Sebago Lake Monitoring Programs

Lower Bay *E. coli* Bacteria Monitoring - 2025

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Introduction

Sebago Lake is the primary drinking water supply for the greater Portland, Maine area. The Portland Water District (PWD) treats and delivers drinking water from the Lake to over 200,000 people in 11 communities. PWD is one of only a handful of large public water suppliers nationwide that has a waiver from the filtration requirements of the federal Safe Drinking Water Act. There are many criteria for obtaining and keeping the waiver, but one of the largest factors is the continued excellent water quality of Sebago Lake and PWD's watershed protection efforts. This waiver agreement requires ongoing monitoring of lake water quality.

PWD has several monitoring and surveillance programs that assess the water quality of Sebago Lake and the rivers and streams that drain to it. In general, more samples are collected and tested for more parameters the closer one moves to the intake pipes, located in Lower Bay.

This report summarizes results of the Lower Bay Bacteria Monitoring Program. The purpose of the program is to monitor *Esherichia coli (E. coli)* bacteria levels around Lower Bay, ensure levels are within historic ranges, and if not, identify possible sources of contamination.

E. coli is a type of fecal coliform bacteria that is found in the guts of warm-blooded animals and is used by water utilities as an indicator of possible contamination and pathogens in the water. Sources of *E. coli* contamination can include: sewage, animal waste, and soil erosion, as a small percentage of fecal bacteria are associated with soil. *E. coli* is used as an indicator organism because it has been shown to be a reliable indicator of pathenogenic contamination, and it is not practical to test every sample for all the pathogens that could be present in water. In particular, giardia and cryptosporidium are two gastrointestinal parasites that pose a risk to the drinking water supply. They are more likely to be present in water with high *E. coli* levels.

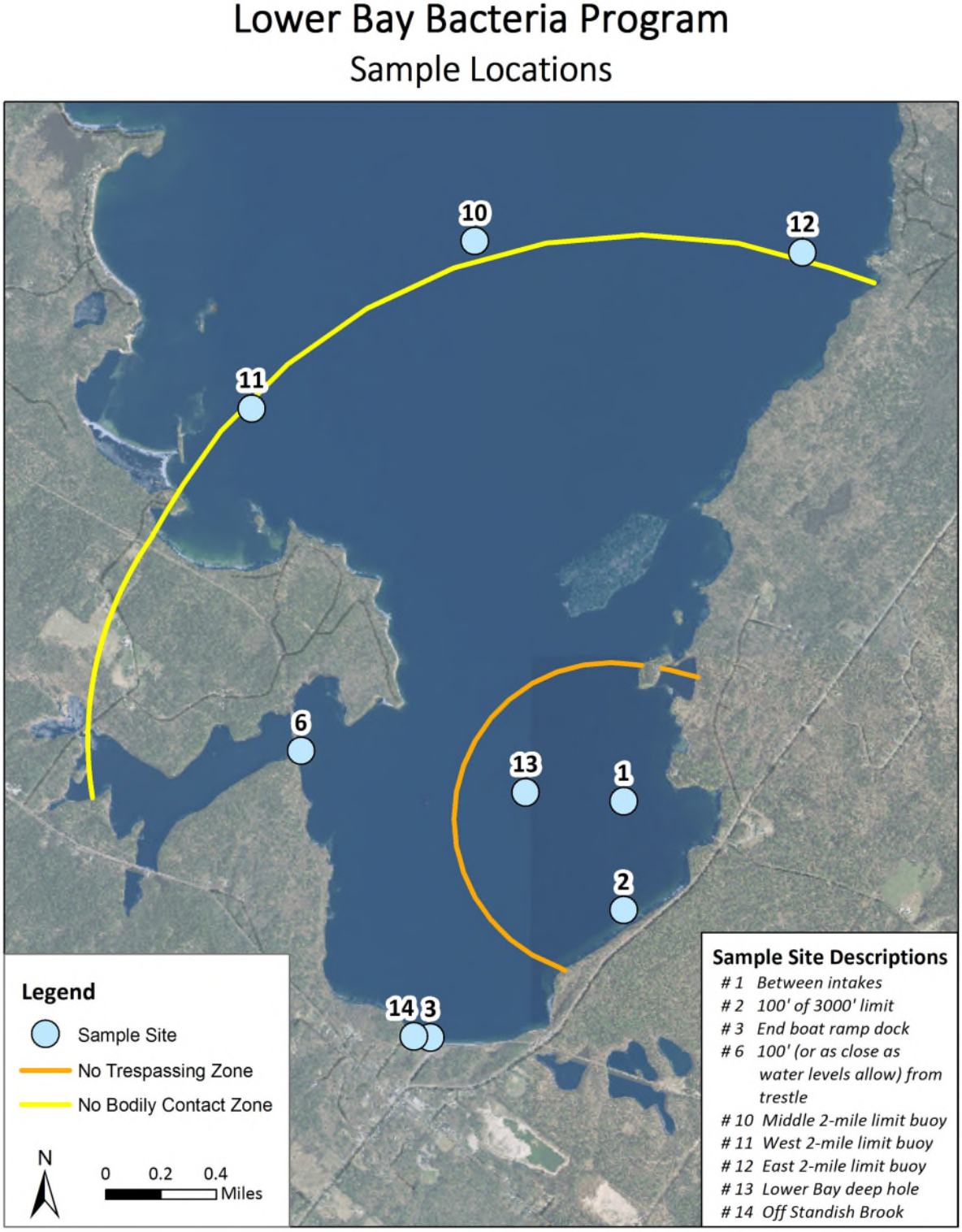

Figure 1: Lower Bay bacteria sampling locations in 2025.

Methods

Bacteria sampling occurs once a month from May to October. Nine locations around Lower Bay are monitored for *E. coli* bacteria (Figure 1). Samples are taken just below the water surface with sterile gloves and sterile collection vessels. Sample collection occurs during "normal" lake conditions, because the program is not designed to monitor extreme storm events or abnormal water circumstances. Samples are analyzed using the IDEXX Colilert quantitray method. Prior to 2019, samples were analyzed for fecal coliform bacteria using a membrane filtration method. The results produced by these two methods was found to be similar enough that we are able to directly compare data collected using both methods in this report.

The District's action level for *E. coli* in Lower Bay is 10 MPN/100 ml (MPN = most probable number), which represents a very conservative but historically achievable limit. Sampling events that result in *E. coli* levels above the action level are re-sampled and, if the level remains high, investigated to determine the cause.

Results and Discussion

The trestle sampling site exceeded the action level of 10 MPN/100 ml during four of the six sampling runs, and twice during resamples in June (Table 1). This site drains the Sticky River bog and is generally undeveloped. Investigations of the drainage area to this site found some evidence of human activity (trash, fires). Additionally, there was a partially sunk dock section near the sampling location that was theorized to be a potential nesting or roosting site for birds or other animals which could have been a contributor of bacteria.

Because of persistent resamples above the action level, a sample from the trestle site was sent out for microbial source tracking analysis in June. This technique uses PCR DNA analysis to determine the source of the bacteria (human, dog, bird, etc.). The sample did not contain enough bacterial DNA to determine a source (non-detect). A resample was not collected in August due to the pending microbial source tracking results, however, a replicate sample was plated using mFC media and the resulting concentration was 5 cfu/ 100ml. This lower value for fecal bacteria vs. *E. coli* using colilert was reassuring.

All other sampling locations were consistently below the 10 MPN/100 ml action level. The overall average level of *E. coli* across all sites in 2025 was 4.3 MPN/100 ml, much higher than in previous years due to the high trestle results. The all-time average across all sites from 2009-2025 is 1 MPN/100 ml.

Overall, open water *E. coli* concentrations in Lower Bay continue to be low compared to similar environmental samples from beaches and tributaries. Across the entire dataset, samples are below the action level at least 98% of the time at all sites except the trestle (Table 2).

Table 1: 2025 *E. coli* data (MPN/100 ml).

	Site 1	Site 2	Site 3	Site 6	Site 10	Site 11	Site 12	Site 13	Site 14
	Between Intakes	No Trespassing Limit	Standish Boat Ramp	Trestle	Middle-Two Mile Limit	West-Two-Mile Limit	East-Two Mile Limit	Lower Bay Deep Hole	Off Standish Brook
5/13/2025	0	0	1	31	0	1	0	1	2
5/14/2025				9					
6/24/2025	0	0	5	72	0	0	0	4	2
6/25/2025				17					
6/26/2025				29					
7/14/2025	8	4	2	11	0	0	1	1	8
7/15/2025				5					
8/6/2025	0	1	0	16	3	2	0	1	0
9/15/2025	2	0	3	0	0	1	0	1	2
10/7/2025	0	1	0	0	0	1	1	0	0

Table 2: Summary of 2009-2025 *E. coli* Data

Lower Bay *E. coli* Results
2009-2025

Sample Site	Minimum (MPN/100mL)	Maximum (MPN/100mL)	Number of Samples	% of Samples less than 10 MPN/100mL
1	0	9	102	100%
2	0	5	103	100%
3	0	6	103	100%
6	0	72	109	92%
10	0	3	103	100%
11	0	27	104	99%
12	0	8	103	100%
13	0	4	103	100%
14	0	14	106	98%

Sites within the 3,000 ft No Trespassing Zone – Closest to the Water Intakes (Sites 1, 2, 13)
Bacteria concentrations from the sampling location above the water intake pipes (Site 1) are historically among the lowest in Sebago Lake. The average *E. coli* concentration above the intakes (site 1) from 2009 to 2025 was 0.6 MPN/100 ml. Site 2 averages 0.7 MPN/100 ml and site 13 averages 0.5 MPN/100 ml.

Sites within 2 Mile No Bodily Contact Zone but outside the 3,000 ft No Trespassing Zone (Sites 3, 6, 14)
Bacteria concentrations at sites outside the 3,000 ft No Trespassing Zone but still within the 2 Mile Limit No Bodily Contact Zone are slightly higher than sites within the No Trespassing Zone, but still well below

levels of concern. The average *E. coli* concentration since 2009 at the Trestle (Site 6) is 3.5 MPN/100 ml, which is the highest of all the sample sites around Lower Bay, and increased over previous yearly averages due to higher than normal bacteria levels in 2025. The site is located at the outlet of a backwater area of the lake that is fed by the Sticky River and a tributary along Smith Mill Road in Standish. The other two sites are located at the Standish boat launch dock and nearby Standish Brook. The average long-term *E. coli* concentrations at these sites are 0.9 and 1.4 MPN/100 ml, respectively.

Sites along the 2 Mile No Bodily Contact Limit – Furthest from the Water Intakes (Sites 10, 11, 12)
Sites 10, 11, and 12 are located along the boundary of the 2 Mile No Bodily Contact Zone and represent the furthest limit of the restricted area of Lower Bay. From 2009-2025, the average *E. coli* concentrations at these sites were 0.4 (site 10), 0.9 (site 11), and 0.3 MPN/100 ml (site 12).

Lower Bay sites compared to sites outside the 2 Mile No Bodily Contact Zone
Bacteria levels are higher at sampling sites outside the no bodily contact zone (Figure 2). PWD's swimming beach monitoring program samples 17 sites around the lake where people recreate and one site at the Standish boat launch that is in the no bodily contact zone. People and dogs swimming, along with animal waste (from dogs, birds, and other animals attracted by food left behind by people) all contribute to increased bacteria at these sites. While average swimming beach *E. coli* levels are well above the Lower Bay 10 MPN/100 ml action level at 33 MPN/100 ml across all sites, they are still within the recreational limits set by the Environmental Protection Agency (EPA), which recommends that beaches have no more 235 MPN/100 ml of *E. coli*.

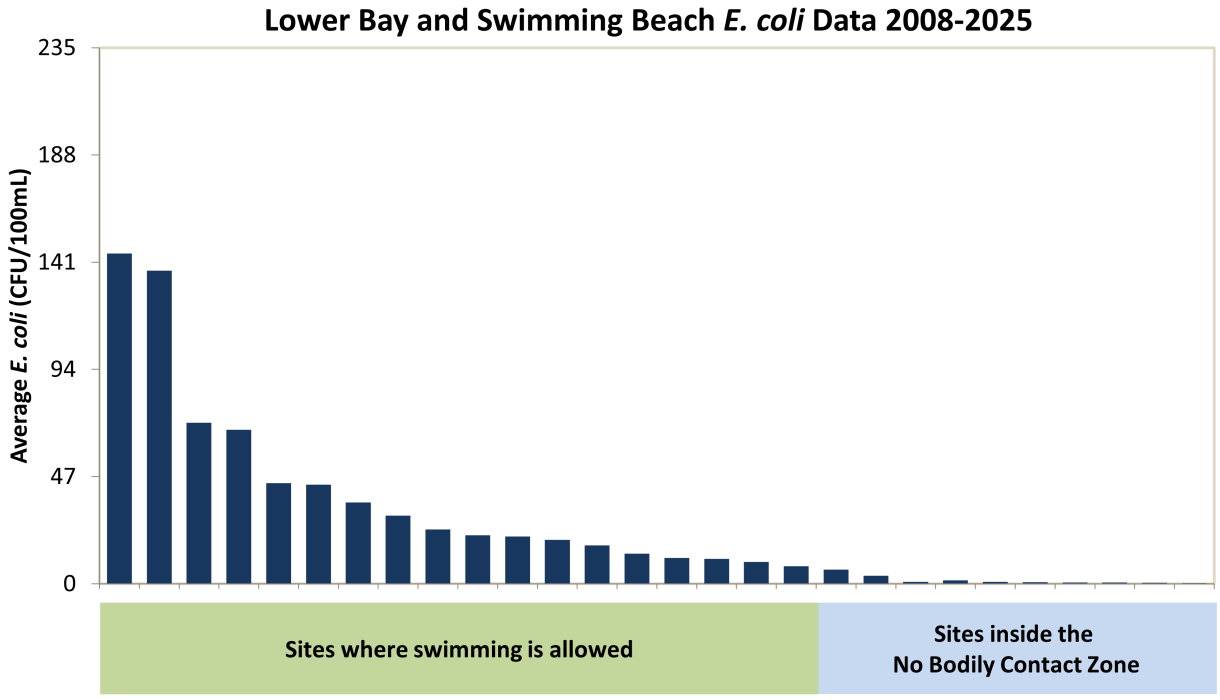

Figure 2. Average *E. coli* levels at beach sites outside the 2 Mile No Bodily Contact Zone where swimming is allowed compared to Lower Bay and beach sampling sites inside the 2 Mile No Bodily Contact Zone.

Conclusion

E. coli bacteria levels around Lower Bay are low for a multi-use lake. A large part of providing safe drinking water to customers is managing risk, and low *E. coli* levels in the area around PWD's water intake pipes means a lower risk of waterborne illness. Though PWD has multiple treatment processes to ensure the water's safety, if pathogens are not present in the first place, then they do not have to be removed and are not a threat to our customers. Because *E. coli* levels are higher where human activity is present, the 2 Mile No Bodily Contact Zone is an important zone of protection around PWD's water intake pipes. Continued monitoring of bacterial levels around Sebago Lake is an important tool for keeping an eye on Sebago Lake's quality with respect to public health.