Higgins Lake Swimmer's Itch Control and Research 2025 Final Report

Sponsored by Higgins Lake Swimmer's Itch Organization (HLSIO)

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by

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* This report was written for the Higgins Lake Swimmer's Itch Organization (HLSIO), a non-profit 501 (c) (3) group tasked with managing and funding a comprehensive swimmer's itch control program on Higgins Lake.

Executive Summary

In the summer of 2015, under the authority of federal and state permits, all common merganser broods were trapped and relocated off Higgins Lake. Not surprisingly, two metrics of the swimmer's itch (SI) problem — snail infection levels and cases of SI (measured by reports to our website) – showed dramatic decreases in all years (2016-2021) following a summer of brood relocation. However, in 2022 and 2023, the common merganser brood relocation program was suspended by MI-DNR because of highly pathogenic avian influenza (HPAI). Fortunately, no common merganser broods appeared on Higgins Lake in 2022.

In 2023, common merganser broods returned, with two broods observed by SIS during bird surveys. Since these broods were not relocated, it was predicted that SI metrics at Higgins Lake would increase in 2024 (see SIS Final Report 2022-2023). A noticeable but modest increase in SI cases was seen in 2024 (see SIS Final Report 2023-2024), although an increase in snail infections was not seen.

In 2024, the state of Michigan resumed the brood relocation program, and we removed the 1 brood that appeared on Higgins Lake. Hence, the anticipation was that the modest increase in SI cases would not persist in 2025, returning to the low levels seen during most relocation years.

Introduction

Swimmer's itch, also known as schistosome cercarial dermatitis, is a common problem in many recreational lakes throughout the northern United States and the world. It can be caused by any of over 70 different avian schistosome parasite species that mistakenly penetrate human skin instead of the skin of their natural definitive host. When this happens, the parasite dies at the site of penetration causing an inflammation of the skin and the formation of a papule. Swimmer's itch papules can itch intensely for up to 10 days.

Brief review of avian schistosome life cycles

All avian schistosome species have a similar two-host life cycle. As adults they live within a definitive host, most commonly a duck; when sexually mature the worms release their eggs, which make their way into the feces of their host. If these feces land in water, eggs of the parasite hatch into larval stages (miracidia), which are infective to an appropriate species of snail (the intermediate host). Upon finding a suitable snail, the miracidium will penetrate the soft tissue and develop within its digestive glands. Over the next 30 days it matures and then produces thousands of cercariae that are released into the water every day, especially during the warm-water summer months. If a cercaria locates the correct vertebrate host species, it penetrates and develops into an adult worm to complete its life cycle. If a cercaria accidentally penetrates human skin, it dies in the skin, and an immune reaction can result, usually causing a raised papule that can itch intensely.

In many northern Michigan lakes, severe outbreaks of swimmer's itch have predominantly and most commonly been attributed to the avian schistosome, *Trichobilharzia stagnicola*. This parasite species typically utilizes the common merganser (*Mergus merganser*) as its definitive host and *Stagnicola emarginata* as its intermediate (snail) host.

Important Fact to Remember: Given the life cycle of *T. stagnicolae* and the biology of its hosts, infected common merganser broods affect the **following summer's** snail infection levels.

Waterfowl Surveys

Summary of work completed: Waterfowl surveys of the entire shoreline of Higgins Lake were conducted on June 3, 2025 (Figure 1) and again August 14, 2025 (Figure 2). No broods had emerged at the time of the first survey, but shortly after that we started receiving credible brood reports on our website, eventually leading us to believe there were 4 broods on the lake. Our second survey confirmed 4 broods, some beginning to test their wings (the larger group of 16 being a crèched brood).

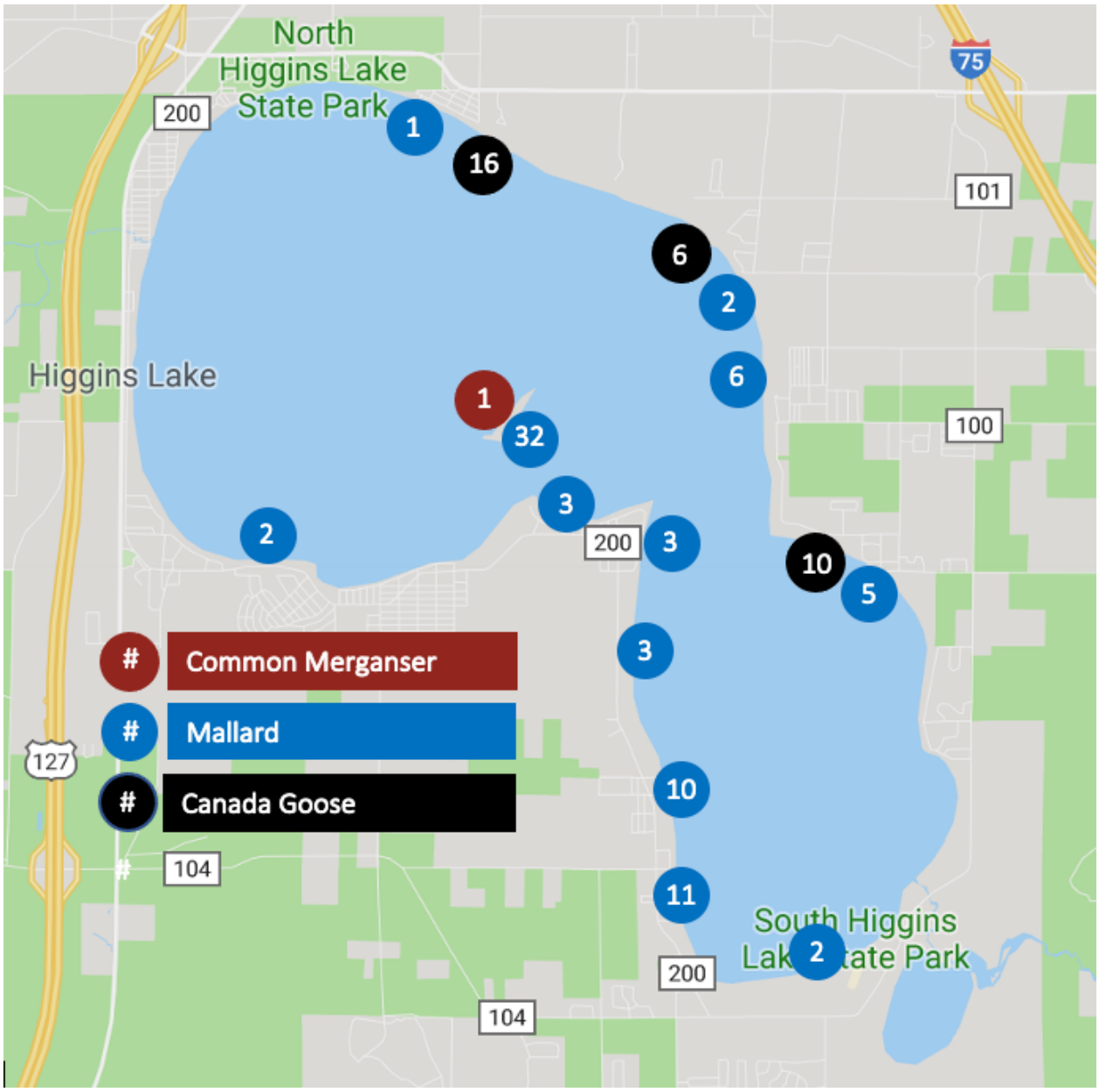

Figure 1. Number of common mergansers, mallards, and Canada geese, and red-breasted mergansers, observed during a June 3, 2025 shoreline survey of Higgins Lake (Roscommon County, MI).

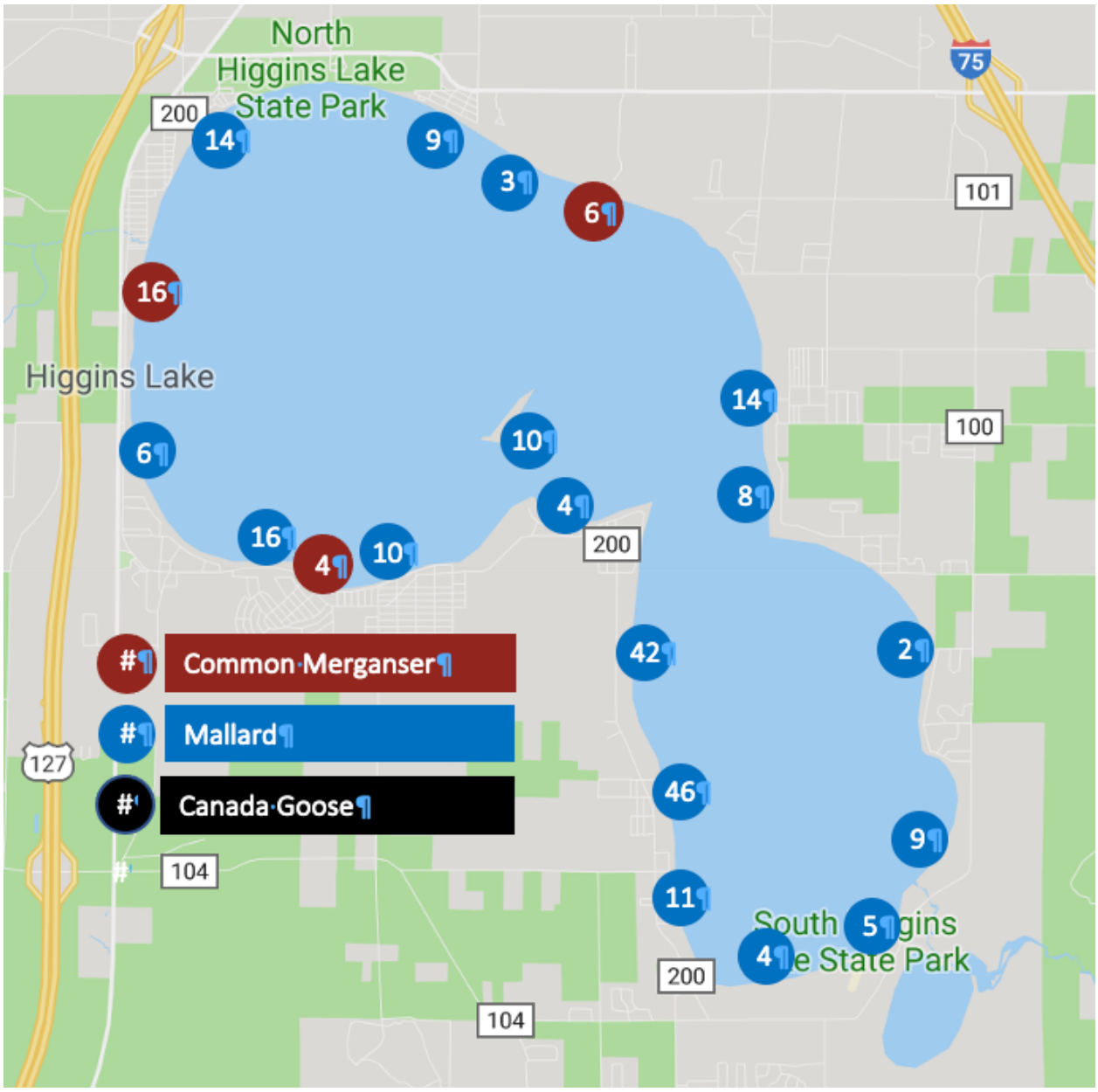

Figure 2. Number of common mergansers, mallards, and Canada geese observed during a August 14, 2025 shoreline survey of Higgins Lake (Roscommon County, MI).

Common Merganser Brood Relocation Activities

Due to concerns about avian flu, we were not permitted to relocate broods in 2025

Snail Infection Surveys

Regular summer survey: On July 1, 2025 over 2000 snails were collect at the usual ten locations on Higgins Lake. Each snail was individually analyzed for avian schistosome infections (Table 1).

With the one common merganser brood seen on the lake in 2024 relocated to Lake Huron, we anticipated that snail infection levels would remain low. Only 1 snail was found to be infected, which is similar to what has been found in every survey 2019 to the present (either 0 or 1 snails infected).

Table 1. The percentage of *Stagnicola emarginata* snails infected with swimmer's itch parasites (*Trichobilharzia stagnicolae*) at ten different locations on Higgins Lake (Roscommon County, MI) in all years sampled. The number in parenthesis indicates the total number of snails examined. Color of cell indicates infection level. Data from July 2015 serve as a pre-program baseline, as the HLSIO initiated swimmer's itch control efforts in 2015. All years after benefited from the absence or the relocation of common merganser broods except 2024, when 2 broods appeared and were not relocated due to suspension of the relocation program in 2023. (■ = Ideal (<0.24%), ■ = Tolerable (0.25-0.49%), ■ = Moderate (0.5-0.9%), ■ = Severe (1.0-1.9%), ■ = Epidemic (>2.0%))*

Control Program	Year 1 baseline	Year 2	Year 3	Year 5	Year 6	Year 8	Year 10	Year 11
Location	**2015** July 10-17	**2016** July 11-12	**2017** July 10-11	**2019** July 14-21	**2020** July 8	**2022** July 11	**2024** June 28	**2025** July 1
Dragonfly House	4.20% (167)	0.0% (200)	0.00% (222)	0.00% (108)	0.0% (120)	0.00% (249)	0.00% (235)	0.00% (220)
Detroit Point	3.50% (200)	0.00% (200)	0.47% (214)	0.00% (144)	0.00% (220)	0.63% (159)	0.00% (284)	0.00% (233)
Island Boat Club	0.50% (200)	0.00% (200)	0.00% (196)	0.00% (5)	0.00% (126)	0.00% (151)	0.00% (2)	0.00% (200)
Sam-O-Set Park	2.00% (200)	0.50% (200)	0.00% (202)	0.48% (207)	0.00% (177)	0.00% (261)	0.00% (250)	0.00% (250)
West Boat Launch	5.50% (200)	0.50% (200)	0.48% (210)	0.00% (149)	0.00% (292)	0.00% (153)	0.00% (260)	0.00% (201)
North State Park	1.94% (155)	0.00% (200)	0.00% (225)	0.00% (199)	0.00% (260)	0.00% (49)	0.00% (300)	0.00% (181)
Gerrish Township Park	6.19% (113)	1.00% (200)	0.40% (253)	0.00% (153)	0.00% (240)	0.00% (257)	0.00% (300)	0.47% (212)
Kelly Beach	2.45% (122)	0.00% (200)	0.00% (208)	0.00% (15)	0.00% (200)	0.00% (298)	0.00% (1)	0.00% (218)
Almeda Beach	0.50% (200)	1.00% (200)	0.00% (216)	0.00% (238)	0.00% (150)	0.00% (11)	0.00% (244)	0.00% (220)
South State Park	3.50% (200)	2.00% (200)	0.00% (239)	0.00% (165)	0.00% (278)	0.00% (8)	0.00% (248)	0.00% (230)
Lake-wide	2.90% (1757)	0.50% (2000)	0.14% (2185)	0.07% (1383)	<0.05% (2063)	0.06% (1596)	<0.05% (2124)	0.05% (2165)

*While these various levels and categories (ideal, tolerable, moderate, severe, epidemic) might seem arbitrary, they are based on decades of professional experience working on swimmer's itch on numerous lakes in the USA.

Additional snail surveys: In the first 2 weeks of August, there was a wave of reports of swimmer's itch on our website, many of which were from Almeda and Kelly Beaches. We speculated multiple possibilities for this wave, including 1) a string of days with warm temperatures, 2) often with west winds, 3) peak vacation season, and 4) the possibility that the 4 broods on the lake in 2025 were starting to infect the baby, or hatch-year (HY), snails. With the fundraising dinner occurring on August 14, we took the opportunity to make an additional collection of snails at these two beach areas. We found that adult snails were starting to become more sparse, and HY snails were visible but mostly too small to be infected. We collected 195 adult snails and 75 HY *Stagnicola* snails in this impromptu sampling. Those results are included in Table 2.

This concern persisted into the fall, and we agreed to do a full snail collection, hitting all 10 sites on September 21, 2025. This was the latest in the fall we've ever collected on any lake and we did not know how many adult snails we would find alive or how many HY snails would be big enough. **We were able to collect 726 adult *Stagnicola* snails and 1660 HY *Stagnicola* snails**. Those results are also in Table 2.

Table 2. The percentage of *Stagnicola emarginata* snails infected with swimmer's itch parasites (*Trichobilharzia stagnicolae*) collected in fall 2025, with summer 2025 included for comparison. HY = hatch-year, dashes indicate no snails were found. Colors, etc. used consistent with Table 1.

	Adult *Stagnicola*			HY *Stagnicola*
Location	**2025** July 1	**2025** August 14	**2025** Sept 21	**2025** Sept 21
Dragonfly House	0.00% (220)	---	---	0.68% (296)
Detroit Point	0.00% (233)	---	0.00% (11)	0.00% (392)
Island Boat Club	0.00% (200)	---	0.00% (8)	0.00% (246)
Sam-O-Set Park	0.00% (250)	---	0.00% (23)	---
West Boat Launch	0.00% (201)	---	---	0.00% (270)
North State Park	0.00% (181)	---	0.00% (38)	---
Gerrish Township Park	0.47% (212)	---	0.00% (88)	0.00% (98)
Kelly Beach	0.00% (218)	1.03% (195)	0.00% (75)	0.74% (135)
Almeda Beach	0.00% (220)		0.00% (265)	---
South State Park	0.00% (230)	---	0.00% (218)	---
Totals	0.05% (2165)	1.03% (195)	<0.15% (726)	0.18% (1660)

A big surprise in the September 21 collection was finding numerous *Physa* snails. *Physa* snails are native to Higgins Lake but always at a small fraction compared to *Stagnicola* – when we collect 2000 *Stagnicola,* we usually find only about 5 *Physa.* We don't usually include them in our reports because of the small number, though we always examine them for parasites and would include them in the report if any were positive. *Physa* snails carry a different swimmer's itch causing species, *Trichobilharzia physellae.* This parasite is carried in common mergansers and in mallards (and other ducks). In our Sept 21 collection, **we collected 4 adult *Physa* snails and 387 HY *Physa* snails**. So it seems that we discovered what time of year the *Physa* are more numerous! The infection data for *Physa* snails is in Table 3 below.

Table 3. The percentage of *Physa parkeri* snails infected with swimmer's itch parasites (*Trichobilharzia physellae*) collected in fall 2025. HY = hatch-year, dashes indicate no snails were found. Colors, etc. used consistent with Table 1.

Location	Adult *Physa* 2025 Sept 21	HY *Physa* 2025 Sept 21
Dragonfly House	---	---
Detroit Point	---	0.00% (4)
Island Boat Club	---	---
Sam-O-Set Park	---	1.20% (83)
West Boat Launch	0.00% (2)	---
North State Park	---	---
Gerrish Township Park	---	0.00% (146)
Kelly Beach	---	0.65% (154)
Almeda Beach	---	---
South State Park	0.00% (2)	---
Totals	0.00% (4)	0.52% (387)

What are the takeaways from the data in these two tables? Here's what we think is important:

1. Note that where adult snails could still be found and where HY snails were present varied dramatically between sites. The data show snail populations vary remarkably between summer and fall. Sampling after August 1 is much more at the whim of what snail populations are currently doing, and getting 2000 adult snails would require multiple days – we worked very hard for the snails we collected on August 14 and September 21!
2. The *Stagnicola* data are suggestive of an increase in SI snail infection levels due to 4 COME broods on the lake in 2025, but not dramatically so. Applying statistics to these data shows the following:
    a. If only 2025 data are considered, the fall data are not statistically different from the summer data, *i.e.,* it's can be within normal expected variation to find 3 infected in one sample (fall) and 1 infected in the other (summer).
    b. If you compare the fall data to all the other summer collections, you have a much greater contrast that is strongly statistically significant: 3 out of 2386 snails infected in the fall is much higher than the 3 total infected snails that were found in the 5 collections from 2019, 2020, 2022, 2024, and 2025 summers (9331 total snails).
3. The 3 infected HY *Stagnicola* snails are evidence that this summer's 4 broods were having an effect on the overall SI parasite level in the lake. These three snails could not have been infected by migrants as they were collected before the fall migration typically begins.
4. The *Physa* snails are a reminder that while we know the swimmer's itch parasite story on Higgins Lake well, there are always surprises to keep an eye out for. Nevertheless, we do not think SI population levels are suddenly increasing on Higgins Lake. Rather, it seems that *Physa* populations peak earlier than *Stagnicola* and are declined by summer. Our prediction is that in summer 2026 we will encounter them at the same frequency as before (about 5 in an entire day's work).
5. As we have always known, infections in *Physa* snails with *T. physellae* could contribute SI cases. We've always been assured that by relocating common merganser broods, we were doing the most significant thing we can do to reduce the number of infected *Physa*. While mallards also carry *T. physellae*, they tend to have low counts of the parasite eggs in their fecal samples, even if they are ducklings.

Our prediction for 2026 Given that 2 broods on the lake in 2023 did not affect snail infection levels much, but 10 broods at Crystal Lake brough their lake-wide levels to at or above their pre-program baseline, we expect something intermediate with the 4 broods observed on Higgins Lake this summer. We would not be surprised to see *Stagnicola* snail infection levels at about 1.0% in 2026. Though this is not as high as the pre-program baseline (3.0%), it will result in a very noticeable rise in SI cases.

Water Exposure Study

Background: Higgins Lake has conducted a program of trap and relocation of common merganser broods since the summer of 2015. The primary assessment of the program has used snail infection data, which documents a dramatic decline in the percent of snails infected (from ~3% in 2015 to ~0.05% or less in 2019, 2020, 2022, and 2024). This means the population of the swimmer's itch parasite has drastically declined, but an important question is always how much have swimmer's itch cases declined as a result?

During the relocation program, our company website has also been open to receive reports of swimmer's itch (SI). The overall trend of this data is also a dramatic decrease (e.g. >150 reports in 2015 to only 9 in 2022), but the decrease was not as swift as the snail infection data and even went up slightly some years when snail infection rates were falling or very low. The data arising from a system of self-reporting of SI cases can be difficult to interpret because there is: 1) variability in people's knowledge of the importance of reporting and where to report it; 2) changing motivation for reporting, for example, there may have been more motivation when the problem was more severe (frustration, hope that something could be done) than when the problem had gotten better (cases less severe, fatigue from reporting); and 3) no motivation or mechanism to report when people entered the water and did NOT get swimmer's itch.

With the trap and relocation program suspended in 2022 by the DNR due to avian flu, it was recognized that another method to document SI cases was needed that would be less affected by the issues above. Hence, the 'Higgins Lake water exposure study' was initiated in summer 2022, with a handful of individuals/families that faithfully reported whenever they were in the water and whether any SI cases resulted. Thus, we obtained data on how many SI cases there were on a *per water use basis.* The purposes of gathering such data were to A) provide further documentation for the success of the relocation program, and B) have strong data to compare to future years if common merganser broods appeared and remained on the lake for the summer.

The water exposure study has been a success in 2022-2024, documenting the modest increase in 2024 from 2 broods present and not relocated in 2023. With brood relocation resuming in 2024, documenting the expected decrease was a priority so the water exposure study was continued into 2025.

Recruitment and Training: Participants were again recruited through HLSIO communications. These individuals completed a Google form that asked for basic information like address and contact info (with ability to indicate preference for email or text) as well as choose a 4-digit PIN that would allow them to file reports without having to enter their name and address for each report. A strong and sustained effort by HLSIO to recruit new participants was successful in drawing interest, doubling the number of people signing up to 22! However, the total who contributed to the study ended up being 13 (Table 2), with the fall-off due to 1) individuals only filing one report (including some who never signed up), and 2) individuals who signed up but then did not report at all.

Table 2. Participant data in water exposure study, 2022-2025.

Year	Number of sign-ups	Number of contributors*
2022	9	6
2023	13	7
2024	11	7
2025	22	13

*The number of contributors includes only those who filed more than one report. In 2023, there were 4 individuals who only filed 1 report. In 2 cases they just reported their first swim and lost interest, and in 2 cases it was apparent that they misunderstood the site to be a place only to report swimmer's itch cases. In 2023 we therefore implemented a policy of deleting any contributors who only filed a single report, adding any one-off SI reports to the website data totals. In 2025, there were 9 individuals who contributed only one report (7 without SI, and 2 with SI) and we applied the same policy to those data.

Reporting Forms: The reporting form was identical in 2022, 2023, and 2024: designed to take 1-2 minutes to complete, consisting of the following questions, most of which just required selecting one of a few choices (very little typing):

1. PIN
2. Date of water use
3. Location (Default was home address which could be obtained from the PIN; other choices were common places like the state parks, or the sunken island).
4. How many people were in the water
5. How long people were in the water
6. What time of day people were in the water
7. Whether wind was onshore/offshore (onshore winds can increase likelihood of SI)
8. Whether any precautions against SI were taken (e.g. wore Swimmer's Itch Guard, wet suite, etc.)
9. How many people got SI
10. Severity of the SI cases
11. Any other details they wished to provide (optional)

Participants also were also able to easily 'correct' any reports if SI appeared later.

Results: Overall, SI results decreased to levels normally seen when merganser broods were not on the lake the previous year.

Table 3. Summary data from water exposure study, 2022-2025. Years following summers when broods were relocated or no broods were seen are highlighted in gray. 2024 was influenced by the presence of 2 broods for the entire summer of 2023.

Year	Total No. of reports	Number of people in water	Avg. min. in water	Number of SI cases	Percent SI cases	No. of swimming locations	Earliest water use	No. water reports in May & June
2022	182	440	35	4	0.91%	18	6/15	12
2023	233	739	56	11	1.49%	19	5/28	63
2024	199	472	31	11	2.34%	18	5/12	31
2025	277	1143	56	15	1.31%	21	5/30	28

Consistent with previous years, SI cases recorded in the case rate study in 2025 were mild, as indicated in Table 4 below. Fourteen of 15 cases in 2025 had only 1-10 papules.

Table 4. Swimmer's itch cases at Higgins Lake reported in the water exposure study, 2022-2025.

Date	Location	No. people in water	Time in water	No. of SI cases	Case severity	Wind	Precautions
2022							
7/9/22	South side of island	6	31-60 min	2	11-30 papules	Calm	None
7/31/22	N shore, east of B&B marina	1	31-60 min	1	2 papules	Calm	Short wetsuit
8/21/22	N shore, east of B&B marina	1	1-2 hr	1	1 papule	Calm	Short wetsuit
2023							
7/16/23	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
7/18/23	N shore, east of B&B marina	1	16-30 min	1	1-10 papules	Light onshore winds	Short wetsuit
7/21/23	North State Park	6	31-60 min	2	1-10 papules	Light onshore winds	None
7/25/23	South side of upper basin	7-9	31-60 min	2	11-30 papules	Light onshore winds	Sunscreen

8/3/23	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Light onshore winds	Short wetsuit
8/4/23	North of Flag Point	7-9	31-60 min	1	1-10 papules	Calm	Sunscreen
8/11/23	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit, sunscreen
9/4/23	South side of upper basin	1	1-15 min	1	1-10 papules	Calm	None
9/5/23	South side of upper basin	1	1-15 min	1	1-10 papules	Calm	None
2024							
6/4/24	Near Gerrish Township Park	4	16-30 min	1	11-30 papules	Calm	None
6/20/24	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
7/5/24	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
7/13/24	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
7/14/24	South side of upper basin	1	16-30 min	1	1-10 papules	Light onshore winds	None
7/24/24	West side of lower basin	8	1-2 hours	1	1-10 papules	Strong onshore winds	None
8/1/24	South side of island	1	1-15 min	1	1-10 papules	Calm	None
8/7/24	South side of upper basin	2	1-15 min	2	1-10 papules	Calm	None
8/25/24	N of Cut River	2	31-60 min	2	1-10 papules	Light onshore winds	None
2025							
6/29/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
7/1/25	N shore, Cottage Grove	1	1-15 min	1	1-10 papules	Light onshore winds	None
7/3/25	North basin, east side; Pine Bluffs	7	31-60 min	1	1-10 papules	Light onshore winds	None
7/21/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Light onshore winds	None

7/22/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	None
7/26/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Light onshore winds	None
8/2/25	North basin, west side; N of west launch	10	1-2 hr	1	11-30 papules	Light onshore winds	None
8/3/25	South basin, east side, S of Chaney Point	3	31-60 min	1	1-10 papules	Light onshore winds	Toweled off
8/4/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Calm	Short wetsuit
8/7/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Light onshore winds	None
8/10/25	South basin, east side, S of Chaney Point	1	1-15 min	1	1-10 papules	Light onshore winds	Toweled off
8/12/25	North basin, east side; Pine Bluffs	1	31-60 min	1	1-10 papules	Light onshore winds	None
8/15/25	N shore, east of B&B marina	1	31-60 min	1	1-10 papules	Light onshore winds	Short wetsuit
8/18/25	N shore, east of B&B marina	1	16-30 min	1	1-10 papules	Light onshore winds	Short wetsuit
9/1/25	Sam-o-set	2	16-30 min	1	1-10 papules	Light offshore winds	None

Discussion of water exposure study: As we have stated previously, the Higgins Lake water exposure study is unique because it 1) records SI cases as a rate per water exposure, and 2) it is lake-wide. There are no studies in the literature like this one. The only other study we know of has been conducted by the Congregational Summer Assembly (CSA) at Crystal Lake, which is specific to their beach at the southwest end of the lake where many swimmers participate in lessons.

At Higgins Lake, SI rates were very low at 0.9%-1.5% in 2022 and 2023, followed by a modest increase in 2024 to 2.3% due to suspension of the relocation program. The modesty of the increase made sense since there were only two broods on Higgins Lake in 2023. In addition, we speculated that those two broods may not have gotten as quickly infected simply because snail infection levels have been so low on Higgins Lake.

With relocation resuming again in 2024, the case rate of 1.3% in 2025 is what we would expect. The remaining question was whether the whole dataset is statistically supportive of the model that claims that the presence/absence of broods is the primary driver of the levels recorded in the data.

To evaluate it statistically, we subjected the data to the same statistical analysis that we did the CSA data in our 2024 paper.

Recommendation: Overall, the water exposure study was a resounding success in 2025, even more so than previous years. Recruitment was more successful and added to the 'backbone' of contributors that had made the bulk of reports the previous 3 years. Given that the SI case study results at Higgins and the continued data collected at Crystal CSA show statistical support for the relocation program, we are thinking of writing a paper about these data (as well as the snail data). It will emphasize that all data demonstrate that we understand the system very well and are able to make testable predictions that are supported by a lot of data – SI goes down following relocation and it goes up when relocation is suspended. So kudos to HLSIO for sustaining this study over the last four years!

With 4 broods on the lake this summer, an increase in SI cases is expected in 2026, and the prediction would be that it will be a bigger increase than in 2024. Documenting that anticipated increase, building on the momentum in recruiting participants this year, and being able to show that the relocation program is continually assessed would be the main reasons for continuing the study.

Website SI Case Reports

Background: From the beginning of the relocation program, SIS has hosted a website where Higgins Lake residents and visitors can report SI cases. These data are only a rough measure of the SI issue on Higgins Lake because it does not include any reporting of times that individuals used the water *without getting SI.* In addition, the rate of reporting probably varies depending on the prior expectations of the person getting in the water, the severity of the case, and the motivation for reporting.

Results: In Figure 4 below, the numbers of SI case reports from 2019-2025 are plotted, broken down by case severity (Mild = 1-10 papules, Medium to high = 11-99 papules, Severe = 100+ papules). It is clear that the number of reports per year varies considerably, from 10 in 2022 to 89 in 2025. Some of the years with the lowest numbers (2021, 2022) do correspond to a lack of any broods on Higgins, as would be expected. Some numbers, however, are perplexing. 2023, for example, was another year that followed an absence of broods, but there were more cases than in 2021 and 2022 combined. In 2024, we expected an increase which was seen in the case rate study, but the number of cases reported to the website was slightly lower than in 2023.

In 2025, there is an increase cases reported to the website (66), and the modest severity shift seen in 2024 persisted also. It is important to maintain the perspective that there were 152 reports to our website in 2015, the first year of the program and before relocation effects would be seen (unfortunately we do not have severity data for that year or some of the years immediately after).

Nevertheless, it is uncertain why the number is up in 2025. A couple of possible factors: 1) the presence of 4 broods on the lake may have begun infecting snails as early as late June such that they began

shedding by early August, and 2) an early ice-out resulted in snails beginning reproduction early in the summer, ensuring that there were plenty of young snails available to be infected early, in addition to the older snails. However, that still would require the parasites to develop relatively quickly in the snails, which takes about 4 weeks in the laboratory but by some past indications it takes longer in a coldwater lake like Higgins. Finally, could there have been a brood that we missed in 2024? We definitely do not think so, as no broods were reported to our website after we relocated the 1 brood on the lake, and we did a final bird survey as well.

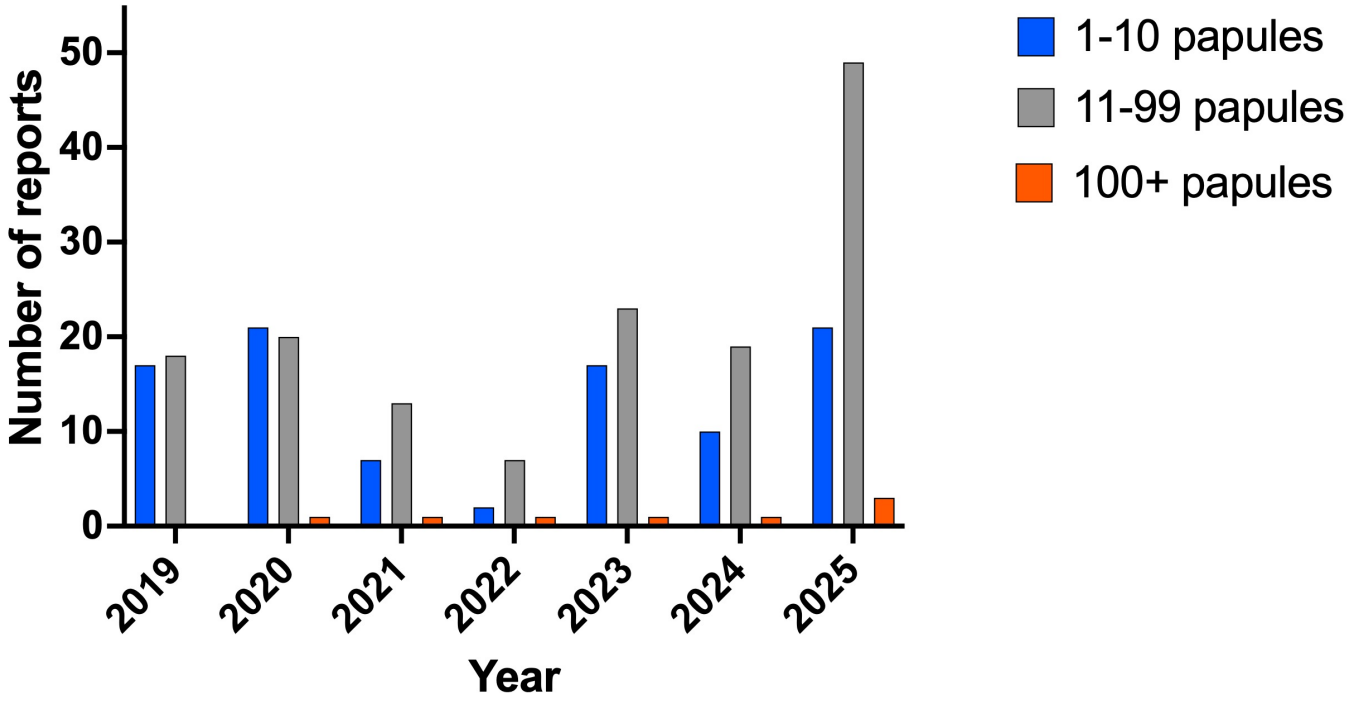

Figure 3. Higgins Lake 2019-2025 SI case reports categorized by severity.

As another way to examine whether the 4 broods on the lake this year were already increasing SI cases, we plotted each of the last 7 years on a timeline (Figure 5). Note the cluster of cases in late July into early August.

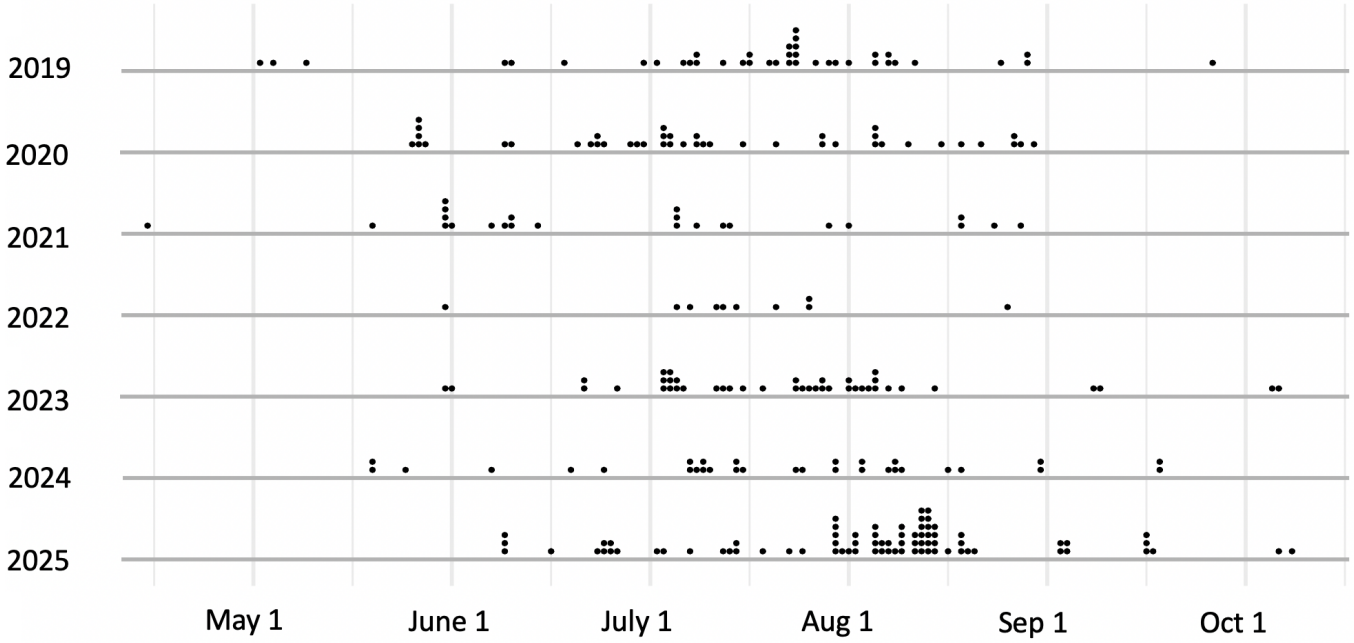

Figure 5. Swimmer's itch reports on Higgins Lake plotted by date SI was contracted, 2019-2025.

Conclusion from all data: All SI assessment metrics in 2025 (snail infection levels, water exposure study results, and SI cases reports—both anecdotal and website-reported) suggest that the SI parasite population in Higgins Lake is "on the rise" due to the presence of 4 COME broods on the lake. Plotting the cases by date suggests that this increase was beginning in late July.