



The State of Swimmer's Itch on Crystal Lake (Benzie County, MI) in 2025

Assessment Report October 22, 2025

by

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*This report was written for the Crystal Lake & Watershed Association (CLWA), a non-profit 501 (c) (3) group of concerned citizens committed to protecting the beauty and water quality of Crystal Lake and its surrounding environment. The CLWA engages in monitoring, education, and advocacy on behalf of the broad community for whom Crystal Lake is a vital economic, recreational, and aesthetic resource.

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Executive Summary

In 2016 the CLWA contracted with SICON, LLC to collect extensive swimmer's itch (SI) baseline data. In the summer of 2017, under the authority of federal and state permits, all common merganser broods were trapped and relocated off Crystal 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, and more scientifically, by the annual study at the Congregational Summer Assembly beach) — showed dramatic decreases in all years (2018-2022) 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). With this suspension, it was expected that both metrics would soon return to pre-relocation levels, and they did. In fact, it only took one summer (2022) of common merganser broods growing up on the lake for snail infection levels to dramatically increase the following year (2023), as did SI cases in the CSA and our website data. This continued in 2024. Given that the relocation program was restored in 2024, we predicted that all metrics would fall again in 2025. **This prediction is validated by the 2025 data.**

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 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. stagnicola*. and the biology of its hosts, infected common merganser broods affect the **following summer's** snail infection levels.

Snail Infection Levels

A comprehensive avian schistosome species assessment in 2016 identified *Trichobilharzia stagnicolae* (carried in *Stagnicola emarginata* snails) as the dominant swimmer's itch causing species on Crystal Lake. Since then, infection levels in this snail species have been monitored during the summers of 2018, 2020, 2022, 2023, 2024, and 2025. (Table 1).

Table 1. Effect of common merganser brood relocation on *Trichobilharzia stagnicalae* snail infection levels in Crystal Lake (Benzie County, MI). Relocation efforts began in 2017, and continued for 5 consecutive years until the Michigan Department of Natural Resources suspended all trapping activities for 2022 and 2023 due to an outbreak of avian influenza. The relocation program was reinstated in 2024, and suspended again in 2025. Arrow indicates breakdown of lake-wide snail infection level by collection sites. Color of cell indicates infection level.

(■ = Ideal (<0.24%), ■ = Tolerable (0.25-0.49%), ■ = Moderate (0.5-0.9%), ■ = Severe (1.0-1.9%), ■ = Epidemic (>2.0%))*

Year	Pre-Program Baseline		All COME Broods Trapped and Relocated (R)					Program Suspended (S)		R	S
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of Relocated COME Ducklings	0	0	126	143	93	89	90	0	0	73	0
Number of Summer Resident COME Ducklings	unknown	61	0	0	0	0	0	85	86	0	??
Lake-wide Snail Infection Level the Following Summer (Number of Snails Examined)	1.05% (2000)	--	0.28% (2112)	--	< 0.05% (2211)	--	0.15% (2029)	1.19% (2185)	0.67% (2234)	< 0.05% (2143)	

Collecting Location	July 20, 2016	July 13, 2018	July 6, 2020	July 13, 2022	July 12, 2023	July 8, 2024	July 8, 2025
River Outlet (L11)	1.0% (200)	0.0% (199)	0.0% (220)	0.67% (300)	5.45% (202)	2.03% (246)	0.0% (232)
Onkeonwe Rd (J11)	2.5% (200)	0.0% (200)	0.0% (212)	0.0% (250)	0.0% (218)	1.00% (200)	0.0% (212)
CBCA (G7)	1.0% (200)	0.0% (228)	0.0% (230)	0.0% (250)	0.0% (211)	0.0% (200)	0.0% (232)
CSA (A6)	0.5% (200)	0.46% (216)	0.0% (212)	0.0% (185)	0.43% (230)	0.40% (250)	0.0% (138)
Marquette Ct (A5)	3.5% (200)	0.46% (216)	0.0% (230)	0.0% (198)	2.27% (220)	0.40% (249)	0.0% (235)
Yacht Club (A3)	0.0% (200)	0.0% (216)	0.0% (220)	0.0% (197)	1.42% (212)	0.0% (249)	0.0% (217)
M6 Hotspot (M6)	1.0% (200)	1.38% (217)	0.0% (212)	0.45% (224)	0.46% (218)	2.00% (250)	0.0% (220)
Nichols Rd (O7)	0.0% (200)	0.0% (216)	0.0% (226)	0.0% (218)	0.00% (219)	0.50% (200)	0.0% (242)
Orchard Hill (R9)	0.50% (200)	0.0% (204)	0.0% (220)	0.0% (3)	0.91% (220)	0.0% (140)	0.0% (195)
Beulah Beach (Q13)	0.50% (200)	0.5% (200)	0.44% (229)	0.0% (204)	1.28% (235)	0.0% (250)	0.45% (220)

*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.

Conclusion: The snail infection data from the last 10 years confirm this simple tenet: When common mergansers broods are relocated off Crystal Lake, snail infection levels (and correspondingly, swimmer's itch case reports) significantly decrease the following summer; when common mergansers broods are allowed to remain on Crystal Lake, snail infection levels significantly increase the following summer.

Website SI Reports

From the beginning of the relocation program, SIS has hosted a website where Crystal Lake residents and visitors can report SI cases. These data are only a rough measure of the SI issue on Crystal 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.

In Figure 1 below, the numbers of SI case reports from 2017-2025 are plotted by case severity (Mild = 1-10 papules, Medium-High = 11-99 papules, Severe = 100+ papules). Suspension of the brood relocation program in 2022 and 2023 produced record numbers of cases in 2023 and 2024 (318, 257), far higher than all other years (range 20-95, average 58 cases/year). The return of brood relocation in 2024 has once again led to a reduction in swimmer's itch, with only 48 cases in 2025. Note also that there is a substantial shift in the severity: no severe cases and a higher proportion of mild cases in 2025. (N.B., it is likely that cases in 2017 were underreported since it was the first year of making the website available).

Finally, a new question that we added to the website in 2024 is interesting to compare for 2024 and 2025: whether they visited a hospital or consulted a medical practitioner for their swimmer's itch. In 2024, 22 report filers consulted a medical practitioner and 2 visited a hospital; in 2025, only 3 consulted a medical practitioner and 1 visited a hospital. These numbers also provide CLWA some evidence that swimmer's itch does drive people to use local medical facilities.

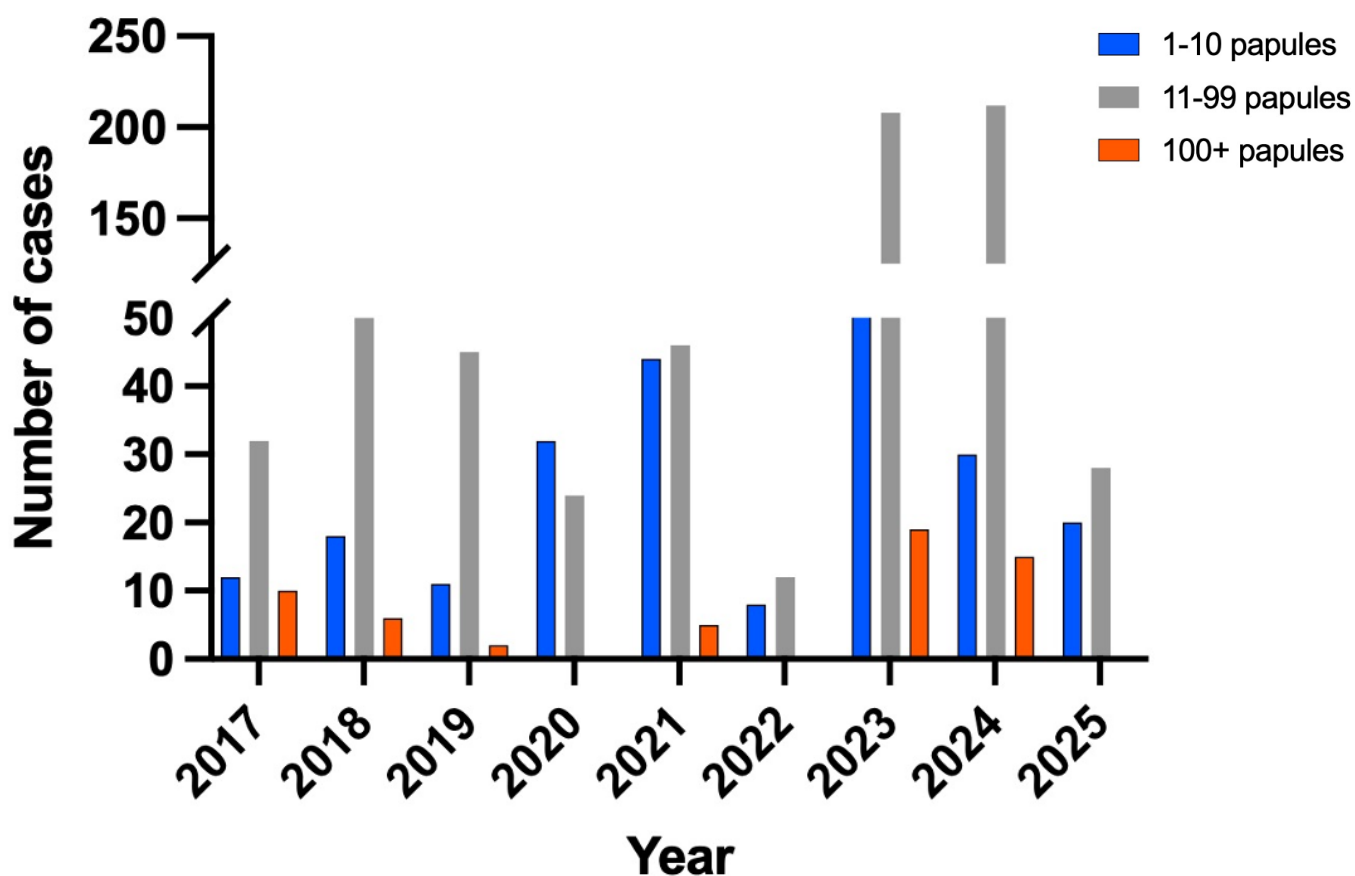


Figure 3. Crystal Lake 2017-2025 SI cases categorized by severity.

Conclusion: The return of the common merganser brood relocation program in 2024 was successful in reducing swimmer's itch in both number of cases and case severity in 2025.

CSA study

CSA lifeguards and supervising personnel have continued to collect data and this data has now reached 64,645 swimmers. CSA usually collects 61 days of data from late June to mid-August. In 2025 there were 7183 swimmers counted and 249 cases of SI, for a case rate of 3.47%. The return of the brood relocation program in 2024 did bring it down considerably from the record highs of 2023 and 2024. It is however the highest rate measured among those following brood relocation (gray bars), and similar to two of the years without relocation (2013, 2.86% and 2017, 3.39%). Possible explanatory factors include:

- Snail infection rates were high in 2024, infecting ducklings quickly, allowing them to infect more snails before the ducklings were trapped and relocated.
- There were at least two ducklings missed during trapping in 2024 (we saw and reported them in our 2024 report).

Since days with onshore winds (N, NE, or NW) always have a disproportionate number of cases (83% of cases from 2013-2019), we did check for whether there happened to be more onshore wind days in 2025. However, it was not an unusual number (15) compared to other years (e.g. 12 in 2024, 10 in 2023, 20 in 2022, 23 in 2021, etc.). In 2025, the 15 days (24.6% of the days) accounted for 60.6% of the cases.

In our published paper, the construction of a mixed-effects statistical model showed that brood relocation was very significant factor determining the frequenting of SI cases in 2013-2019. We have continued to update this analysis with each year's data. With the 2025 data included, the model still very strongly supports that relocation significantly reduces the percentage of SI cases. Even with the two high years of 2023 and 2024 excluded from a simple calculation of averages, the 5 years before relocation (2013-2017) have a much higher case rate (4.40%, 1121 cases out of 25485 swimmers) than the 5 years with relocation (2018, 2019, 2021, 2022, 2025; 1.94%, 551 cases out of 28427 swimmers).

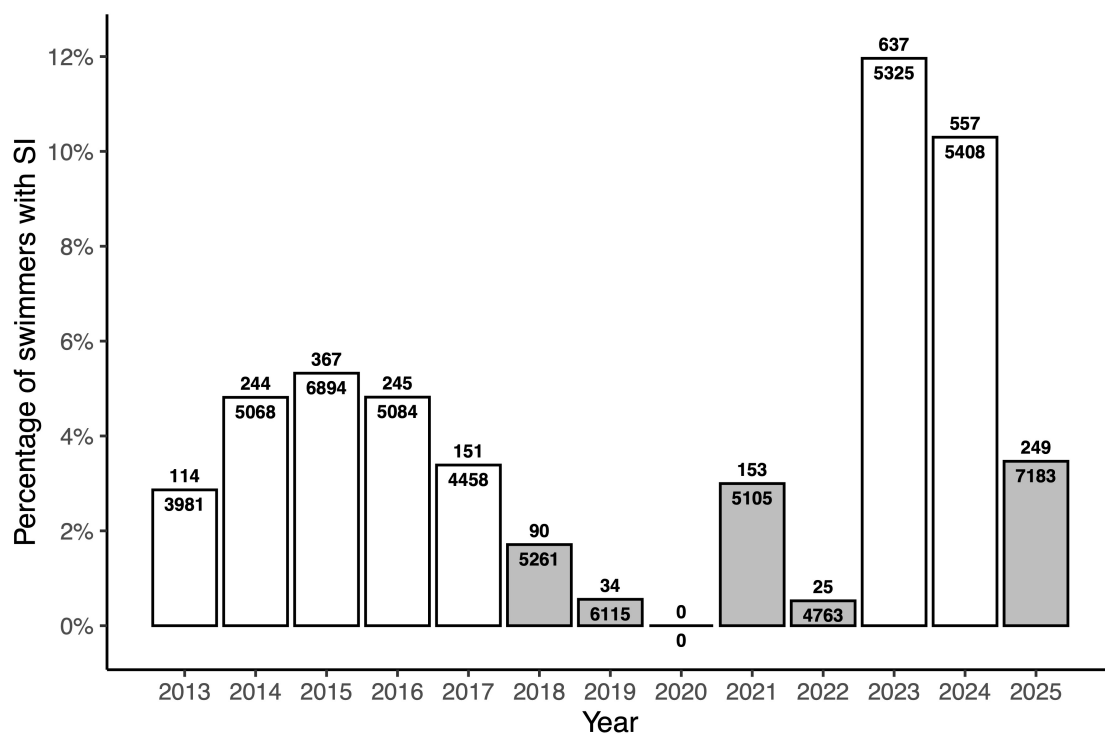


Figure 2. Percent of swimmers with SI at CSA beach at Crystal Lake. Number of SI cases is above the bar and number of swimmers is below. Gray shading indicates year following relocation of common merganser broods.

Summary Conclusion and Recommendations:

All metrics (snail infection levels, website reports of SI, and CSA swimmer data) all continue to show that brood relocation reduces the number and severity of SI cases.

Since the relocation program was suspended again in 2025 due to avian flu, we predict that 2026 will see increased snail infection levels, and that website reports and CSA data will record an elevated number of SI cases. The ability to predict accurately in science is the best measure of whether we understand the system. While we would like know other factors that might contribute to year-to-year variation, our ability to predict significant changes with a high level of certainty shows that brood presence is the most important factor in the system.

We recommend the following action items for 2026:

1. The CLWA continue to assess/monitor swimmer's itch case reports on Crystal Lake (the CSA beach study does this well)
2. The CLWA fund the fee for the continued use of our website reporting system in 2026. This is valuable information and contributes evidence.
3. The CLWA fund a snail infection level assessment in 2026. This data would document the predicted rise in snail infection rates.