Jordan River Monitoring Report 2017

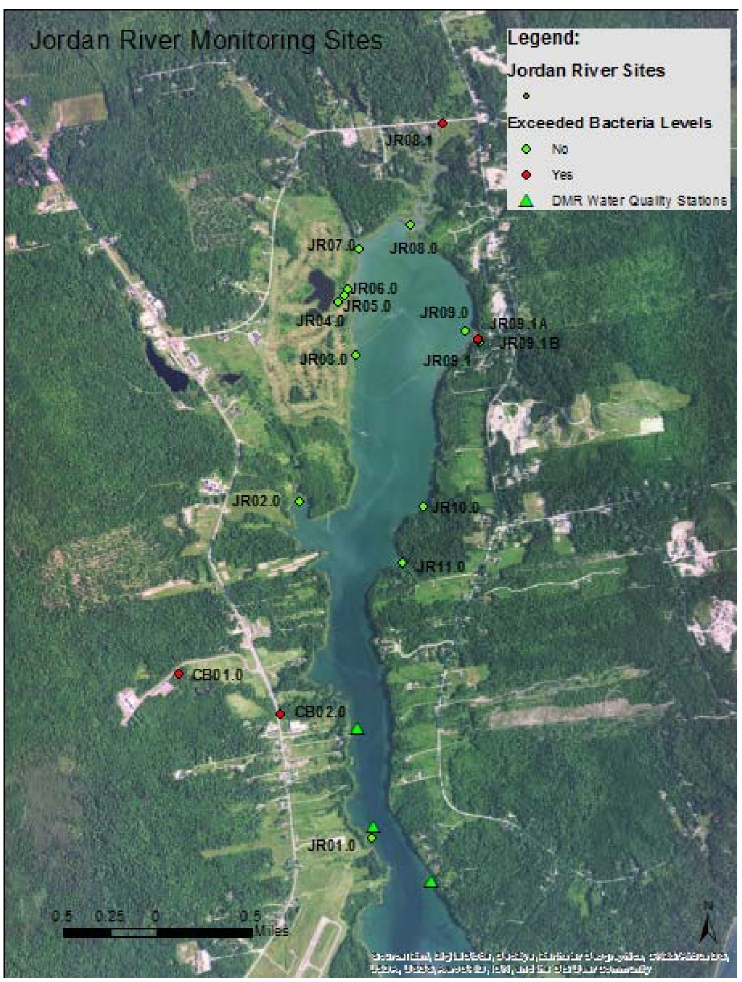
Ashley Taylor and Anna Farrell, Community Environmental Health Laboratory

MDI Biological Laboratory, Salisbury Cove, ME 04672

Executive Summary

In congruence with the Maine Department of Marine Resources' efforts to monitor declining water quality in the Jordan River, Frenchman Bay, Maine, the Community Lab at MDI Biological Laboratory implemented regular water quality monitoring at additional sites in the watershed to supplement the work of the DMR. Water samples were collected weekly between June and August of 2017 by staff and students from the Community Lab. Samples were collected via boat and by car to reach additional intermittent streams and smaller tributaries that feed into the Jordan River. Samples were analyzed for *Enterococcus* bacteria, optical brighteners, and salinity. A goal of this work was to identify potential pollution sources and increase water quality knowledge in this area to help provide additional information to consider in regards to shellfish closure. All monitoring data and results were entered into the Anecdata.org Jordan River Monitoring Project to keep data updated, easily accessible, and open to the public.

Jordan River, Water Quality Survey Sites



Introduction

Between June 9, 2017 and August 31, 2017, 122 Jordan River water samples across 16 sites were collected and analyzed for *Enterococcus* bacteria, Optical Brighteners, and salinity.

An exploratory visit to sites JR08.1 and JR09.1 was conducted on June 9th, 2017 to evaluate site accessibility. With input from project leads at the DMR and institutional knowledge, site selection was finalized by June 13th, 2017. Throughout the season, four experimental sites were tested and then included in the weekly monitoring events as they were close in proximity to sites with past or current elevated levels of *Enterococcus* bacteria. While new sites were added during the sampling season, five were only sampled a few times and then discontinued from the monitoring rotation, either due to consistently low bacteria results or deemed that the area was already receiving sufficient sampling.

Methods

What we tested for: The variables assessed in the water quality sampling were: water temperature, salinity, *Enterococcus* bacteria, and optical brighteners.

Why we monitored for these variables:

Enterococcus bacteria is an indicator of fecal matter presence in the water, which is a carrier of pathogenic organisms. It is found in fecal matter of all mammals and thus without further analysis or testing of water samples, it is impossible to determine if *Enterococcus* bacteria is from a human or wildlife source.

Optical brighteners are added to laundry detergents to increase clothing brightness. They are not harmful themselves, but instead can denote a potential human source of pollution. When optical brighteners are found in a watershed area it can indicate waste water that was inadequately or untreated and is entering the system.

How samples were collected and analyses were conducted:

Samples from sites: JR01.0, JR02.0, JR03.0, JR04.0, JR05.0, JR06.0, JR07.0, JR08.0, JR09.0, JR10.0, JR11.0 were collected via boat every Thursday at 0930, depending if the tide allowed for sufficient access to upper river sites. At low to mid tide, JR05.0 through JR09.0 are inaccessible. Samples from sites: CB01.0, CB02.0, JR08.1, JR09.1, JR09.1A, and JR09.1B were collected by car via road access every Thursday after boat sampling had finished. In addition to the weekly sampling schedule, samples were collected if there was an adverse rain event. As noted in the DMR's protocol, an adverse rainfall event is when there has been over 0.75" of rain over the previous 24 hours. We did not collect any adverse rainfall event samples this summer.

Optical brightener samples were collected in conjunction with our bacteria samples. In order to avoid contamination, the samples should not come into contact with clothes as these can set off false readings. If samples are not kept dark after the point of collection, the compounds may degrade from the light. The holding period for samples is seven days and they do not need to be kept ice. The typical threshold values for contamination is 100 ug/l. However, organic matter can interfere and elevate the reading and thus this threshold is not always a good metric for indicating human-sourced pollution.

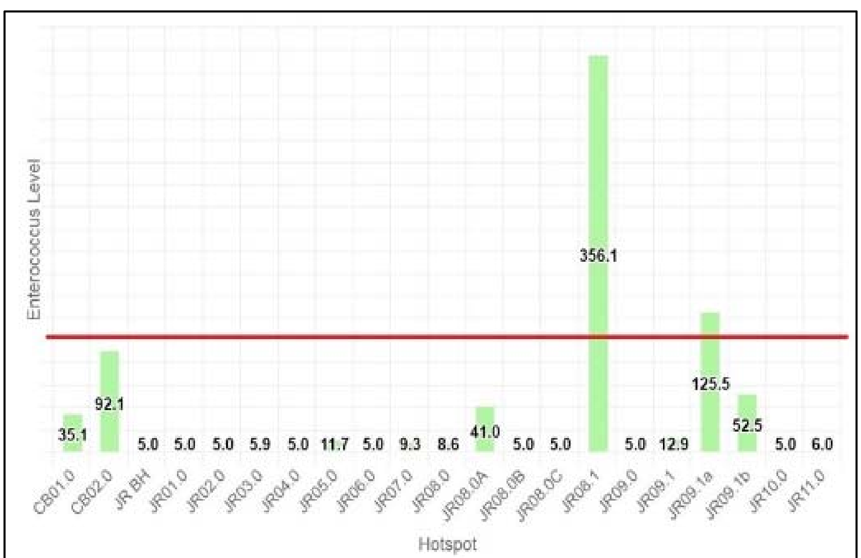


Figure 1. Bar graph of monitoring sites and their average Entercoccus level. Downloaded from Anecdata.org.

Additional data on environmental characteristics were recorded, including: air and water temperature, tidal stage, weather, currents, surface conditions, cooler temperature, precipitation in the last 48 hours, and pollution indicators. Temperatures were recorded from a digital thermometer. Tide stage was determined using a U.S. harbors tide chart. Weather was recorded based on observations in the field while sampling. Precipitation levels were determined using data online from Wunderground weather.

Results and Discussion

Scope of Monitoring: We conducted 15 sampling events between 6/2017 and 8/2017, collecting and analyzing 122 samples.

Bacteria: Of the 122 samples collected and analyzed, 19 exceeded the EPA standard for recreational water contact, which is 104 MPN/100 ml for salt water, and 60 MPN/100 ml freshwater. Of these 19 samples that exceeded the healthy limits, they all came from 5 of our 22 sites sampled. All 5 of these sites are freshwater. None of our saltwater sites ever exceeded the 104 MPN/100 ml threshold.

Sites	6/22/17	6/29/17	7/6/17	7/13/17	7/20/17	7/27/17	8/3/17	8/10/17	8/17/17	8/24/17
JR08.1		172.3		298.7	80.5	435.2	114.5	127.4	2419.6	816.4
CB02.0		350	73.8	118.7		103.9	120.1			
JR09.1a	122.3			104.6	866.4					
CB01.0		135		70.3						
JR09.1b					266					

Figure 2. Table of sites, dates, and Enterococcus levels (MPN) that exceed EPA threshold.

Of the sampling dates in the table in *Figure 2.* 6/29 and 7/13 both coincided with light rain events (0.1 – 0.4 in over 24 hours).

Optical Brighteners: Roughly half of our samples (60) were shipped to Meagan Sims, Southern Maine Field Coordinator with the Maine Healthy Beaches Program, for optical brightener testing throughout the season. Five of those samples exceeded the 100 ug/l threshold, all of which were collected at two sites, CB01.0 and CB02.0 (see *Figure 3.*).

Site	Date	Concentration
CB01.0	7/6/2017	114.0
CB02.0	7/6/2017	108.0
CB02.0	8/10/2017	109.0
CB01.0	8/10/2017	125.0
CB01.0	8/17/2017	122.0

Figure 3 Table of sites, dates, and optical brightener concentrations.

However, despite these samples having high concentrations, it is unlikely that they are indeed showing a positive result for optical brighteners. The water from these two sites is consistently a tan color and were flagged by the testing lab as having substantial potential interference with tannins/humic substances due to the coloration of the sample and therefore the results are likely inflated.

Conclusions

After 15 days of water sample collection and analysis of 122 samples, there were only 19 samples at five sites that exceeded the EPA recreational water safety levels. The site, JR08.1, a culvert off of Route 204 in Lamoine, had the most samples that contained bacteria counts above safe levels. It also had the highest *Enterococcus* level of all sites throughout the season at >2,419.6 MPN 100/ml.

Samples from sites CB01.0 and CB02.0 also were above the safe threshold, twice and five times respectively, this season. These sites were also the only two with positive optical brightener results, however it is unlikely that they are true results. These sites are part of Crippens Brook that contains high humic (dead organic matter)/organic content and is likely skewing the optical brightener results.

Recommendations

It is recommended that adverse rainfall event sampling continue this fall as higher flows may reveal different *Enterococcus* bacterial level trends.