

OARS Bacteria Monitoring Results - 2023

Updated Dec. 14, 2023

Following is a summary of OARS' monitoring results for 2023 for *E. coli* bacteria at the core 6 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.

2023 Results (May 15, 2023 – September 11, 2023):

Site #	Description	River	Samples	Exceed-ences	% Exceeded	2023 Geo-Mean	2022 Geo-Mean	2021 Geo-Mean	2020 Geo-Mean	2019 Geo-Mean
ABT-077	USGS gage, Maynard	Assabet	9	4	44%	195	193	164	289	121
ABT-162	Cox St, Hudson	Assabet	9	4	44%	173	123	119	203	161
CND-009	Rogers St Bridge, Lowell	Concord	9	3	33%	191	203	153	216	147
CND-093	Rt 4 Carter Ave, Billerica	Concord	9	0	0%	51	9			
RVM-001	Lawrence St, Lowell	River Meadow	9	8	89%	502	504	412	427	
SUD-137	Little Farms Rd, Framingham	Sudbury	9	2	22%	121	102			
SUD-236	Rt 135, Ashland	Sudbury	9	2	22%	186	201	169	348	151

(Pink shading designates > 25% exceedance of BAV threshold or swimming geo-mean exceedance.)

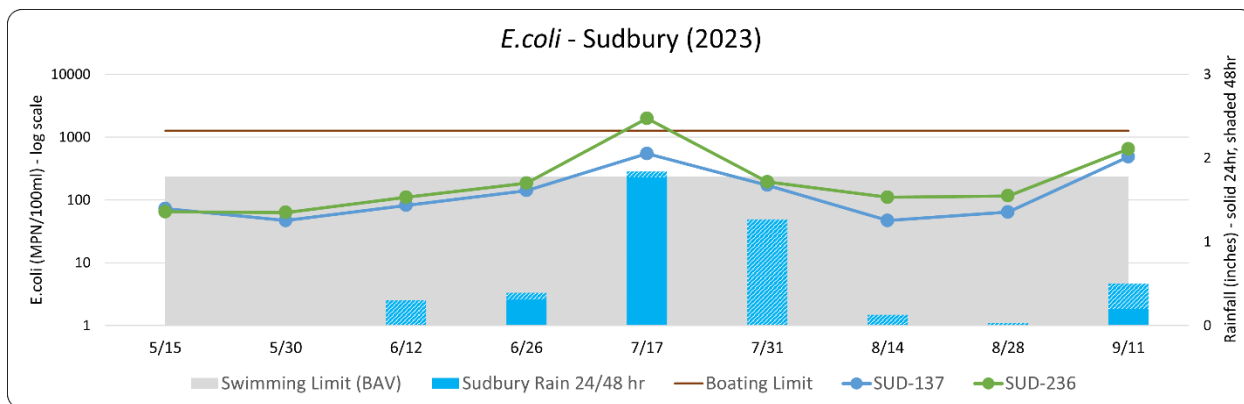
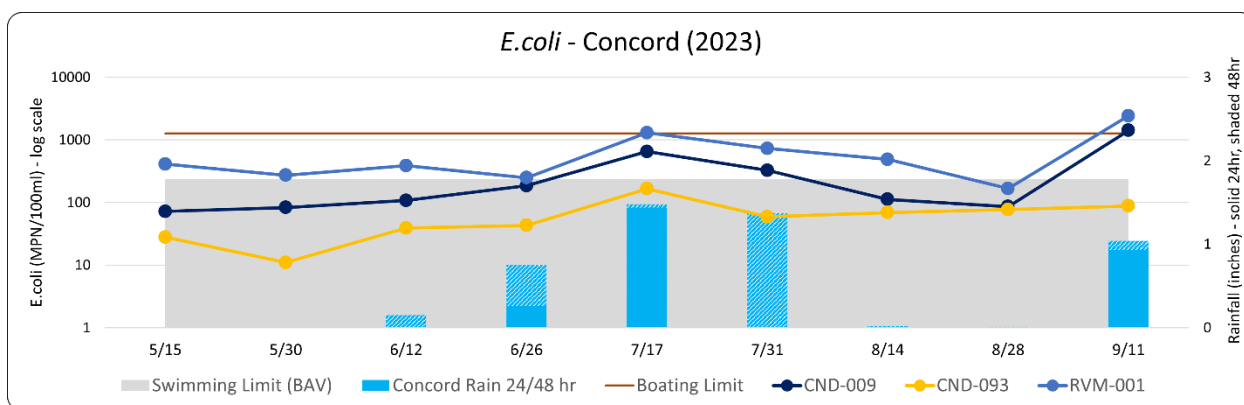
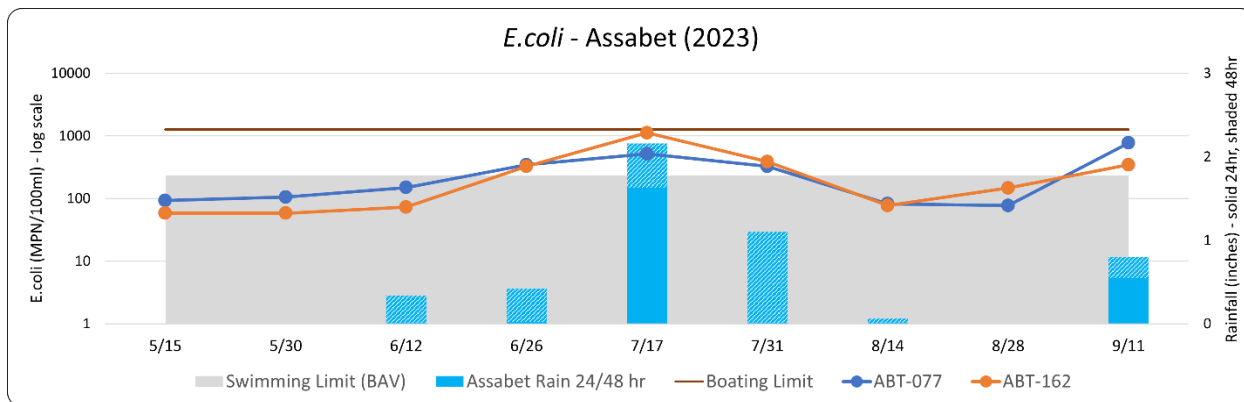
(See graphs of data below for details and explanations of thresholds.)

Our 2023 Bacteria monitoring highlighted the same sites of concern as previous years. The Ashland, Lowell, and Maynard sites all had seasonal geometric means above the swimming threshold of 126 CFU/100 ml. The Hudson site also exceeded this threshold in 2023. The year 2023 was a wet-weather year, and Hudson has a history of low bacteria levels in dry weather and high bacteria levels in wet weather, which indicates a dominance of storm-water surface pollution.

The two new sites, Carter Ave. in Billerica and Little Farms Rd. in Framingham, continued to have low levels of bacteria. Carter Ave. is very similar to the Bedford Rt. 225 site that we previously monitored. Both Carter Ave and Rt. 225 have perfect records with no exceedances of the BAV threshold. Both sites are within the Wild & Scenic segment of the Concord River. Little Farms Rd. is very similar to the Wayland Rt. 20 site that we previously monitored. These two sites have very rare BAV exceedances, limited to significant precipitation events. Both of these sites are within the Wild & Scenic segment of the Sudbury River.

The River Meadow Brook site 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. This year we have also been conducting a special study in Maynard. 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 Maynard water samples. We also conducted a survey for detergents in pipes emptying into the Assabet River in Maynard. This survey identified two pipes and a stream with sanitary sewage signals. A more detailed review of this study will be issued separately.

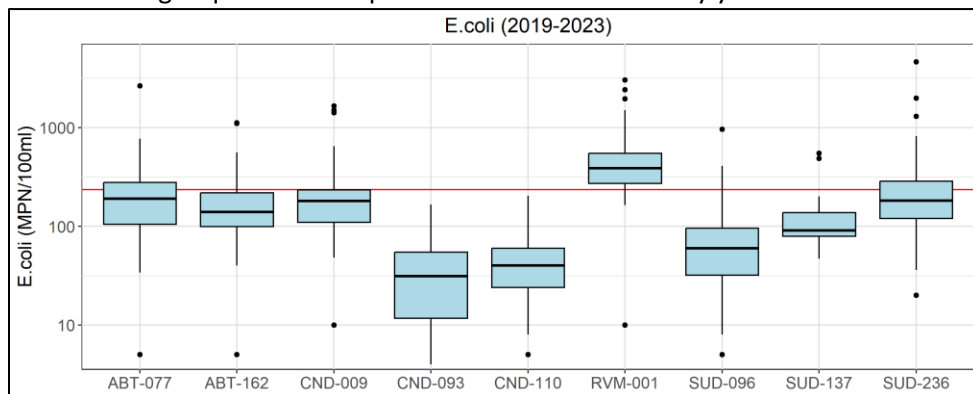
Graphs of E.coli Results by River (2023):



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.

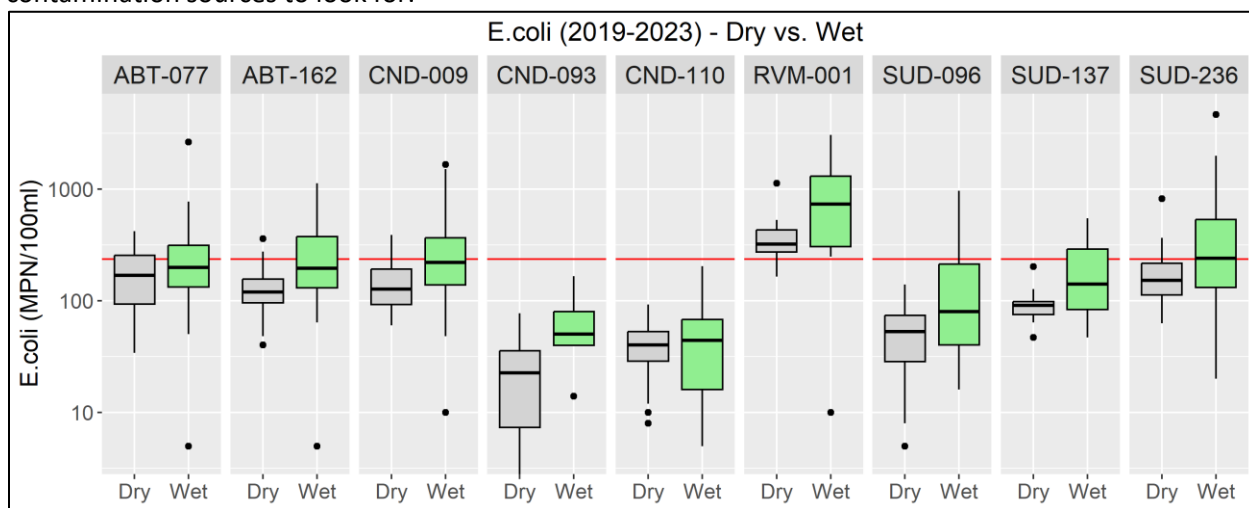
Full Data since 2019:

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, all of the sites consistently tend to a narrow range of bacterial contamination. Sites CND-093, CND-110, SUD-096, and SUD-137 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.



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 site SUD-137, 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:

