

Summary of Swimmer's Itch Data from the CSA Beach, 2013-2019

INTRODUCTION:

During each of the past seven summers, Congregational Summer Assembly (CSA) waterfront staff have collected information on the number of swimmers and cases of swimmer's itch (SI) at the CSA beach. Data were recorded daily for: the total number of swimmers, total cases of SI, time-of-day swimmer counts (morning/afternoon), prevailing wind direction, wind speed, and water temperature. Daily records were collected from approximately the third week of June through the middle of August.

RESULTS:

Overall Incidence:

As shown in Table 1, the overall SI incidence has been approximately 3.4% (i.e. 3.4 cases for every 100 swimmers) over the past seven years. Incidence rates climbed from 2.9% in 2013 to 5.3% in 2015, but have decreased consistently over the past four years. In particular, 2018 and 2019 showed dramatically decreased incidence, with rates of 1.7% and 0.6% respectively. One possible explanation for this improvement is the systematic removal and relocation of merganser broods from Crystal Lake. The merganser removal program was initiated three years ago, and continues to receive CLWA support.

Lower SI rates appear to be leading to increased water usage. The "*total swimmers*" count reached a low point in 2017 (4468 swimmers) but has increased steadily since, with over 6,000 swimmers in 2019. Anecdotally, waterfront staff also report that SI case severity (e.g. number of spots per case) has improved over the past two years, and they have experienced more than a doubling of entry-level swimming lesson enrollment for 2019. All of these factors suggest improvements resulting from CLWA control measures.

TABLE 1: OVERALL INCIDENCE BY YEAR

YEAR	TOTAL SWIMMERS	TOTAL SI CASES	INCIDENCE RATE (% = #CASES/100 SWIMMERS)
2013	3981	114	2.9%
2014	5068	244	4.8%
2015	6894	367	5.3%
2016	5084	245	4.8%
2017	4468	151	3.8%
2018	5261	90	1.7%
2019	6115	34	0.6%
TOTAL	36871	1245	3.4%

Associated Variables:

Two variables, wind direction and time of day, have been consistently associated with an increased risk of SI. Table 2 presents data for wind direction. Historically, studies have suggested that onshore winds act to concentrate schistosome cercaria in shallow areas near the shoreline, thus increasing the probability of SI. From 2013 - 2018, the probability of having at least one case of SI was significantly higher on days when the prevailing winds were from the northwest, north or northeast (i.e. “onshore” winds). However, the percentage of days with any SI for 2019 was notably similar for onshore (23.5%) vs. offshore (20.6%) days. We do not have a definitive explanation for this change, but will continue to monitor it in future years. It is possible that lower overall incidence rates may make it more difficult to assess differences for individual variable.

TABLE 2: DAYS WITH POSITIVE SI CASES BY WIND DIRECTION

WIND DIRECTION	PERCENT OF DAYS WITH AT LEAST ONE CASE OF SI							
	2013	2014	2015	2016	2017	2018	2019	TOTAL
ONSHORE*	68.8% (11/21)	79.2% (19/27)	54.5% (12/22)	59.1% (13/22)	62.5% (10/16)	65.2% (15/23)	23.5% (4/17)	56.8% (84/148)
OFFSHORE**	31.2% (5/27)	20.8% (5/26)	3.3% (1/30)	10.0% (3/30)	5.9% (2/34)	4.2% (1/24)	20.6% (7/34)	11.7% (24/205)

* Onshore = North, Northwest or Northeast

** Offshore = South, Southwest, Southeast, West, or East

Incidence rates for morning versus afternoon swimmers are presented in Table 3. Overall, the incidence rate for morning swimmers (6.9%) was more than double the afternoon rate (2.4%). This pattern has been consistent throughout the study. While we are not certain why the difference occurs, a recent study of five Michigan lakes (including Crystal Lake) found that schistosome cercarial concentrations are highest early in the morning and drop throughout the day.¹ This provides a logical explanation for higher morning SI rates.

TABLE 3: INCIDENCE BY TIME OF DAY

TIME OF DAY	INCIDENCE RATE OF SI (CASES/TOTAL WATER USES)							
	2013	2014	2015	2016	2017	2018	2019	TOTAL
AM	5.2% (51/972)	13.1% (117/890)	13.3% (161/1209)	9.6% (98/1022)	6.0% (55/916)	3.7% (54/1446)	1.6% (28/1689)	6.9% (564/8144)
PM	2.1% (63/3009)	3.0% (127/4178)	3.9% (220/5687)	3.8% (155/4090)	2.7% (96/3552)	0.9% (36/3815)	0.1% (6/4426)	2.4% (703/28757)

¹ Rudko, S.P., Reimink, R.L., Froelich, K, Gordy, M.A., Blankespore, C.L., Hanington, P.C. Use of qPCR-Based Cercariometry to Assess Swimmer's Itch in Recreational Lakes. *Ecohealth*. 2018: 15(4): 827-839.

CONCLUSIONS:

The overall incidence of SI appears to be decreasing, and was especially low in 2019. The risk of SI continues to be highest during morning hours, possibly due to higher cercarial concentrations. With the exception of 2019, SI rates were also higher for days with onshore winds. We will continue to monitor wind direction to determine whether 2019 was an anomaly or indicative of a true change in SI patterns.

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