



Eastern Georgian Bay Stewardship Council

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Killbear Channel and Parry Sound Lake Trout Egg Collection For Thiamine Analysis

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Eric McIntyre, Coordinator
Eastern Georgian Bay Stewardship Council



Volunteer, David Sweetnam assisting with
lake trout netting operations at Davy Island, October 2010

Executive Summary:

Trap-nets were fished in Killbear Channel and Parry Sound of Eastern Georgian Bay during the lake trout spawning period of 2010 to collect egg samples for thiamine analysis. The absence of thiamine (Vitamin B1) has been implicated as a contributing factor to the lack of lake trout reproductive success in Great Lakes waters.

A total of 84 lake trout were captured from ten net-nights of fishing effort at two netting sites. Egg samples were collected from 12 ripe females and one dead female encountered during the survey. (The dead female was the result of otter predation.) Once analyzed by the Great Lakes Science Centre in Ann Arbor, Michigan, thiamine level results will be posted on their website at www.glsc.usgs.gov.

The Eastern Georgian Bay Stewardship Council (EGBSC) previously conducted the same survey in 2008. We observed the following changes between surveys:

- Over-all Catch-Per-Unit-Effort (CPUE) was 8.4 lake trout per net set in 2010, compared with 27.7 in 2008. We do **not** consider the reduction in CPUE a reflection of relative abundance between surveys.
- Size distribution of male lake trout has shifted substantially towards smaller (i.e. shorter Total Length) fish; largely attributable to recruitment of one or more young year classes to the spawning population.
- Lamprey wounding was up marginally in 2010, but the scarring rate was considerably lower than in 2008. This is partially attributable to the influx of young males into the spawning population that have had less exposure to lamprey predation and scarring.

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1.0 Introduction and Purpose:

The failure of newly hatched lake trout in Great Lakes waters to survive and grow has been linked in part to a lack of thiamine (Vitamin B1) in their system (www.glsc.usgs.gov). This condition called thiamine deficiency complex (TDC), is believed to be caused by the presence of a thiamine destroying enzyme – thiaminase. This enzyme is found in alewife and smelt and it is believed that lake trout populations that rely heavily on these prey species are more susceptible to TDC.

The complexity, scope and seriousness of TDC has necessitated that natural resource agencies work together on an integrated research and monitoring program to better understand TDC and to propose and evaluate possible solutions (www.glsc.usgs.gov). To this end, the Upper Great Lakes Management Unit (UGLMU) of the Ontario Ministry of Natural Resources is working together with the Great Lakes Science Centre in Ann Arbor, Michigan. To contribute towards this thiamine monitoring initiative, the UGLMU requested the Eastern Georgian Bay Stewardship Council (EGBSC) assist through the collection of lake trout egg samples from the Davy Island and Horse Island spawning populations in 2008. This request was again made in 2010. The EGBSC was delighted to contribute towards this initiative.

As a secondary purpose, this project also offered a fortuitous opportunity to collect spawning population assessment data as well as information relating to lamprey wounding and scaring rates.

2.0 Methods:

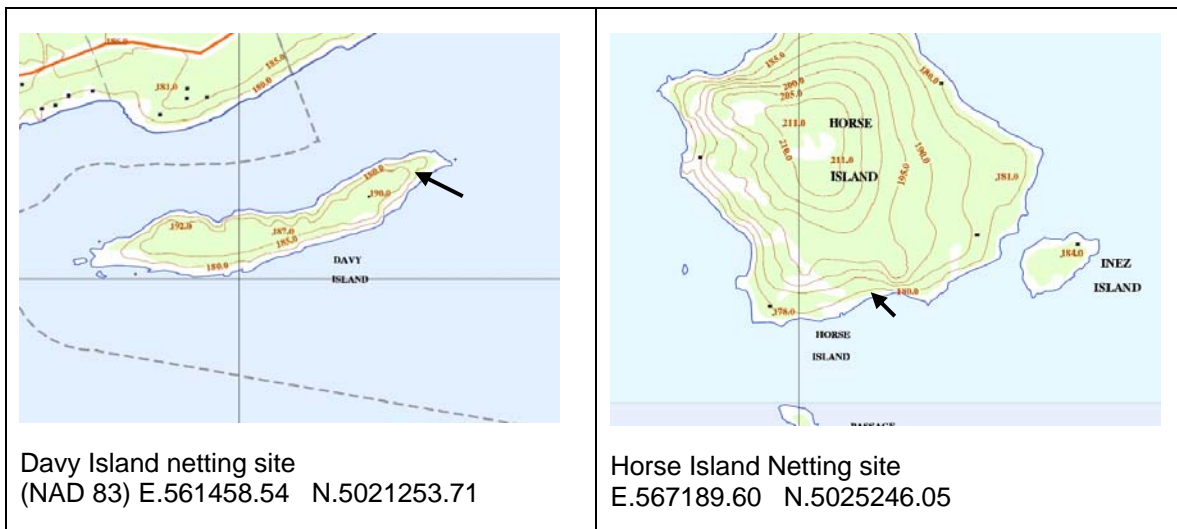
We used 6'-trapnets to capture lake trout because of negligible mortality associated with this gear. Nets were set October 21 at two locations: 1) the south-east corner of Davy Island in the Killbear Channel, and 2) the south-central shore of Horse Island in Parry Sound (aka the Big Sound) (Figure 1). Leads were shortened such that approximately 50' of lead was used at each site.

The catch was completely enumerated and all captured lake trout were bio-sampled for total and fork length, round weight, sex, reproductive condition, fish tag number (if present), fin clip (if present) and the presence/absence of lamprey scars and fish lice. We used the convention requested by the Upper Great Lakes Management Unit (UGLMU) for documenting lamprey scars and wounds (Appendix C.)

Approximately 10 grams of eggs (30 – 50+ eggs) were collected from ripe, freely-flowing females. One egg sample was collected from a female lake trout killed in the net by an otter. Egg samples were placed in zip-lock bags and held on ice while in the field and immediately frozen upon termination of daily field work. Biosampling and catch location data for individual fish from eggs were collected was recorded on scale envelopes and accompanied the frozen egg samples. Egg samples and data were later transferred to

the UGLMU. Final destination of the egg samples for thiamine analysis was the Great Lakes Science Centre of the United States Geological Service in Ann Arbor, Michigan.

Figure 1. Location of Netting Sites



3.0 Results:

3.1 Netting Results:

From five nights of fishing at two sites (i.e. 10 net nights of fishing effort), we captured a total of 84 lake trout (Table 1).

Table 1. Trap Net Catch Summary – 2010 Big Sound Thiamine Analysis Project.

Location	Date (lifted)	Water Temp. Deg. C.	# Males Caught	# Females Caught	Total LT Catch	Other' Catch / Comments
Horse Island	Oct. 22	11	2	1	3	11 - rock bass
Horse Island	Oct. 23	11	1	2	3	1 rainbow 1 smallmouth 2 rock bass
Horse Island	Oct. 24	12	2	1	3	2- rock bass
Horse Island	Oct. 25	12	4	2	6	3 - rock bass
Horse Island	Oct. 26	12.5	6	2	8	1 - rock bass
Total			15	8	23	
Davy Island	Oct. 22	11	9	2	11	Dead Otter; killed 1LT; injured another
Davy Island	Oct. 23	12	8	4	12	
Davy Island	Oct. 24	12	14	2	16	1 - rock bass
Davy Island	Oct. 25	12	17	4	21	
Davy Island	Oct. 26	12.5	1	0	1	
Total			49	12	61	

Our over-all Catch-Per-Unit-Effort (CPUE) was 8.4 lake trout per net night. CPUE at Davy Island was 12.2 and at Horse Island 4.6 (Table 1).

3.2 Egg Sample Collection Results

Nine egg samples were collected from ripe females at Davy Island (Appendix A-1) and four from females at Horse Island (Appendix A-2).

One egg sample (#13885) from Davy Island was extracted from a dead female lake trout that was killed by an otter in the net.

At the time of writing of this report, analysis relating to thiamine levels was not available. This information will subsequently be posted on the website of the Great Lakes Science Centre (www.glsc.usg.gov) when available.



Lake trout eggs collected for Thiamine analysis

3.3 Biosampling Results

Mean size of male and female lake trout from the two netting sites was as follows:

Sex	Netting Site	Mean Total Lg. (cm)	Mean Fork Lg. (mm)	Mean Weight (grams)
Female	Davy Is.	72.7 (N=12)	67.1 (N=12)	3850 (N=12)
	Horse Is.	72.5 (N=8)	66.5 (N=8)	3542 (N=8)
Male	Davy Is.	64.1 (N=49)	58.7 (N=49)	2428 (N=48)
	Horse Is.	66.7 (N=15)	61.1 (N=15)	2627 (N=15)
Note: Complete biosampling data presented in Appendix A1-2 and B1-2				

3.4 Lamprey Scaring

We used the convention adopted by the UGLMU for reporting lamprey scaring and wounding (Appendix C).

We observed 7 lake trout (8%) with open lamprey wounds in various stages of healing (i.e. designate as A1, A2 or A3 as per Appendix C). In 2008, only 1.8% of lake trout sampled had similar open lamprey wounds.

We observed 31 lake trout (37%) with healed lamprey wounds or scarring indicating attachment but unsuccessful penetration (A4, B1-4). In 2008, 45.9% of lake trout sampled had similar scarring. The reduced scarring rate observed in 2010 is probably somewhat related to an influx of young males to the spawning population (see Section 4.2) that have had less exposure to lamprey predation.

3.5 Tag Data

Five lake trout (6%) – all males, had ‘spaghetti tags’ attached to them (Appendix B1 and B2). When this project was conducted in 2008, 10% of lake trout observed were tagged (McIntyre, 2008).

These tags are remnants of past assessment studies conducted by the Upper Great Lakes Management Unit (UGLMU). *Data relating to these tags (tagging location, date affixed, size at time of tagging) is available through the UGLMU – Lake Huron Office (Owen Sound).*

3.6 Fish Lice

The presence of fish lice was detected on nine lake trout (11%) (Appendix B1-2) – all of which were males.

4.0 Discussion

This project has been conducted by the EGBSC in two years – 2008 and 2010. The primary purpose of this project is to collect lake trout eggs for thiamine analysis. However, in doing so it also provides a fortuitous opportunity to collect spawning assessment data for lake trout at two distinct spawning sites. We noted some considerable changes in observations (results) between years.

4.1 Catch-Per-Unit-Effort (CPUE) Between Surveys

We had a more difficult time capturing lake trout and collecting eggs in 2010 than we did in 2008. In 2008, the over-all CPUE was 27.7 lake trout per net night; in 2010 it was 6.1. In 2008, Horse Island had the highest CPUE at 36.5, but in 2010 it was only 5.8. Conversely, at Davy Island the CPUE in 2008 was 19.0, and in 2010 12.2. We do not necessarily ascribe the lower CPUE observed in 2010 to a reduction in abundance of

lake trout. Different environmental conditions, inadequate sampling intensity and a multitude of natural variables all influence the CPUE independent of population abundance.

Similarly, as our CPUE diminishes between years, it is logical that opportunities to collect eggs from ripe females also diminish. In 2008 we collected 17 egg samples from 4 net-nights of fishing effort; in 2010 we collected 13 egg samples from 10 net-nights.

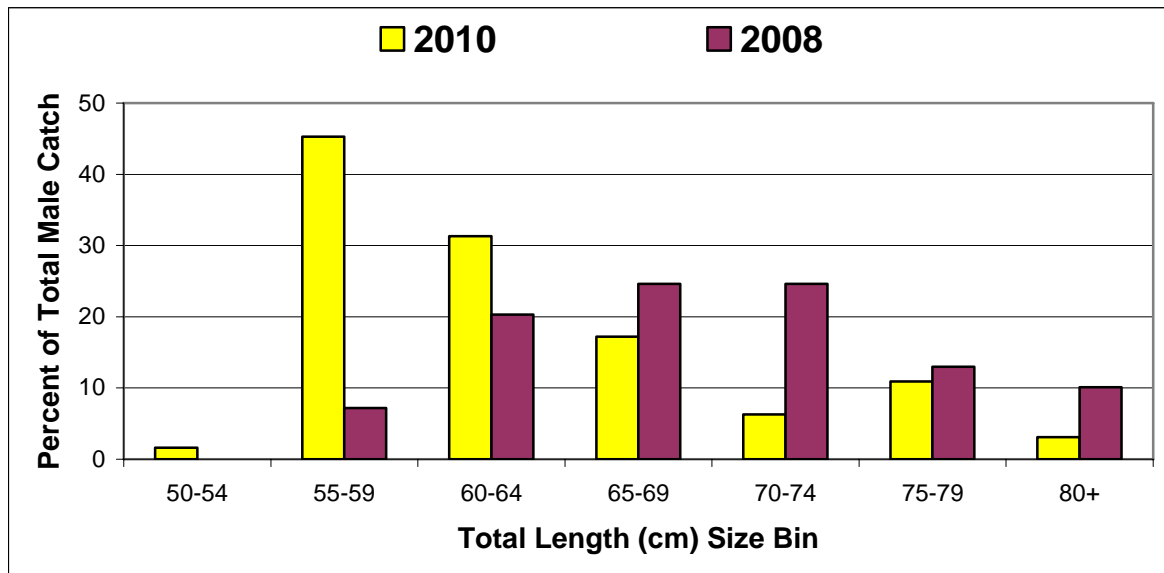
4.2 Size Distribution Between Surveys

The mean size (as measured by Total Length) of male and female lake trout at the two netting sites were similar between years except for Davy Island males. Their mean total length decreased from 72.3 cm in 2008 to 64.1 in 2010.

	2008	2010
Davy Island Males	72.3 (N=27)	64.1 (N=49)
Davy Island Females	72.9 (N=11)	72.7 (N=12)
Horse Island Males	68.2 (N=42)	66.7 (N=15)
Horse Island Females	73.3 (N=21)	72.5 (N=8)

Sample sizes between years at individual sites were too small for comparative purposes. We combined our males from both sites and looked at size distribution between years (Figure 2).

Figure 2. Size Distribution of Male Lake Trout Sampled in 2008 (N=69) and 2010 (N=64) (Both netting sites combined)



Clearly, there has been a substantial shift to smaller size (total length) males in 2010 relative to 2008. This is largely attributable to a large influx of young males – less than 60 cm in total length, into the spawning population.

Recruitment of these younger year classes is not yet evident in our female sample; probably due to females being recruited to the spawning population at a later age than males.

5.0 Acknowledgements

The EGBSC would like to thank the tremendous manpower assistance (six man-days) from the Parry Sound District of the Ministry of Natural Resources. Jim Palmer and Ken Molyneaux provided essential services with respect to boating, netting and sampling operations. We also wish to thank volunteers David Sweetnam of Georgian Forever and Shawn Morrissey for their valuable assistance with field operations. Eric McIntyre of the EGBSC supervised field activities. Adam Cottrill of the UGLMU provided egg sampling directions.

6.0 Literature Cited

McIntyre, E. 2008. Killbear Channel and Parry Sound Lake Trout Egg Collection for Thiamine Analysis. Unpublished Eastern Georgian Bay Stewardship Council Project Summary Report available at the following live link:
http://www.helpourfisheries.com/Documents/2008_documents/Killbear-Channel-and-Big-Sound-Lake-Trout-Egg-Collection-for-Thiamine-analysis-report-2008.pdf
11 p.

Appendix A-1 Biosampling Data for Female Lake Trout Captured at the Davy Island Netting Site

Date 2010	Total Lg. (cm)	Fork Lg. (cm)	Round Wt. (grams)	Condition	Lamprey	Comments
Oct.25	84.2	78.6	5900	Ripe	A4-15 A4-30	Egg Sample #13882
Oct.25	65.4	60.5	2800	Ripe	Nil	Egg Sample #13914
Oct.25	75.1	69.8	4000	Ripe	Nil	Egg Sample #13886
Oct.25	73.4	67.0	4200	Green	A4-10 B4-30	
Oct.24	89.2	82.4	7500	Green	A1-20 A1-15	
Oct.24	67.0	62.3	2800	Green	B4-20	
Oct.23	81.4	74.6	5000	Green	B4-20 A4-20	Egg Sample #13918
Oct.23	70.6	65.4	3600	Ripe	B4-15	Egg Sample #13917
Oct.23	69.6	63.5	2900	Ripe	A4-15	Egg Sample #13916
Oct.23	67.5	63.4	3000	Ripe	Nil	Egg Sample #13881
Oct.22	64.0	58.1	2000	Unknown	Nil	Otter mortality; Egg Sample #13885
Oct.22	65.0	60.0	2500	Ripe		Egg Sample #13920
Mean	72.7	67.1	3850			
Confidence Level(95.0%)	5.240	4.912	1016.050			
Standard Error	2.381	2.232	461.634			
Standard Deviation	8.248	7.731	1599.148			
Sample Size	12	12	12			

Appendix A-2 Biosampling Data for Female Lake Trout Captured at the Horse Island Netting Site

Date 2010	Total Lg. (cm)	Fork Lg. (cm)	Round Wt. (grams)	Condition	Lamprey	Comments
Oct.26	77.3	70.4	4900	Ripe	A4-25	Egg Sample #13883
Oct.26	73.5	67.8	3950	Green	A3-30	
Oct.25	71.4	66.1	3400	Green	A4-20 A4-30	Egg Sample #13905
Oct.25	71.7	65.4	3300	Ripe	B3-25 A4-20	Egg Sample #13904
Oct.24	71.5	65.2	2500	Ripe	Nil	Egg Sample #13894
Oct.23	70.6	64.0		Green	B4-15	Weight missed
Oct.23	70.8	65.9		Green		Tumour on side - no wt.
Oct.22	73.3	67.2	3200	Green	Nil	
Mean	72.5	66.5	3542			
Confidence Level(95.0%)	1.843	1.644	851.542			
Standard Error	0.780	0.695	331.264			
Standard Deviation	2.205	1.966	811.429			
Sample Size	8	8	6			

Appendix B-1 Biosampling Data for Male Lake Trout Captured at the Davy Island Site

Date 2010	Total Lg. (cm)	Fork Lg. (cm)	Round Wt. (grams)	Condition	Lamprey	Comments
Oct.26	64.0	58.5	2100	Ripe	Nil	
Oct.25	59.5	54.6	2000	Ripe	Nil	Fish Lice
Oct.25	74.0	67.7	3700	Ripe	Nil	
Oct.25	88.9	81.0	7200	Ripe	A1-25 A4-15	Unreadable Tag
Oct.25	74.6	68.9	4000	Ripe	A1-15 A4-25	Fish Lice
Oct.25	62.5	56.8	2300	Ripe	A4-15	Tag 21901
Oct.25	60.4	55.3	1900	Ripe	B4-20	Fish Lice
Oct.25	63.0	57.9	2500	Ripe	Nil	
Oct.25	62.6	57.7	2100	Ripe	Nil	
Oct.25	60.5	55.8	2100	Ripe	Nil	Fish Lice
Oct.25	55.7	50.7	1500	Ripe	B4-25	
Oct.25	77.5	71.4	4500	Ripe	B4-10 A1-15	
Oct.25	75.7	69.9	3900	Ripe	Nil	
Oct.25	58.0	53.7	1500	Ripe	Nil	
Oct.25	69.6	54.2	3400	Ripe	Nil	
Oct.25	63.2	58.0	2100	Ripe	A3-25 B1-15	
Oct.25	60.1	55.4	2100	Ripe	Nil	
Oct.25	82.6	77.0	5900	Ripe	B4-35	Unreadable Tag
Oct.24	57.6	53.5	1500	Ripe	B4-30	
Oct.24	56.2	51.4	1500	Ripe	Nil	
Oct.24	64.2	59.1	2200	Ripe	Nil	
Oct.24	63.2	57.8	2000	Ripe	Nil	Fish Lice
Oct.24	72.2	65.9	3100	Green	Nil	
Oct.24	79.2	72.8	4000	Ripe	A4-15	Tag 6787
Oct.24	56.5	51.3	1500	Ripe	Nil	
Oct.24	64.1	59.5	2300	Ripe	A4-20	
Oct.24	58.9	54.2	1400	Ripe		
Oct.24	65.7	61.3	2800	Ripe		
Oct.24	65.2	59.7	2400	Ripe	B4-25	
Oct.24	67.6	61.8	2800	Ripe		
Oct.24	65.6	60.2	2400	Ripe	B4-30	
Oct.24	62.5	57.6	2100	Ripe	Nil	
Oct.23	59.1	54	1650	Ripe	B3-15	
Oct.23	59.0	54.6	1700	Ripe	Nil	
Oct.23	56.2	51.5	1400	Ripe	Nil	
Oct.23	61.4	57.2	2500	Ripe	Nil	Fish Lice
Oct.23	60.3	55.6	1500	Ripe	Nil	
Oct.23	56.5	52	1500	Ripe	Nil	
Oct.23	69.9	65.1	2900	Ripe	A4-30	
Oct.23	56.4	52.4	1500	Ripe	Nil	Fish Lice
Oct.22	60.3	54.8	1150	Ripe	B4-20	
Oct.22	59.8	55.8	1600	Ripe	Nil	Fish Lice
Oct.22	59.7	54.5	1600	Ripe	Nil	
Oct.22	68.7	61.0	2400	Ripe	B4-10	
Oct.22	57.0	52.4	1600	Ripe	Nil	
Oct.22	59.4	53.8	1950	Ripe	Nil	
Oct.22	56.6	52.4		Ripe	Nil	wounded by otter
Oct.22	66.7	62.3	2700	Ripe	Nil	
Oct.22	60.4	55.3	2100	Ripe	B3-10	
Mean	64.1	58.7	2428			
Confidence Level(95.0%)	2.155	1.987	342.444			
Standard Error	1.072	0.988	170.223			
Standard Deviation	7.502	6.919	1179.339			
Sample Size	49	49	48			

Appendix B-2 Biosampling Data for Male Lake Trout Captured at the Horse Island Site

Date 2010	Total Lg. (cm)	Fork Lg. (cm)	Round Wt. (grams)	Condition	Lamprey	Comments
Oct.26	57.2	51.7	1500	Ripe	Nil	
Oct.26	77.6	71.1	4100	Ripe	A4-30	
Oct.26	60.5	55.8	1500	Ripe	B4-20	Tag 10452
Oct.26	65.8	59.8	2400	Ripe	A3-30 A4-20	
Oct.26	63.0	57.8	2200	Ripe	Nil	
Oct.26	59.2	53.8	1500	Ripe	Nil	
Oct.25	61.2	55.8	2200	Ripe	Nil	Fish Lice
Oct.25	79.4	73.0	5100	Ripe	A3-30	
Oct.25	62.6	57.3	2200	Ripe	B4-30	
Oct.25	53.2	48.2	1400	Ripe		Fish Lice
Oct.24	78.5	71.8	4000	Ripe	B4-40 A4-20	
Oct.24	66.9	62.0	1900	Ripe	Nil	
Oct.23	72.7	67.5	3300	Ripe	B4-30 B4-35	
Oct.22	77.4	71.2	4500	Ripe	B3-40	
Oct.22	65.7	60.0	1600	Ripe	B4-30	
Mean	66.7	61.1	2627			
Confidence Level(95.0%)	4.679	4.421	688.329			
Standard Error	2.182	2.061	320.931			
Standard Deviation	8.450	7.984	1242.961			
Sample Size	15	15	15			

Appendix C – Reporting system for Lamprey Scars and Wounding

This is a four-character code using the following convention:

First Character	A – denotes lamprey scar or wound that penetrated the skin and into the underlying musculature B – denotes lamprey scar that did not penetrate the skin; remnants of attachment evident however
Second Character	Denotes the stage of the scar or wound: 1 – fresh wound or attachment site 2 – Some healing has taken place 3 – Considerable healing has taken place 4 – Site has healed
Third and forth characters	Indicates the size (diameter) of the wound / mark in mm rounded to the nearest 5 mm
Note: More than one scar or wound is recorded for fish with multiple scars and/or wounds present.	