Branch of the MNR, who had occasion to visit the site on or about May 3, 2011 (pers. comm.).

Also of considerable significance at the time of his inspection, Scott noted the presence of a lake sturgeon at the site.

## **Acknowledgements:**

The EGBSC would like to thank the Georgian Bay Biosphere Reserve for making available to us two exchange staff persons from Germany – Thomas and Susan Abe, who were extremely helpful in assisting with netting operations. We couldn't have done the project without their valuable contribution.

We would also like to thank Arunas Liskauskas and Ed Delaplante, of the Upper Great Lakes Management Unit (UGLMU) for their guidance and assistance with netting activities. Also, the UGLMU provided the boat and motor used for netting operations.

Many thanks to Georgian Bay Islands National Park for providing launching, docking and parking facilities at their base in Honey Harbour. It was a welcome refuge on several nasty days and an immense convenience all-around.

Thank you to Steve Scholten, Parry Sound District Fisheries Biologist, for providing valuable assistance and advice relating to radio-transmitter implant procedures.

Thank you to Jeremy Rouse, Parry Sound District Species-At-Risk Biologist, for valuable assistance and direction related to obtaining appropriate radio-transmitters and tracking procedures.

Thank you to OMNR Parry Sound District, for their logistical support to the project and providing netting equipment.

## Appendix A. Catch Summary

| Sample Number               | Water temp. © | Date Set | Date Lifted | Effort Net-nights | Catch   |  |           |        |           |
|-----------------------------|---------------|----------|-------------|-------------------|---------|--|-----------|--------|-----------|
|                             |               |          |             |                   | Walleye | CW.Sucker                                | RH.Sucker | n.pike | Rock Bass |
| 1                           | 4.7           | Ap.18    | Ap.19       | 1                 | 8       | 29                                       | 0         | 4      | 0         |
| 2                           | 4.7           | Ap.19    | Ap.21       | 2                 | 8       | 13                                       | 0         | 0      | 0         |
| 3                           | 5.1           | Ap.21    | Ap.22       | 1                 | 7       | 12                                       | 1         | 1      | 0         |
| 4                           | 4.8           | Ap.22    | Ap.23       | 1                 | 5       | 12                                       | 0         | 1      | 1         |
| 5                           | 5.6           | Ap.23    | Ap.25       | 2                 | 5       | 69                                       | 1         | 1      | 3         |
| 6                           | 5.9           | Ap.25    | Ap.26       |                   |         | deleted - not considered a valid net set |           |        |           |
| 7                           | 5.9           | Ap.26    | Ap.27       | 1                 | 5       | 12                                       | 0         | 0      | 1         |
| 8                           | 6.5           | Ap.27    | Ap.28       | 1                 | 0       | 5  | 0         | 0      | 0         |
| Total                       |               |          |             | 9                 | 38      | 152                                      | 2         | 7      | 5         |
| C.U.E. (number per net set) |               |          |             |                   | 4.2     | 16.9                                     | 0.2       | 0.8    | 0.6       |

## Appendix B. Biosampling Data for FEMALE walleye captured during the 2011 Index-spawners survey

| Sample No               | Fish No. | Total Lg. (mm) | Rnd. Wt. (gr) | Condition | Comment                                   |
|-------------------------|----------|----------------|---------------|-----------|---|
| 1                       | 1        | 505            | 1300          | Green     | radio transmitter; frequency: 172.106 MHz |
| 1                       | 2        | 505            | 1500          | Green     | radio transmitter; frequency: 172.116 MHz |
| 1                       | 3        | 600            | 2500          | Green     | radio transmitter; frequency 172.127 MHz  |
| 1                       | 5        | 548            | 1600          | Green     | radio transmitter; frequency 172.146 MHz  |
| 2                       | 1        | 718            | 3900          | Green     | Spear wound prominently evident           |
| 2                       | 2        | 554            | 1700          | Green     |   |
| 2                       | 5        | 588            | 2200          | Green     |   |
| 2                       | 8        | 514            | 1900          | Green     |   |
| 3                       | 1        | 698            | 4600          | Green     |   |
| 3                       | 3        | 548            | 1700          | Green     | Lymphocystis present                      |
| 4                       | 2        | 567            | 2100          | Green     | Lymphocystis present                      |
| 4                       | 3        | 601            | 2300          | Ripe      |   |
| 4                       | 4        | 590            | 2900          | Green     |   |
| 5                       | 1        | 730            | 4300          | Green     |   |
| 5                       | 2        | 537            | 1600          | Green     |   |
| 7                       | 1        | 581            | 2700          | Green     | Lymphocystis present                      |
| 7                       | 2        | 559            | 1800          | Green     |   |
| Mean                    |          | 585            | 2388          |           |   |
| Standard Error          |          | 16.810         | 243.123       |           |   |
| Median                  |          | 567            | 2100          |           |   |
| Standard Deviation      |          | 69.308         | 1002.424      |           |   |
| Sum                     |          |                | 40600         |           |   |
| Confidence Level(95.0%) |          | 35.635         | 515.399       |           |   |
| Count                   |          | 17             | 17            |           |   |

**Appendix C. Biosampling Data for FEMALE walleye captured during the 2011 Index-spawners survey**

| Sample No               | Fish No. | Total Lg. (mm) | Rnd. Wt. (gr) | Condition | Comment                                  |
|-------------------------|----------|----------------|---------------|-----------|--|
| 1                       | 4        | 592            | 2200          | Ripe      | radio transmitter; frequency 172.137 MHz |
| 1                       | 6        | 445            | 700           | Ripe      |  |
| 1                       | 7        | 405            | 550           | Ripe      |  |
| 1                       | 8        | 410            | 550           | Ripe      |  |
| 2                       | 3        | 452            | 900           | Ripe      |  |
| 2                       | 4        | 416            | 600           | Ripe      |  |
| 2                       | 6        | 408            | 700           | Ripe      |  |
| 2                       | 7        | 422            | 600           | Ripe      |  |
| 3                       | 2        | 452            | 800           | Ripe      |  |
| 3                       | 4        | 427            | 700           | Ripe      |  |
| 3                       | 5        | 441            | 1300          | Ripe      |  |
| 3                       | 6        | 420            | 750           | Ripe      |  |
| 3                       | 7        | 406            | 650           | Ripe      |  |
| 4                       | 1        | 430            | 700           | Ripe      |  |
| 4                       | 5        | 352            | 400           | Ripe      |  |
| 5                       | 3        | 378            | 400           | Ripe      |  |
| 5                       | 4        | 402            | 600           | Ripe      |  |
| 5                       | 5        | 426            | 700           | Ripe      |  |
| 7                       | 3        | 410            | 500           | Ripe      |  |
| Mean                    |          | 426            | 753           |           |  |
| Standard Error          |          | 10.774         | 92.201        |           |  |
| Median                  |          | 420            | 700           |           |  |
| Standard Deviation      |          | 46.961         | 401.896       |           |  |
| Sum                     |          |                | 14300         |           |  |
| Confidence Level(95.0%) |          | 22.634         | 193.708       |           |  |
| Count                   |          | 19             | 19            |           |  |