



# OARS BACTERIA MONITORING RESULTS—2024

Published October 21, 2024

Author: B. Wetherill

Following is a summary of OARS’ monitoring results for 2024 for *E. coli* bacteria at the core 7 locations in the Assabet, Sudbury, and Concord rivers, plus one in River Meadow Brook. Thanks to the Greater Lowell Community Foundation for supporting this monitoring.

## 2024 RESULTS (May 13, 2024–September 16, 2024)

Site #	Description	River	Samples	Exceed-ances	% Exceeded	2024 Geo-Mean	2023 Geo-Mean	2022 Geo-Mean	2021 Geo-Mean	2020 Geo-Mean	2019 Geo-Mean
ABT-007	Waltham St, Maynard	Assabet	9	7	78%	294	195	193	164	289	121
ABT-176	Wheeler Rd, Hudson	Assabet	9	3	33%	228					
ABT-033	Route 62, Concord	Assabet	9	1	11%	117					
CND-009	Rogers St, Lowell	Concord	9	3	33%	185	191	203	153	216	147
CND-093	Carter Ave, Billerica	Concord	9	0	0%	26	51	9			
RVM-001	Lawrence St, Lowell	River Meadow	9	7	78%	396	502	504	412	427	
SUD-144	Danforth St, Saxonville	Sudbury	9	1	11%	58					
SUD-236	Chestnut St, Ashland	Sudbury	9	3	33%	174	186	201	169	348	151

\* Orange shading designates > 25% exceedance of BAV threshold or swimming geo-mean exceedance.

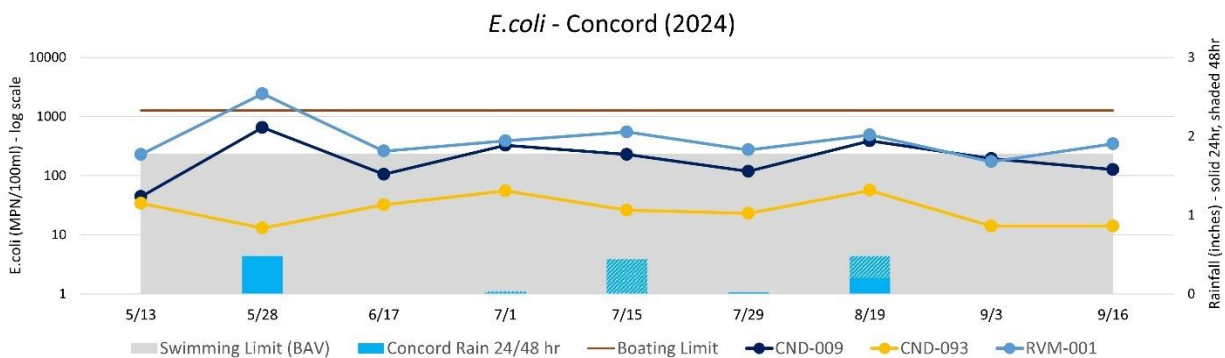
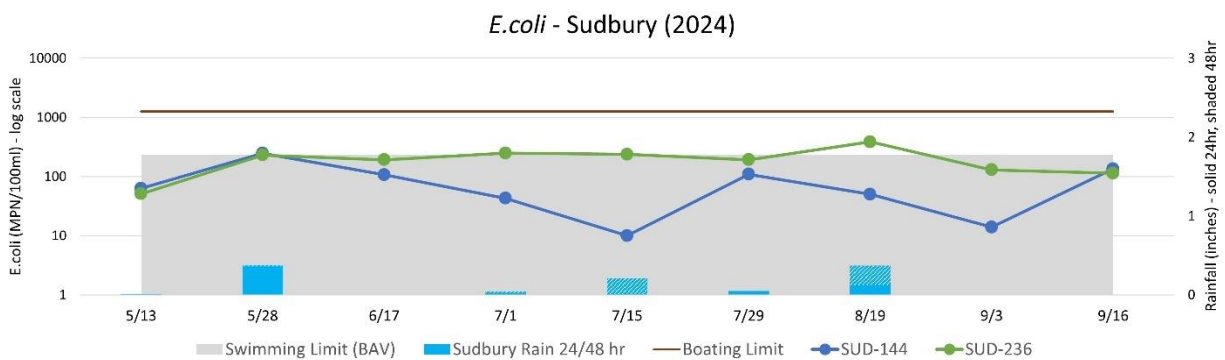
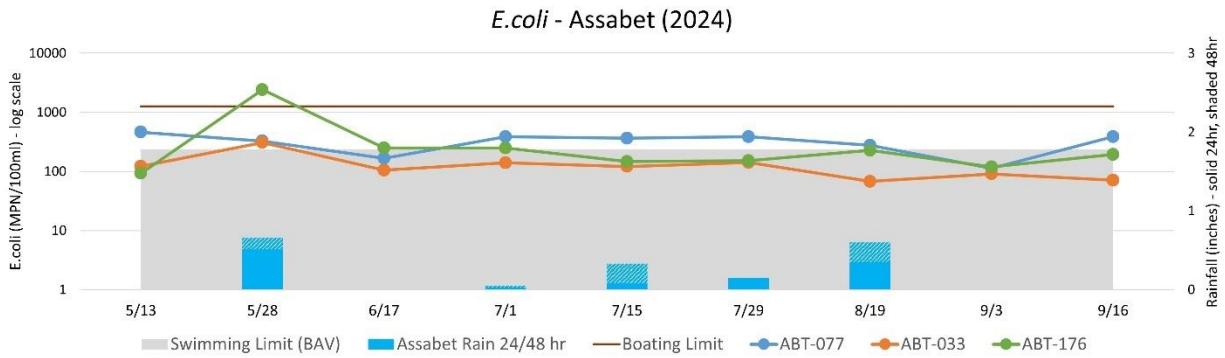
\*\* See graphs of data below for details and explanations of thresholds.

Our 2024 Bacteria monitoring highlighted the same sites of concern as previous years. The Ashland, Lowell, and Maynard sites (SUD-236, CND-009, ABT-077) all had seasonal geometric means above the swimming threshold of 126 CFU/100 ml. These three sites have exceeded the threshold almost every year. The upper Concord River site (CND-093) continued to have very low bacteria levels and swimmable conditions for the whole year. The Sudbury Landing site (SUD-144) was a new site moved slightly upstream closer to the populated Saxonville area, but results there were similar to the previous site with very low bacteria levels and swimmable conditions for all but one of the sampling events. This year, we also added a site in West Concord (ABT-033), and we were pleased to see that bacteria levels were low and conditions were mostly swimmable at this site too. It is noteworthy that all the sites within the Wild & Scenic designated sections of our rivers in the lower Assabet and Sudbury and upper Concord have consistently been mostly or completely swimmable for all of our sampling years (see map in Appendix).

The River Meadow Brook site (RVM-001) continues to return very high bacteria levels. We shared our River Meadow Brook special study findings with the Lowell Wastewater Utility in March 2023. We will continue sharing results until conditions improve. In 2023, we also conducted a special study of bacteria sources in Maynard (ABT-077) and we shared that with the Maynard Department of Public Works in April 2024. This year we have been conducting a special bacteria study in Ashland (SUD-236). We

conducted qPCR DNA analysis on two samples to find out whether the *E. coli* bacteria is from humans or animals. Preliminary results confirmed that there is human DNA in the Ashland water samples. We also conducted a survey for detergents in pipes emptying into the Sudbury River in Ashland. This survey identified a stream and several pipes with sanitary sewage signals. A more detailed review of this study will be issued separately.

## GRAPHS OF *E.coli* RESULTS BY RIVER (2024)

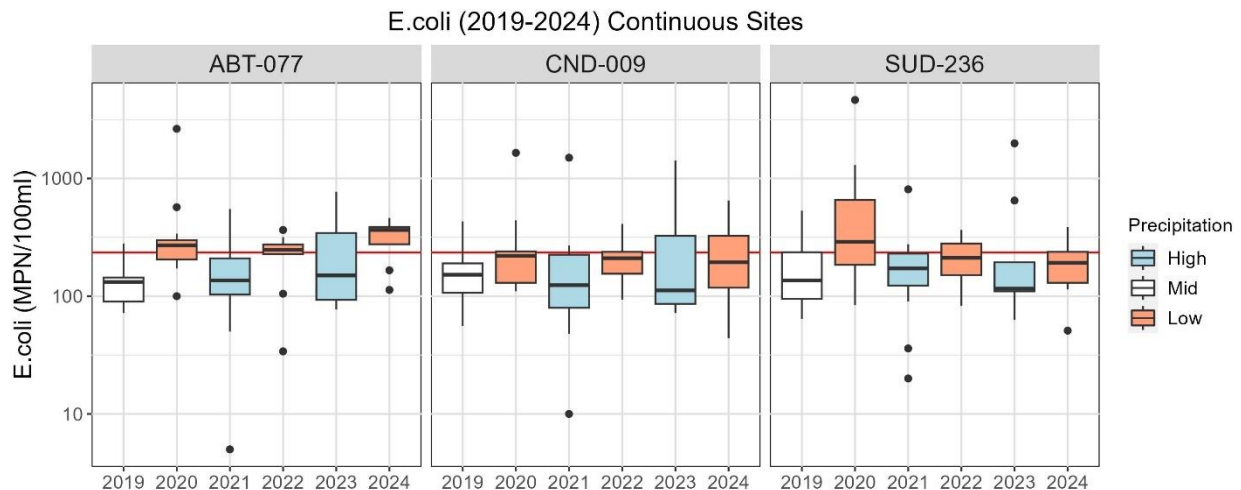
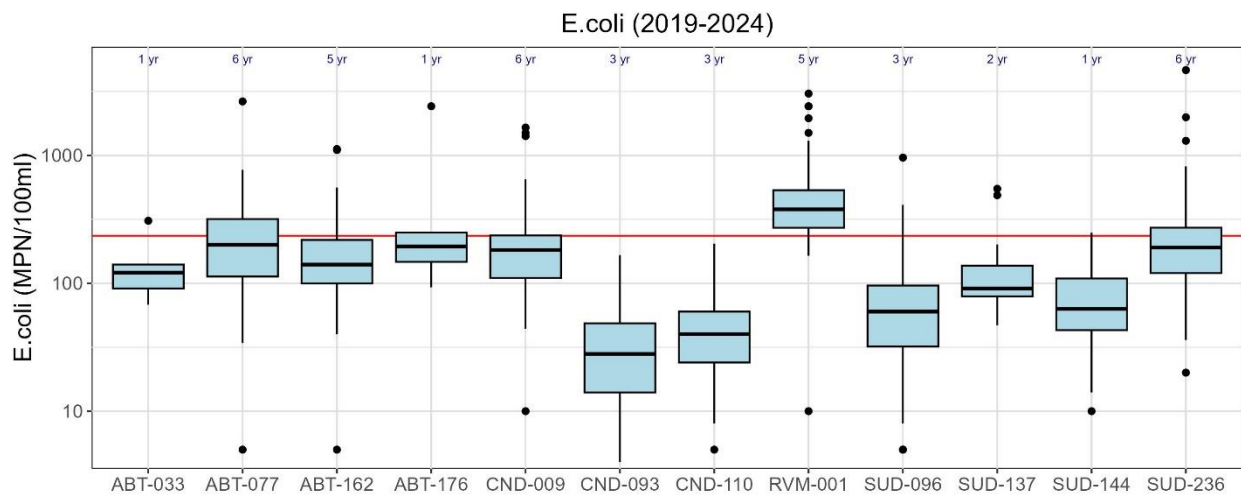


*E. coli* is used as an indicator of fecal contamination in water bodies, and the EPA has defined safety thresholds for recreational swimming and boating. The Beach Action Value (BAV) for single samples is 235 CFU/100 ml. The swimming threshold for the geometric mean of a series of samples over a 30 to 90-day period is 126 CFU/100 ml, and no more than 10% of samples can exceed 410 CFU/100 ml. Bacteria data are normally analyzed on a logarithmic scale because bacteria multiply exponentially. Culturable bacteria can be enumerated in either CFU/100 ml (Colony Forming Units) or MPN/100 ml (Most Probable Number), which are statistically interchangeable.

## FULL DATA SINCE 2019

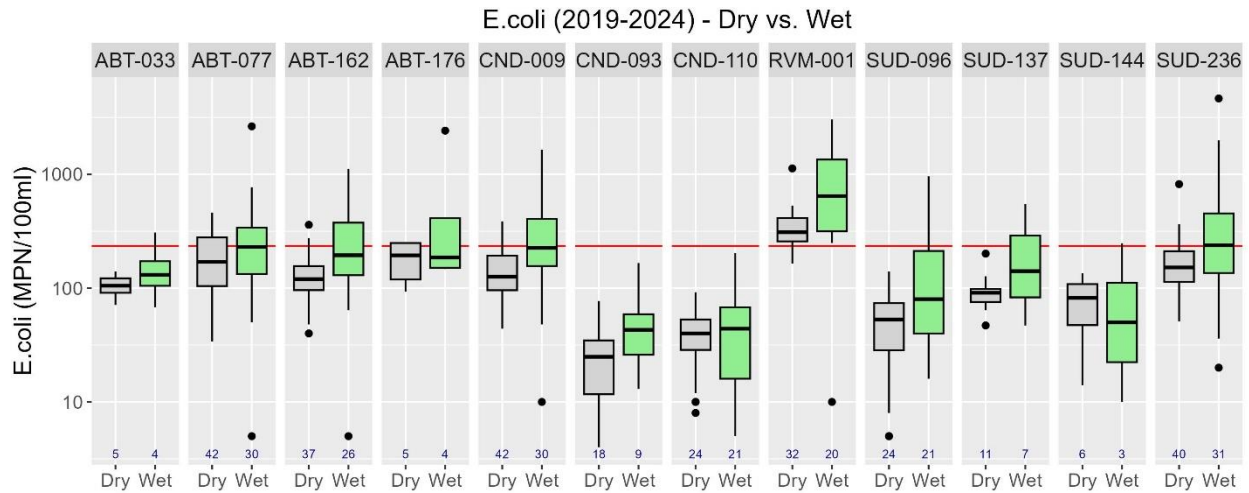
The following graph summarizes all OARS *E. coli* results since 2019 by site (not including special studies in Lowell and Maynard). The boxplots depict the middle 50% of the data, and the upper and lower whisker lines depict the upper and lower 25% of the data. The points represent outliers. With the exception of a few outliers, each of the sites consistently tends to a narrow range of bacterial contamination. Sites CND-093, CND-110, SUD-096, SUD-137, and SUD-144 have all been consistently below the BAV swimming threshold (red line). Site RVM-001 is almost always above the BAV threshold. The remaining sites tend to be near the BAV threshold depending on conditions. This by-site stability helps us identify which sites to focus more studies on and allows us to move to new sampling locations without being required to sample the same locations every year. The plot also shows the number of years each site has been monitored.

The second graph shows the annual progression of bacteria results for the three sites we have been monitoring continuously for all six years. The differences between wet and dry years are quite evident for all three sites. Bacteria concentrations are often diluted during higher flows. The data also show a possible worsening trend for the Maynard site (ABT-077) and a possible improving trend for the Ashland site (SUD-236). We will keep an eye on this and share it with the towns.



## DRY vs. WET WEATHER

The following graph groups *E. coli* results based on the previous 48-hour precipitation. Wet weather is defined as 48-hour precipitation exceeding 0.10 inches, and dry weather is less than 0.10 inches. When dry weather *E. coli* is high, such as at sites ABT-077 and RVM-001, there is most likely a sanitary sewer source of bacteria that provides flow during all weather conditions. When *E. coli* is only high in wet weather, such as at sites SUD-137, SUD-096, and ABT-033, the bacteria source is most likely from surface runoff. Sites ABT-162, CND-009, and SUD-236 have definite wet-weather signals, but the dry-weather results are also high enough to raise concerns. In the case of CND-009, the wet-weather signal could be reflecting the high-flows coming from River Meadow Brook (RVM-001), which enters the Concord just upstream of CND-009 and has confirmed sewer contamination. This wet vs. dry analysis helps us know what types of contamination sources to look for.



# MAP OF MAINSTEM SAMPLING LOCATIONS



## Sudbury, Assabet, & Concord Bacteria Monitoring 2019 - 2024

