

Musquash River

Spawning Bed Construction

Summary Report

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Executive Summary:

In November, 2012, White Contracting and Barging began and completed construction of spawning beds on the lower stretches of the Musquash River. This was the culmination of approximately 3 years of planning undertaken by the Ministry of Natural Resources and Eastern Georgian Bay Stewardship Council.

This spawning bed project was spurred on because of lower water levels in Georgian Bay eliminating the ability of walleye to move upstream to more traditional spawning grounds. It also provided an opportunity to establish good quality Lake Sturgeon spawning habitat in an area that receives relatively constant flow velocities throughout the spawning season.

A total of 800 metric tonnes of rock was barged in to complete the project. Construction of the spawning bed consisted primarily of diverting a portion of the Musquash River Flow toward the north side of the river over spawning beds constructed at the same time. A final part of the project included armoring a bank that was subject to erosion at high river levels and higher Georgian Bay water levels. These spawning beds have been designed to be functional at a range of water levels both in Georgian Bay and to a certain extent from the river.

This project effectively completes the major work requirements for the spawning bed construction in Georgian Bay portions of the outflows of the Moon River/Musquash River watershed taking advantage of consistent water levels from hydro power production in the Musquash where the Moon River is unable to receive those same 'natural' flows. This project is step 4 of the Musquash River and Cognashene Area Walleye and Lake Sturgeon Population Rehabilitation/Restoration Project Proposal; the remaining steps being rehabilitative walleye plantings and post-treatment assessment.

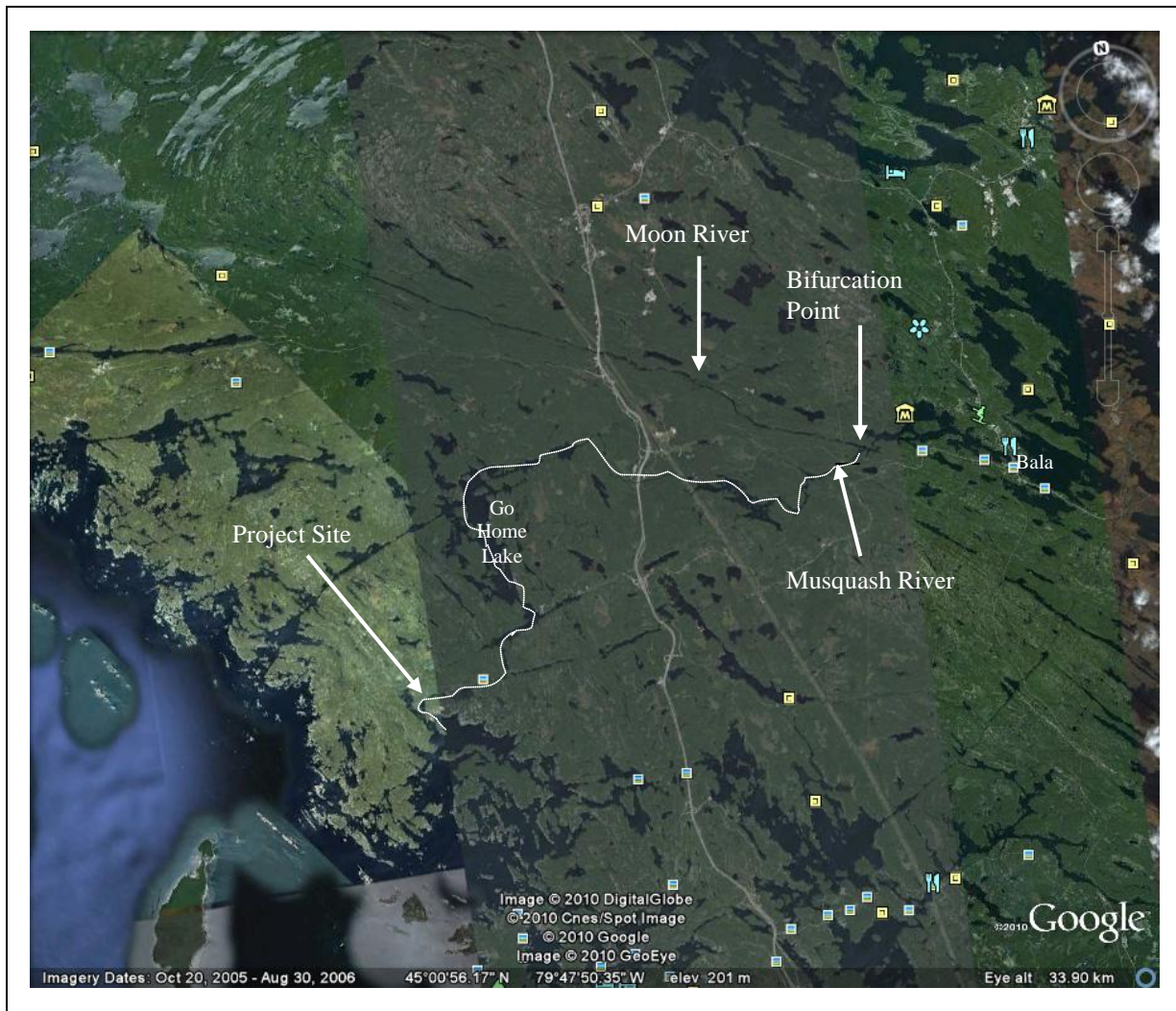
Background:

Anecdotal and commercial fish records indicate walleye and sturgeon were once abundant in south-eastern Georgian Bay extending from Severn Sound northward along the eastern shore as far as Sandy Island, west of Parry Island and Wasauksing First Nation. Undoubtedly, a large portion of the walleye and sturgeon comprising the early commercial and sport fisheries in this area originated from other well-known and once thriving stocks that spawned at Moon River and Severn River (Port Severn). However, anecdotal accounts also suggest there were several additional walleye and sturgeon spawning stocks in this portion of Georgian Bay. These include: Go Home Bay, Musquash River, McCrae Lake outlet, Tadenac Lake outlet, and Baxter Lake outlet (South Bay of Geo. Bay).

The Musquash River is one of several rivers emptying into south-eastern Georgian Bay. It is the southern terminus of the large Muskoka River watershed that bifurcates just west of Bala (Figure 1). The northern portion is the Moon River.

At some unknown time in the past, walleye and sturgeon use of these spawning sites diminished to the point where it is currently uncertain if a remnant spawning population continues to use them today. We will probably never know the exact cause of this drastic decline, but the possibility and opportunity still exists to rehabilitate these stocks.

Figure 1. Geographic Setting of Musquash River.



During the early logging era on Georgian Bay (circa 1860 – 1900), a large lumber operation called *Muskoka Mills* operated in the vicinity of the mouth of the Musquash River. Lumbermen constructed a dam downstream of Three Rock

Chutes and an upstream sluiceway between the river and the mill to facilitate the delivery of logs (Fig.2).

Figure 2. Aerial photo of the mouth of the Musquash River showing historical and proposed walleye spawning sites.



Submerged remnants of the old log dam still exist today. During periods of high water on Georgian Bay, walleye can access this site for spawning purposes and some suitable spawning habitat is present. Today, remnants of the old dam combined with the natural constriction of the bedrock and high flow velocities, probably prevent further upstream movement of walleye. Perhaps, in odd years when Georgian Bay water levels are high, as they were in the late 1980s, and dry spring conditions prevail with reduced flow velocities in the Musquash River, walleye may still be able to access the Three Rock Chutes spawning site. The problem is, the aforementioned circumstances seldom occur and their frequency is diminishing!

Today, walleye are unable to access these up-stream sites due to:

- 1) high flow volumes (related to up-stream hydro generation), and
- 2) low Georgian Bay water levels that prevent walleye from by-passing the first constriction in the river (Figure 2 and McIntyre, 2011).

This first constriction, which we call 'Musquash Chutes', is essentially at Georgian Bay water level, and the proposed site for enhancement work (Figures 2 & 3).

Under natural circumstances, as flows diminish during the spring freshet walleye would eventually be able to by-pass this constriction and spawn further upstream at the old logging dam or Three Rock Chutes. However – the Musquash River does not have a natural flow regime! Throughout the spring freshet that includes the walleye spawning and incubation periods, the river generally receives a steady flow of 80-100 cubic metres per sec second (cms) to maximize hydro-electric production at upstream generating stations.

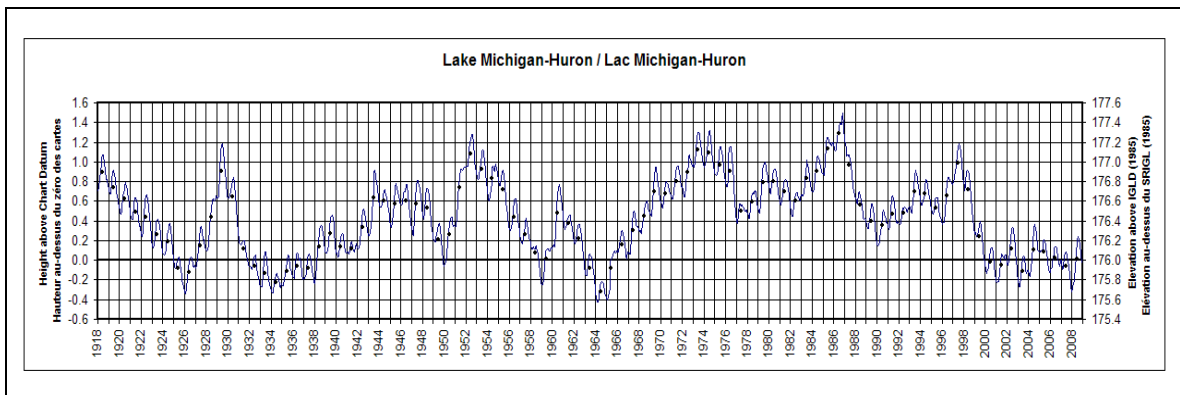
Note: Under the odd and rare circumstance of low flow during the spring freshet, the Musquash River may receive a flow considerably less than 80 cms.

Consequently, in most years (when Georgian Bay water levels are low) - walleye are confined to spawning downstream of this first constriction in the river. A radio-telemetry study conducted at the site in 2011 (McIntyre, 2011), provided compelling circumstantial evidence walleye were unable to by-pass this site. Currently, very little and poor quality walleye spawning habitat exists at this location.

Under high Georgian Bay water levels, it is likely walleye can by-pass this constriction. However, since 1999 Georgian Bay water levels have been close to historic lows (Figure 3). Climate change models predict a 1 – 2 metre reduction in long-term water levels for Lake Huron. It would seem wise that we plan spawning habitat enhancement work with this consideration in mind. In so doing, it points us to conducting enhancement work at the Musquash Chutes – the first upstream constriction on the Musquash River.

In 2007, the Eastern Georgian Bay Stewardship Council (EGBSC) commenced an initiative to rehabilitate walleye populations in south-eastern Georgian Bay from Severn Sound to the Moon River. Rehabilitative work – including walleye spawning bed enhancement, has been conducted at the Moon River, Tadenac Bay and Go Home Bay of Eastern Georgian Bay. On-going rehabilitative walleye plantings continue at these sites.

Figure 3. Historic water levels for Lake Huron – including Georgian Bay



Rehabilitation and enhancement work at the Musquash River holds the potential for a tremendous increase in walleye and sturgeon productivity in south-eastern Georgian Bay. This particular site has a number of factors that makes it a prime candidate for rehabilitation:

1. Historically, the Musquash River provided a significant contribution to walleye and sturgeon productivity in the area. Unfortunately, there is no data available to characterize the historical magnitude of this spawning run. Remnant walleye and sturgeon spawning populations still exists to form the basis for rehabilitation.
2. The site is large – with a high potential for significant fish production.
3. The Musquash River is a primary producer of hydro-electric power whereby spring-time (and spawning and incubation periods) flows are regulated in a manner that is highly conducive to successful reproduction.
4. The Musquash River, nearby Cognashene area and the waters of Severn Sound provide excellent nursery and feeding habitat for walleye and sturgeon.

In late August of 2011 the site was intensively surveyed to collect morphometric data for the production of a 3-dimensional model of the river bed (Figure 5). This information was used to model flow velocities at different locations under varying flow regimes – including the regulated flow regime, to determine where enhancement work should be conducted (Figures 4 & 5).

Figure 4. Three Dimensional model of the Musquash River showing preferential sites for walleye (red and orange polygons) and sturgeon (yellow polygon) enhancement work.

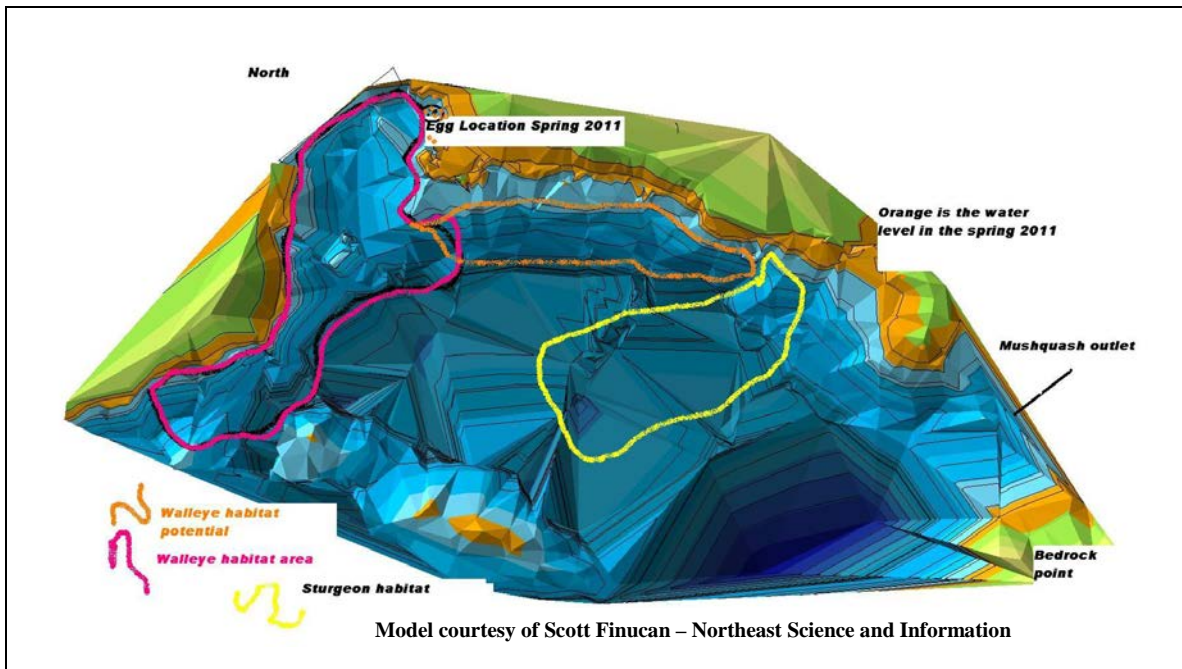
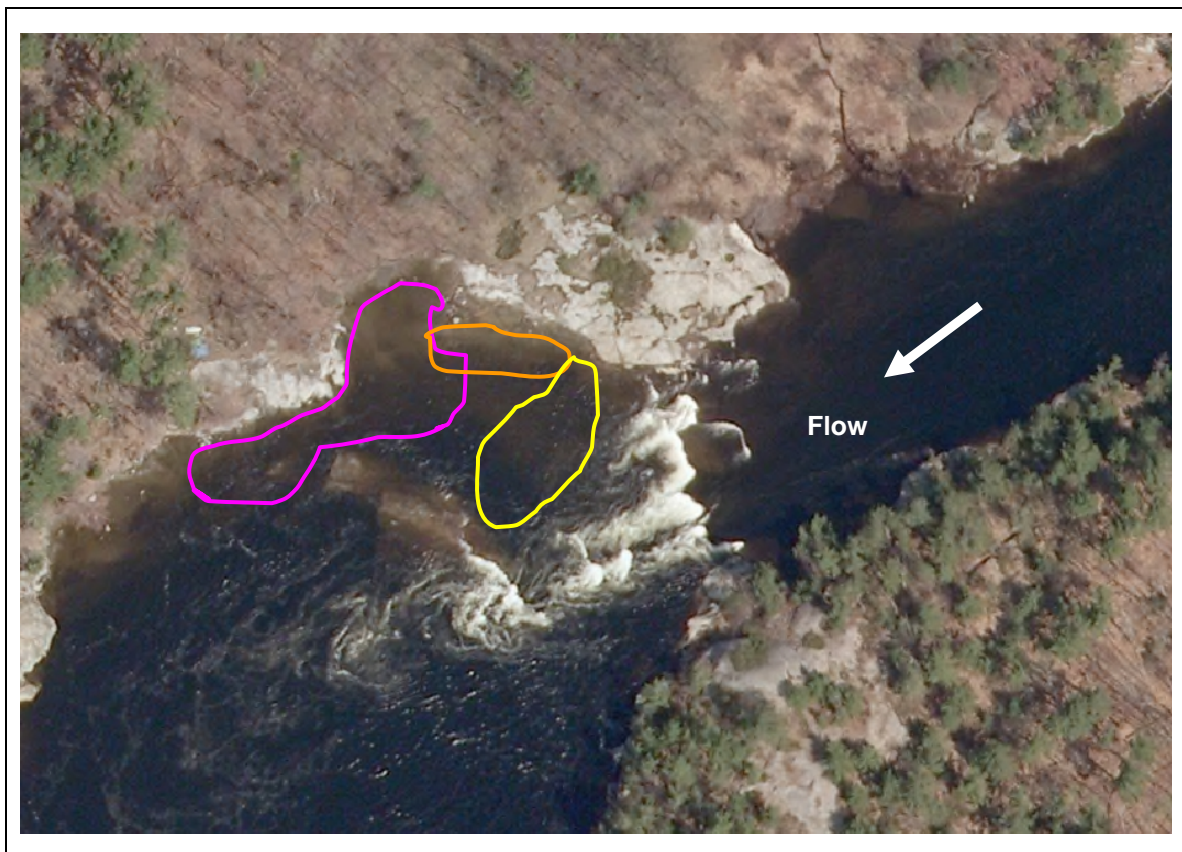


Figure 5. Above enhancement area polygons transposed (approximate location) onto aerial photo of Musquash River enhancement site



The Environmental Screening Report was completed at the end of November 2011 and approvals were gained in summer of 2012. Subsequently, the UGLMU provided funding for a project coordinator and under the joint management of the UGLMU and the District of Parry Sound MNR, the construction phase was initiated and completed by December 2012.

Construction Activities

The design specifications for this project called for 3 key tasks to be completed. First, a portion of the rivers flow was redirected and flow was concentrated to flow over the new spawning area. Second, rock was spread in appropriate areas to create walleye and lake sturgeon spawning habitat just down stream of the redirected flow. Third, an adjacent shoreline bank indicating signs of significant erosion (specifically at higher Georgian Bay water levels, was armored with cobble to eliminate erosion potential and also potentially provide spawning habitat during high Georgian Bay water level regimes.

Specifically, the materials provided on site were:

Size Requirement	Amount Required
0.7 – 0.8 meters in diameter	115 metric tonnes (approximately 120 boulders)
0.35 - 0.5 meters in diameter	80 metric tonnes (approximately 280 boulders)
0.2 – 0.4 meters in diameter (round granite, river run cobble – not blasted rock)	480 metric tonnes (approximately 300 cubic meters)

This material was barged to an adjacent embayment (Longuissa Bay) and White Contracting arranged with the adjacent private land owner permission to transport the material overland to the construction site. It was deemed necessary to access the site in this way because very low fall water levels made it impossible to easily and safely access the site via the river due to constrictions and navigation challenges at the mouth of Musquash River combined with higher river flow levels.

The contractor was forced to traverse a small (approximately 50 metre stretch) of crown land to a rock outcrop adjacent to the proposed spawning site where the rock was stockpiled. Parry Sound District MNR sent a Forestry Technician on-site to ensure that no natural resource values were compromised over the 50 metre stretch of crown land. (Site visit October 25, 2012)

Barging and stockpiling on site began on November 12, 2012 and continued for that week. Actual construction of the spawning site began on November 20th and was completed by November 21, 2012. There was some concern about the ability to complete the work due to high river flows. There were many

discussions with MNR and OPG and a general willingness to try to manage river flows to enable the construction to begin; however in the end, this was not required and the work was able to be completed without manipulation of river flow levels.

Scott Finucan and team was on-site to monitor the placement of the rock and ensure that it met the design requirements. He was able to take some flow and spot samples to map the newly constructed habitat though higher river flow levels requires that he return to complete this work.

Documentary photos of the above work is provided in Appendix A.

Acknowledgements:

This project was yet another successful collaborated effort between the Provincial Government (Ontario Ministry of Natural Resources) and the Eastern Georgian Bay Stewardship Council. Primary funding was provided through the Canada-Ontario Agreement (COA) for the construction costs in addition to staff support being provided by the Upper Great Lakes Management Unit, the Parry Sound District MNR and the Northeast Science and Information Section. Other sources of funding were received from the Township of Georgian Bay and the Cognashene Cottagers Association.

Thanks are due to the diligence and timeliness of staff at White Barge and Contracting and in particular Jon White and Trevor White and to their contact Mike Bushey for providing access over his property.

Ontario Power Generation is to be thanked for a number of conversations and a general willingness to explore water flows on the Musquash River that might facilitate construction of the grounds; despite adjustments not being required in the end.

Dan Duggan and staff at the OMNR Parry Sound District Office were instrumental in completing the Environmental Assessment and providing key support and knowledge during the procurement phase of the project.

Thanks are due also to Ministry of Government Services staff and Melissa Miller in particular with her guidance on the procurement procedures provided in a very tight timeline.

