

Follow-up Swimmer's Itch Assessment 2019

Long Lake Association (LLA)

Final Report

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Submitted by

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Preface

Comprehensive swimmer's itch assessment research conducted by Freshwater Solutions (FWS) scientists on Long Lake in 2018 established volumes of baseline data from which to draw conclusions and was reported in the LLA 2018 Final Report. Since the natural history of the parasites responsible for causing swimmer's itch often show a one-year lag time (one year's waterfowl community can affect the next year's swimmer's itch severity), follow-up assessment in 2019 was conducted to answer some important questions.

The LLA contracted with FWS for additional assessments in 2019 to learn more about the life cycle dynamics of the parasites causing swimmer's itch and population changes within the waterfowl definitive hosts. Specific objectives, strategies, and tactics were described in the accepted proposal and are presented below (in italics), followed by results and conclusions.

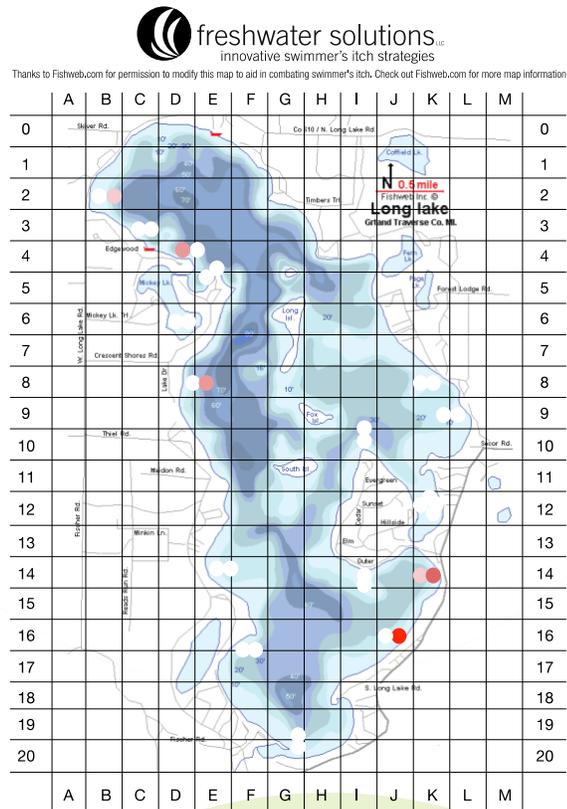
***Objective 1:** Determine the level of parasite infestation on Long Lake in 2019 to assess changes from 2018.*

Strategies and Tactics

Collect and analyze water samples at 20 locations sampled in 2018 twice during the summer, once in June and once in July. Each water sample will be analyzed for not only the number of "worms in the water", but also for relative numbers of each species using our newly developed specie-specific assays.

New technology allows us to not only identify the parasites by using a microscope and DNA barcoding, but also by using a molecular technique called qPCR (quantitative polymerase chain reaction). qPCR allows us to take a known volume of water (25 liters) and count the number of "worms in the water", using a pan-avian assay. We recently developed and published a species-specific assay that also allows us to report the relative numbers of each species found in each water sample. Results from the pan-avian (all schistosomes) work are found in the table below, along with maps showing collection sites. Most of these sites were the same as those sampled in 2018.

Long Lake Water Sample Data			
	18 July 2019	1 August 2019	23 July 2018
Site	Avg Cer/25L	Avg Cer/25L	Avg Cer/25L
B2	0.0	1.3	0.0
C3	0.0	0.0	0.6
D4	17.0	0.0	3.2
E5	0.0	0.0	4.9
D6	0.0	0.0	0.0
D8	0.0	20.8	0.0
E14	0.0	0.0	0.0
F16	0.0	0.0	2.8
G20	0.0	0.0	>100
J16	>100	0.0	0.0
K14	74.8	1.3	0.5
I14	0.0	0.0	19.9
I10	0.0	0.0	0.5
K12 West	0.0	0.0	>100
K12 East	0.0	0.0	46.2
L9	0.0	0.0	16.6
K8	0.0	0.0	0.0
J7	0.0	2.0	N.A.
G20	0.0	0.0	>100
E0	0.0	1.0	N.A.
Ratio>30/<30	0.1	0.0	0.2



Levels of cercariae in the water seem to be lower in 2019 than 2018, both in distribution and severity. New evidence from Dr. Mark Luttenton (GVSU) with his work on Higgins Lake suggests snail population density fluctuations from year to year play a big impact on severity of swimmer's itch. No resident common mergansers in 2018 could also have reduced at least one species of parasite. Additionally, we are learning that cercariae numbers fluctuate from day to day so the sample dates may have been lower cercariae output days.

All positive water samples from Long Lake were also run with our species-specific qPCR assays to determine what species of parasite were present. Interestingly, of the 3 positive samples with enough cercariae for species-specific assessment, all of them showed presence of the new schistosome species from *Helisoma* sp. snails (currently unnamed) and none of them were *T. stagnicola*, the species commonly transmitted by common mergansers.

Objective 2: Assess summer resident avian host diversity (species richness and relative abundance) on Long Lake in 2019 to determine changes in community structure from 2018.

Strategies and Tactics

Conduct two (2) boat surveys of the entire lake shoreline to record summer resident anatid species, number of birds, and age categories.

Two boat surveys were conducted on Long Lake. Results from 2018 are provided for comparison.

Long Lake Waterfowl Survey Summary 7/18/19					
	Total Birds	AHY	HY	Broods	% of Population
Mallard	74	48	26	5	64.91%
Canada Goose	14	6	8	2	12.28%
Loon	16	10	6	3	14.04%
Common Merganser	3	1	2	1	2.63%
Hooded Merganser	6	2	4	2	5.26%
Gull	1	1	0	0	0.88%
Totals	114	68	46	13	100.00%

Long Lake Waterfowl Survey Summary 8/1/19					
	Total Birds	AHY	HY	Broods	% of Population
Mallard	104	53	51	11	70.75%
Canada Goose	16	4	12	2	10.88%
Loon	13	9	4	2	8.84%
Common Merganser	8	2	6	2	5.44%
Hooded Merganser	5	1	4	1	3.40%
Wood Duck	1	1	0	0	0.68%
Totals	147	70	77	18	100.00%

Long Lake Waterfowl Survey Summary 7/13/18					
Species	Total Birds	AHY	HY	Broods	% of Population
Mallard	108	67	41	11	90.00
Canada Goose	11	6	5	2	9.17
Mute Swan	0	0	0	0	0.00
Common Merganser	0	0	0	0	0.00
Hooded Merganser	1	1	0	0	0.83
Red-breasted Merganser	0	0	0	0	0
Totals	120	74	46	13	100.00

The waterfowl community did not change drastically from 2018 to 2019 except for the addition of 2 broods of common mergansers and 2 broods of hooded mergansers. There is still a relatively large mallard population on Long Lake.

Objective 3: *Assess relative infection levels and parasite species identification in definitive hosts.*

Strategies and Tactics

Collect avian fecal samples, where possible, and examine for avian schistosomes. Preserve pure samples of all miracidia obtained from examined waterfowl, extract their DNA, and sequence the DNA to compare against species housed in GenBank for species identification.

Miracidia were pipetted into a 1.5ml conical collection tube and processed using the same techniques described in the 2018 final report. DNA analysis revealed that *Anserbilharzia brantae* was cycling through Canada geese on Long Lake and *Trichobilharzia stagnicolae* through the common merganser. The mallard samples were less conclusive but additional testing is being done. Species identification will be communicated in an addendum memo if results are obtained.

Long Lake Waterfowl Fecal Sample Analysis					
Date	Species	Location	Age/Certainty	Ave Miracidia/g/min	Species (if determined)
7/19/19	Mallard	K12	10/11 HY	0.82	Analysis ongoing
7/19/19	Mallard	K12	10/11 HY	1.44	Analysis ongoing
7/19/19	Mallard	K12	10/11 HY	0.26	Analysis ongoing
8/2/19	Goose	K11	7/9 HY	1.94	<i>Anserobilharzia brantae</i>
8/2/19	Goose	K11	7/9 HY	0.88	<i>Anserobilharzia brantae</i>
8/2/19	Goose	K11	7/9 HY	0.77	<i>Anserobilharzia brantae</i>
8/2/19	C. Merganser	I5	AHY	6.41	<i>Trichobilharzia stagnicolae</i>

Recommendations

1. Stay tuned.

Ongoing research being conducted by FWS in 2019 will be of interest and possibly influence decisions about next steps for the LLA. We will provide you with complete results and conclusions regarding this research once completed (likely in early 2020). This research will hopefully shed light on the impact migratory vs. resident waterfowl have on lakes across NW Michigan, provide better resolution as to the community structure of the different parasite species responsible, and reveal new information about MDNR-approved common merganser relocation sites.

2. Discontinue further assessment unless it answers an important and specific question.

While another year of bird surveys and water sample analyses would provide more data on which to draw increasingly definitive conclusions, the costs of more assessments in 2020

should be weighed against other lake-wide concerns that LLA continues to battle. FWS does not recommend further assessment unless it seeks to answer important and specific questions.

3. Report swimmer's itch cases to “swimmersitch.ca”.

We encourage you to promote to your membership the reporting of all swimmer's itch cases from Long Lake to the University of Alberta website at “swimmersitch.ca”. This website is becoming the “911” site for all swimmer's itch cases across North America and will provide important data for obtaining federal and international grants to battle swimmer's itch. We are modifying this reporting mechanism so it can not only detect trends across the continent, but also provide detailed information about cases for each specific lake association. Changes to the website will be ready for the 2020 swimming season. This service is provided free of charge to lake associations like the LLA, with whom FWS has worked.

4. Educate LLA riparians on ways they can personally reduce their chance of contracting swimmer's itch.

Project '17 and '18, FWS research, funded largely by lake associations in Leelanau County (Glen, Lime, Leelanau), provided discoveries into innovative site-specific control options as well as cercariae behavior. This knowledge can help riparians reduce their risk of contracting swimmer's itch. FWS recently produced a document entitled “*Preventing Swimmer's Itch with 2020 Vision*” that describes the many options riparians have to greatly reduce their chance of getting swimmer's itch. This document can be used by lake associations to educate and empower their members to prevent swimmer's itch in 2020 and beyond.

5. Encourage LLA members to join LLA and FWS in assessing the efficacy of various prevention measures in 2020.

FWS will be presenting the LLA with an opportunity to join a multiple-lake project in 2020 that will assess the various prevention strategies presented in “*Preventing Swimmer's Itch with 2020 Vision*”. The details of this initiative will be shared in the coming months.

Acknowledgements

It was our pleasure to work on Long Lake again this past summer. We try not to take for granted the natural beauty of the water and landscapes in NW Michigan, even though that is where we go to “work” every day in the summer. Thanks to the countless hours of work by volunteer members of the LLA on water and land preservation issues, we have good reason to believe we will leave our beautiful slice of earth in great shape for our children and grandchildren.

One of the best things about engaging a new lake association in our battle against swimmer's itch is the relationships that develop. Although we only had the opportunity to work closely with a few, we especially want to recognize Rick Dahlstrom this year. He has been very accommodating, helping make 2019 a very successful field season. Thank you!



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Finally, we could not function without the dedicated and talented work of our other team members: Chris Froelich, Kelsey Froelich, Sydney Rudko, Brooke McPhail, Dan Clyde, Matt Schuiling, and Annette Dobrzynski. Their pursuit of excellence and tireless commitment to quality is what has made FWS so successful. Without their behind-the-scenes diligence, we could not have produced the results we presented to you in this report.



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