

Section 5-2

Androscoggin River (Friends of Merrymeeting Bay)

Refer to Chapter 4 of this document for information about sampling methods, sampling sites, and quality assurance.

Overview

The lower Androscoggin River is monitored by the Friends of Merrymeeting Bay (FOMB). FOMB has been in existence since 1975 and focuses on protecting the Merrymeeting Bay watershed through research, education, advocacy, and land conservation. They have been monitoring the lower part of the Androscoggin River, tributaries to Merrymeeting Bay, and the Bay since 1999. Their monitoring has extended up the Androscoggin at times (depending on volunteers) to Livermore Falls. FOMB joined the VRMP in 2009 with an interest in bringing about water classification upgrades when possible.

The Androscoggin River is the third largest river in the state. It has a length of 177 miles and drainage area of 3,450 square miles (2,730 sq. mi. in Maine).¹ The headwaters are Umbagog Lake in Maine/New Hampshire. From there it flows into New Hampshire and then back into Maine through the towns of Gilead and Bethel. It continues flowing through the towns and cities of Rumford, Mexico, Dixfield, Jay, Livermore Falls, Lewiston, Auburn, Lisbon, Lisbon Falls, Durham, Brunswick, and Topsham where it joins the Kennebec River at Merrymeeting Bay.

The Androscoggin River is assigned Class B from the Maine/New Hampshire boundary to its confluence with the Ellis River. It is assigned Class C from the confluence with the Ellis River to Merrymeeting Bay. The “DEP 2012 Integrated Water Quality Monitoring and Assessment Report” lists segments of the main stem in 4 categories:

- **Category 4-A:** Rivers and Streams with Impaired Use Other than Mercury, TMDL completed. Androscoggin River, Lewiston-Auburn. CSO affected. Cause of impairment is *E. coli*.
- **Category 4-B:** Rivers and Streams Impaired by Pollutants-Pollution Control Requirements Expected to Result in Attainment. A number of segments are listed. The cause of non-attainment is dioxin.
- **Category 4-C:** Rivers and Streams with Impairment not Caused by a Pollutant. Main stem, from Pejepscot dam to Brunswick dam. Cause is fish passage barrier- aquatic life impairment due to inadequate fish passage for American Shad at Brunswick dam.
- **Category 5-D:** Rivers and Streams Impaired by Legacy Pollutants. A number of segments are listed in Category 5-D. The cause of non-attainment is polychlorinated biphenyls (PCBs).

The Androscoggin River has a long history of industrial and municipal use over the last 200 years.¹ Beginning in the early 1800s, many dams were constructed for mills, primarily in the lower part of the river. By the late 1800s, many textile and lumber mills were in operation, mostly from Lewiston to Brunswick. Pulp and paper mills that are still in operation today were established in the late 1800s in

¹ Maine Rivers Website- Androscoggin River Profile

New Hampshire, Rumford, and Jay. Beginning in the late 1920s, Central Maine Power built hydroelectric dams that impounded much of the river from Lewiston to Livermore Falls. Some of these uses continue today. “Along its course to the sea, the river is repeatedly dammed. It receives discharges from industrial and municipal sources, as well as polluted runoff from a variety of sources.”² Specific problems include mill discharges, combined sewer overflows (CSOs), dam impacts (28 dams exist), and historical sediment toxins.

The primary purpose of monitoring performed by FOMB, done under the VRMP, is to acquire data that will facilitate the water quality classification upgrade of the lower portion of the Androscoggin River. FOMB currently monitors at numerous sites from Merrymeeting Bay upstream to Lewiston. Three of FOMB’s sampling sites are VRMP approved sites and five are non-approved sites.

In 2011, FOMB requested that two of the three approved sites (Water Street Mooring, WSM and Brunswick Canoe Mooring, BCM) be moved from mid-channel to shore. They submitted monitoring data from mid-channel and shore to demonstrate similarity. The Department approved relocation of these approved sites. FOMB renamed these sites Brunswick Water Street (BWS) and Brunswick Canoe Portage (BCP), respectively.

Methods

The volunteers monitored the Androscoggin River in 2013 at three approved stations [BBB, BWS, BCP] and five non-approved stations [DBL, BIL, FPD, FPU, PBL] on the main stem (Table 5-2-1 and Figure 5-2-1).

Table 5-2-1: Friends of Merrymeeting Bay sampling sites at Androscoggin River.

| VRMP Site ID | Organization Site Code | Sample Location | Class |
|--------------------------------|------------------------|-----------------------------|-------|
| Androscoggin River-A231-VRMP | BBB | Bay Bridge Jetty | C |
| Androscoggin River-A281BK-VRMP | BWS | Brunswick Water Street | C |
| Androscoggin River-A299BK-VRMP | BCP | Brunswick Canoe Portage | C |
| Androscoggin River- A24-FOMB | BIL | Brunswick Interstate Ledges | C |
| Androscoggin River-A45-FOMB | FPD | Fish Park Downstream | C |
| Androscoggin River-A47-FOMB | FPU | Fish Park Upstream | C |
| Androscoggin River-A71-FOMB | PBL | Pejepscot Boat Launch | C |
| Androscoggin River-A158-FOMB | DBL | Durham Boat Launch | C |

² Androscoggin River Alliance Website-Androscoggin River slideshow

2013 Androscoggin River Sampling Sites Friends of Merrymeeting Bay

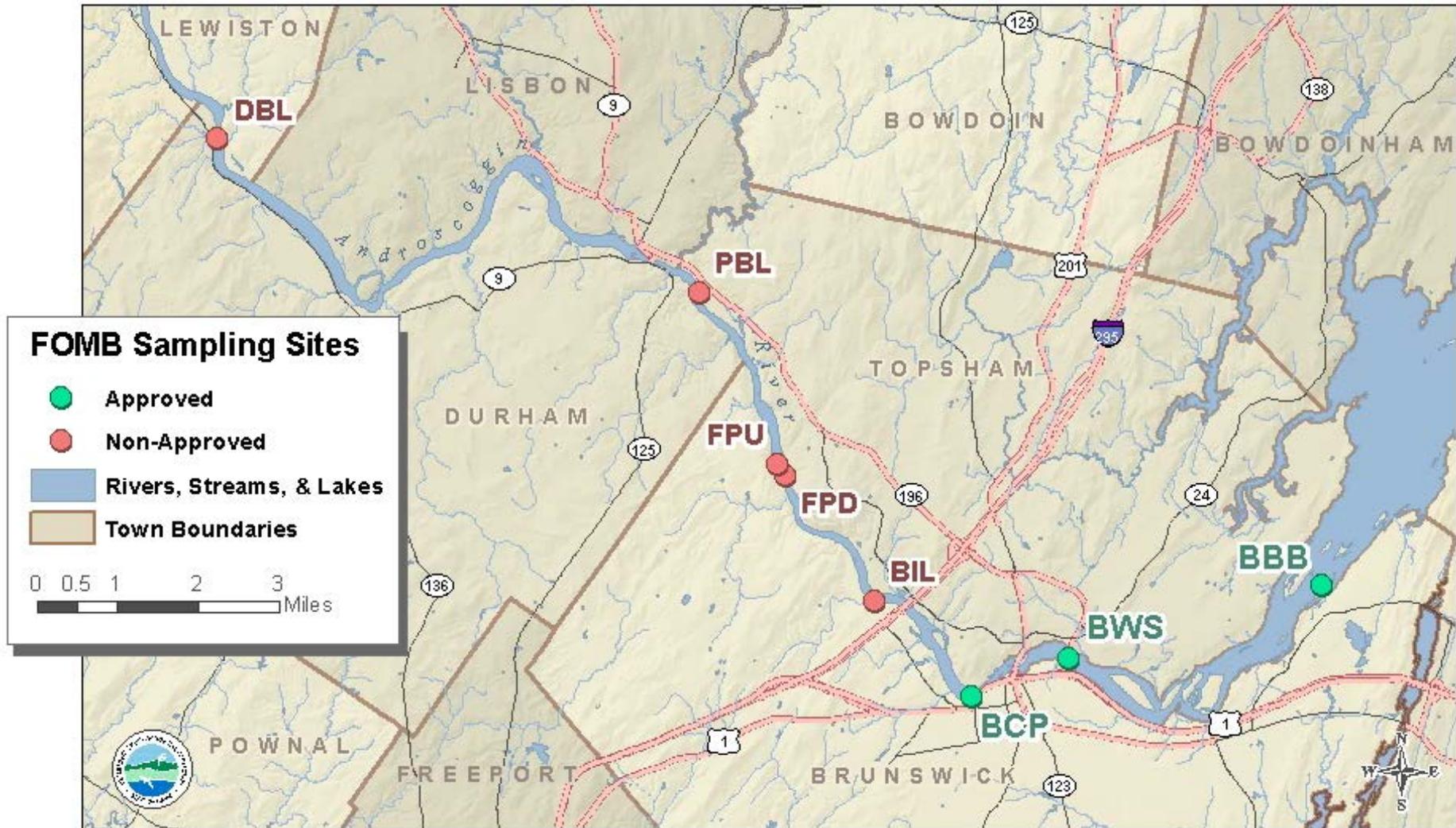


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

Monitoring was conducted from May through August-September, once per month. At each site, the monitors made direct measurements of water temperature, dissolved oxygen, and specific conductance using a handheld YSI 85 meter. Samples were also collected for *E. coli* bacteria at the three approved sites with a DEP designed bacteria sampling device or extension pole (which uses sterile whirl-paks for water collection). Bacteria samples were delivered to Bowdoin College for analysis by FOMB volunteers. Bacteria monitoring was also done at the non-approved sites, but since sampling at these sites does not meet VRMP requirements the data is not included.

The approved sites met VRMP requirements for sampling laterally and vertically in the river to obtain well-mixed representative samples. As noted in the previous section, two of the approved sites were sampled from shore. The third site was sampled from a jetty allowing for a representative and well-mixed area of the river to be monitored.

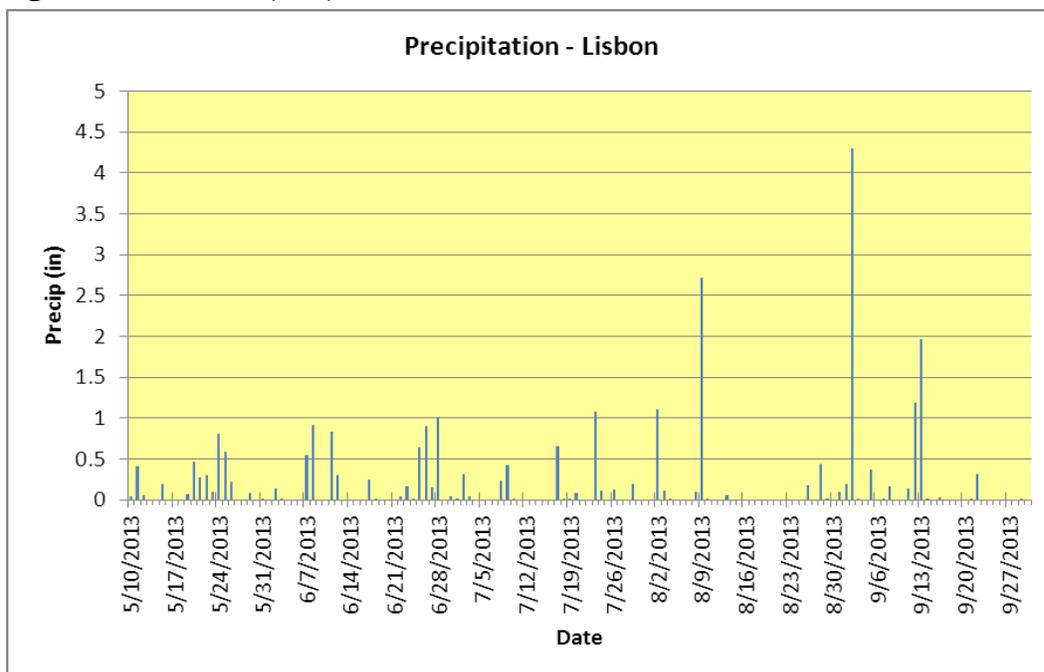
Results

Refer to Appendices A-1 and A-2 in discussion of individual site data and trends.

Precipitation

Figure 5-2-2 provides a graph of rainfall and sampling dates for the monitoring period. Rainfall data was obtained from Weather Underground (<http://www.wunderground.com>). Weather station (King Road-Lisbon (KMWLISBO07) choice was based on proximity and station with most complete records. If there was an airport station close by, this was chosen. This information provides an overview of rainfall events and can be useful in interpreting monitoring results for some parameters. Summer 2013 was wet with significant rain events in August and early September.

Figure 5-2-2: Seasonal precipitation measured at Lisbon.



Dissolved Oxygen

Dissolved oxygen (DO) was measured 1-5 times at each of the eight sampling sites (Figure 5-2-3 and Figure 5-2-4; Table 5-2-2 and Table 5-2-3). Monitoring occurred from May to August-September. Class C criteria for DO are a minimum of 5.0 mg/l (milligrams/liter) or 60% saturation, whichever is higher. Class B criteria are a minimum of 7.0 mg/l or 75% saturation, whichever is higher. To meet water quality criteria, both concentration and saturation standards must be met.

Figure 5-2-3: Graph of dissolved oxygen concentrations.

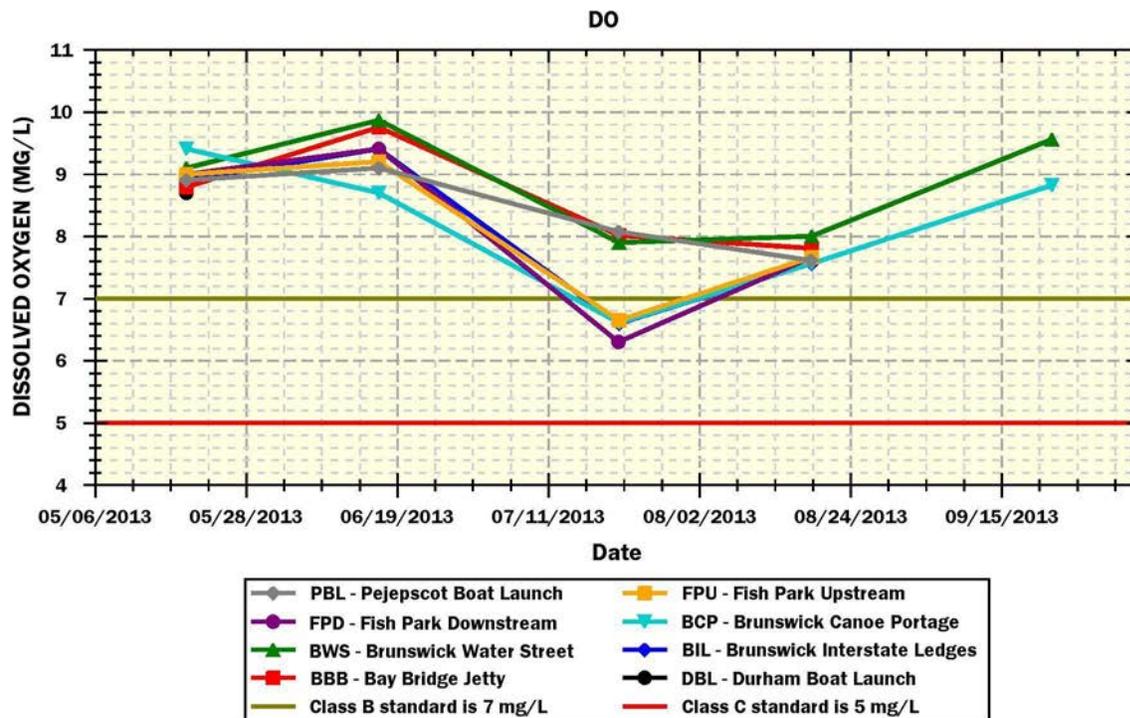


Table 5-2-2: A summary of minimum, maximum, and average dissolved oxygen concentration values (mg/l) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

| Site | Approved Site | # of Samples | Minimum Value | Maximum Value | Average Value |
|------|---------------|--------------|---------------|---------------|---------------|
| BBB | Y | 4 | 7.8 | 9.8 | 8.6 |
| BWS | Y | 5 | 7.9 | 9.9 | 8.9 |
| BCP | Y | 5 | 6.6 | 9.4 | 8.2 |
| BIL | N | 4 | 6.6 | 9.4 | 8.1 |
| FPD | N | 4 | 6.3 | 9.4 | 8.1 |
| FPU | N | 4 | 6.7 | 9.2 | 8.1 |
| PBL | N | 4 | 7.6 | 9.1 | 8.4 |
| DBL | N | 1 | 8.7 | 8.7 | 8.7 |

Figure 5-2-4: Graph of dissolved oxygen saturation

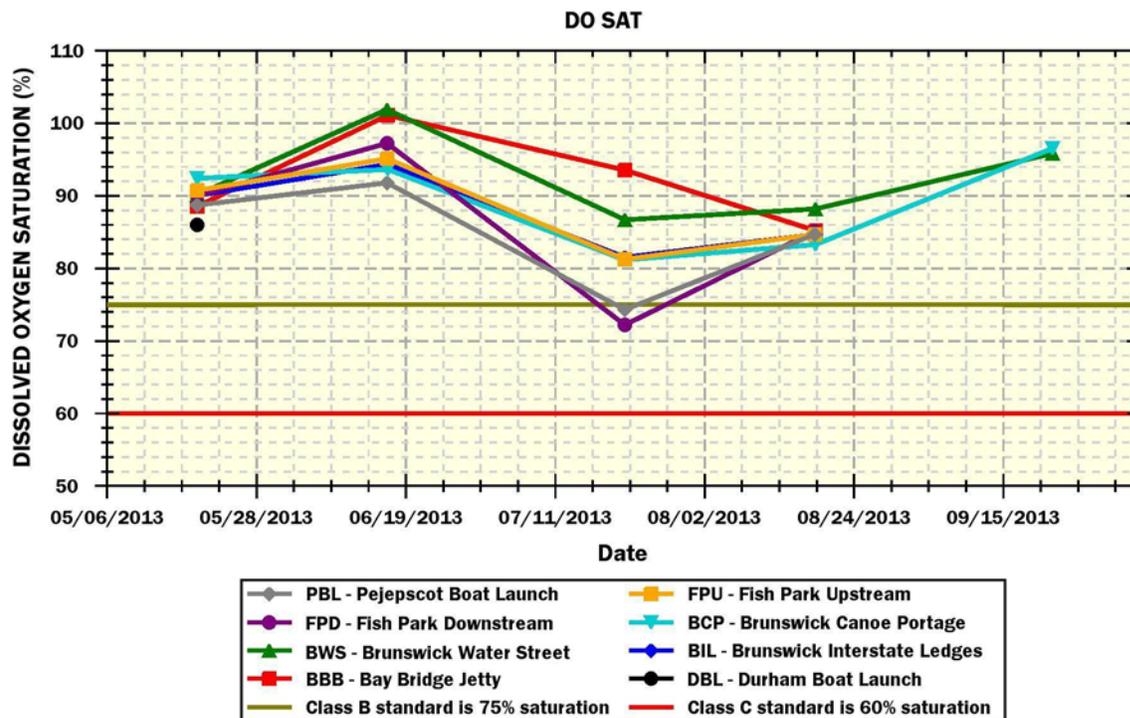


Table 5-2-3: A summary of minimum, maximum, and average dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

| Site | Approved Site | # of Samples | Minimum Value | Maximum Value | Average Value |
|------|---------------|--------------|---------------|---------------|---------------|
| BBB | Y | 4 | 85.2 | 101.1 | 92.1 |
| BWS | Y | 5 | 86.7 | 101.9 | 92.5 |
| BCP | Y | 5 | 81.1 | 96.5 | 89.4 |
| BIL | N | 4 | 81.5 | 94.3 | 87.6 |
| FPD | N | 4 | 72.2 | 97.2 | 86.1 |
| FPU | N | 4 | 81.2 | 95.1 | 87.9 |
| PBL | N | 4 | 74.3 | 91.8 | 84.9 |
| DBL | N | 1 | 86.0 | 86.0 | 86.0 |

Dissolved oxygen concentrations measured at Androscoggin River sites ranged from 6.3 mg/l to 9.9 mg/l. Sites BBB and BWS which are below the Brunswick dam were similar with values ranging from 7.8 mg/l to 9.9 mg/l. All values were above the Class C standard of 5.0 mg/l and Class B standard of 7.0 mg/l. Site BCP values were lower than Sites BBB and BWS, except for the May date. The July value was (6.6 mg/l) was below the Class B standard. The non-approved sites [BIL, FPD, FPU, PBL, and DBL (sampled 1X)] were overall similar with the exception of 1 date. Sites BIL, FPD and FPU were lower than Site PBL in July and a bit lower in August. These 3 sites were below the Class B standard in July.

Dissolved oxygen saturation followed a similar pattern as dissolved oxygen concentration. Sites BBB and BWS were similar and Site BCP generally a bit lower than these 2 sites. Saturation for these sites ranged from 81.1% to 101.9%. The non-approved sites' values ranged from 72.2% to 97.2%. Values at these sites were similar with the exception of July. In July Sites FPD and PBL had values below the Class B standard of 75% saturation.

Friends of Merrymeeting Bay volunteers do a good job of getting out early in the morning to sample. All but 1 of the 31 measurements were taken by 8:00 am or earlier. This is the recommended time to sample because DO is lowest at this time of day. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen enters the river from the atmosphere as the water is more turbulent and there is more opportunity for re-aeration. Cooler water holds more oxygen.

Water Temperature

Temperature was measured 1-5 times at each of the eight sampling sites (Figure 5-2-5 and Table 5-2-4). Monitoring occurred from May through August-September. Maine's Regulations Relating to Temperature (06-096 CMR Chapter 582) require that discharge of pollutants not raise the temperature of any river and stream above the EPA criteria for indigenous species (23°C maximum and 19°C weekly average) or 0.3°C (0.5°F) above the temperature that would naturally occur outside a mixing zone established by the Board of Environmental Protection. Pollutant is defined in statute as many things including dirt and heat. For tidal waters, discharge of pollutants may not raise the temperature more than 4°F (2.2°C) or more than 1.5°F (0.8°C) from June 1 to September 1, and may not cause the temperature of any tidal waters to exceed 85°F (29°C) at any point outside a mixing zone established by the Board of Environmental Protection.

Figure 5-2-5: Graph of temperature

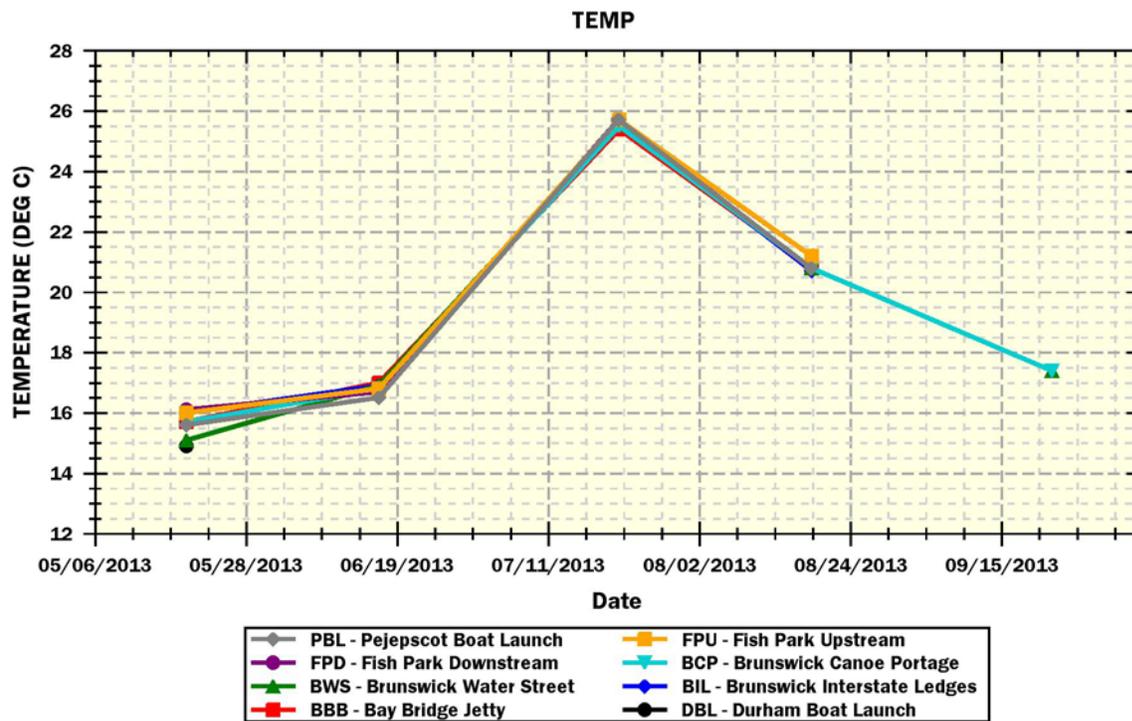


Table 5-2-4: A summary of minimum, maximum, and average water temperature (°C) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

| Site | Approved Site | # of Samples | Minimum Value | Maximum Value | Average Value |
|------|---------------|--------------|---------------|---------------|---------------|
| BBB | Y | 4 | 15.7 | 25.4 | 19.7 |
| BWS | Y | 5 | 15.1 | 25.6 | 19.2 |
| BCP | Y | 5 | 15.7 | 25.5 | 19.2 |
| BIL | N | 4 | 16.0 | 25.6 | 19.8 |
| FPD | N | 4 | 16.1 | 25.7 | 19.9 |
| FPU | N | 4 | 16.0 | 25.7 | 19.9 |
| PBL | N | 4 | 15.6 | 25.7 | 19.7 |
| DBL | N | 1 | 14.9 | 14.9 | 14.9 |

Temperatures measured at all the Androscoggin River sites ranged from 14.9°-25.7°C (Celsius). All of the sites had very similar temperatures. Temperature was very high in July (25.4°-25.7°C) and high in August (20.7°-21.2°C). Since measurements are taken close to the surface [mid-depth (1-1.5 ft.)], it is not too surprising that temperatures can get quite warm in July and August in the large open river.

Specific Conductance

Specific conductance was measured 1-5 times at each of the eight sampling sites as well (Figure 5-2-6 and Table 5-2-5). Monitoring occurred from May through August-September. Specific conductance is related to the amount of dissolved materials in the water. While there are no numerical standards, a relationship exists between conductivity and chloride which has numerical criteria. In general, streams located in urban areas tend to have high specific conductance due to polluted urban stormwater runoff. This may also in large part be due to salt buildup in surface and groundwater from road maintenance practices. Also, discharges from pulp and paper mills upstream measurably increase the conductivity of the river.

Figure 5-2-6: Graph of specific conductance

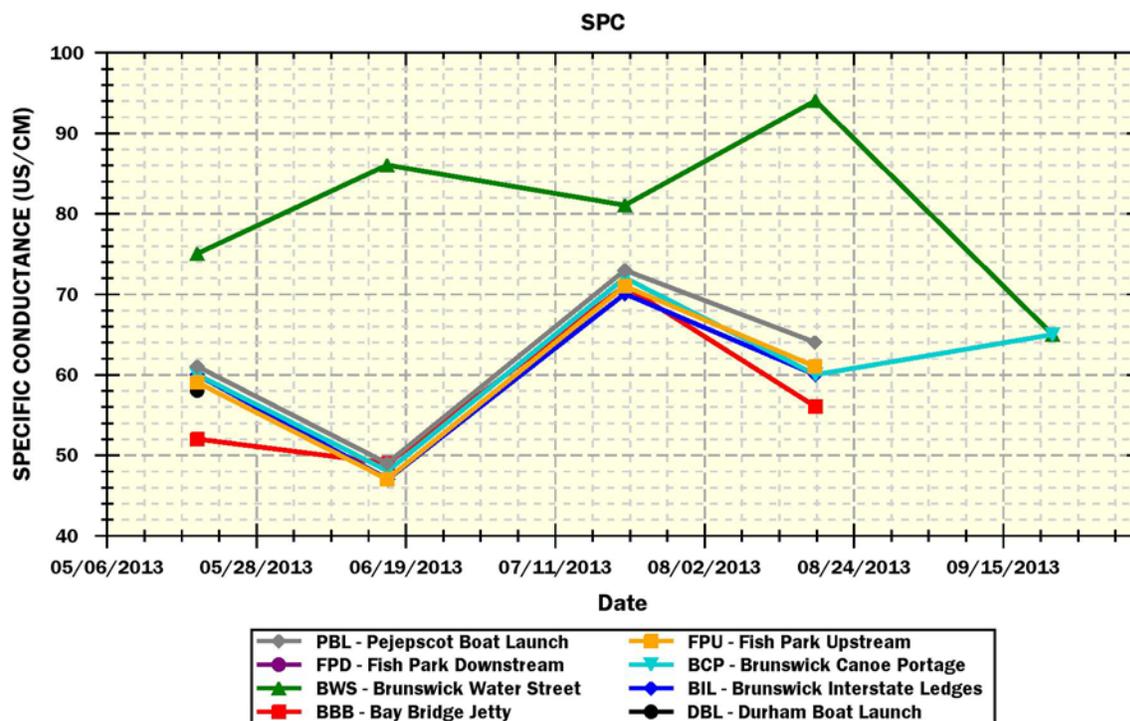


Table 5-2-5: A summary of minimum, maximum, and average specific conductance values (micro-ohms/cm, $\mu\text{S/cm}$) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

| Site | Approved Site | # of Samples | Minimum Value | Maximum Value | Average Value |
|------|---------------|--------------|---------------|---------------|---------------|
| BBB | Y | 4 | 49 | 71 | 57 |
| BWS | Y | 5 | 65 | 94 | 80 |
| BCP | Y | 5 | 48 | 72 | 61 |
| BIL | N | 4 | 47 | 70 | 59 |
| FPD | N | 4 | 47 | 71 | 60 |
| FPU | N | 4 | 47 | 71 | 60 |
| PBL | N | 4 | 49 | 73 | 62 |
| DBL | N | 1 | 58 | 58 | 58 |

Specific conductance at all the sites ranged from 47-94 $\mu\text{S/cm}$. All of the sites were very similar with the exception of Site BCP which was always slightly higher. All the values were below 100 $\mu\text{S/cm}$ which is considered low, but somewhat elevated from natural background values reflecting point and non-point source effects.

Bacteria

Escherichia coli bacteria were measured 4-5 times at each of the eight sampling sites (Figure 5-2-7 and Table 5-2-6). Monitoring occurred from May through August-September. Enterococcus bacteria are used as the indicator organism for marine waters, and *E. coli* bacteria are used for freshwaters. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms including bacteria and viruses that can cause gastrointestinal illnesses. Class C criteria for bacteria are as follows: “Between May 15th and September 30th, the number of *Escherichia coli* of human and domestic origin shall not exceed a geometric mean of 126/100 ml (milliliters) or an instantaneous level of 236/100 ml.” Class B criteria are as follows: “Between May 15th and September 30th, the number of *Escherichia coli* of human and domestic origin shall not exceed a geometric mean of 64/100 ml (milliliters) or an instantaneous level of 236/100 ml.” Geometric means are calculated instead of averages because measures like bacteria often have a few very large values that strongly influence the mean and make it a poor predictor.

Figure 5-2-7: Graph of E. coli (MPN/ml)

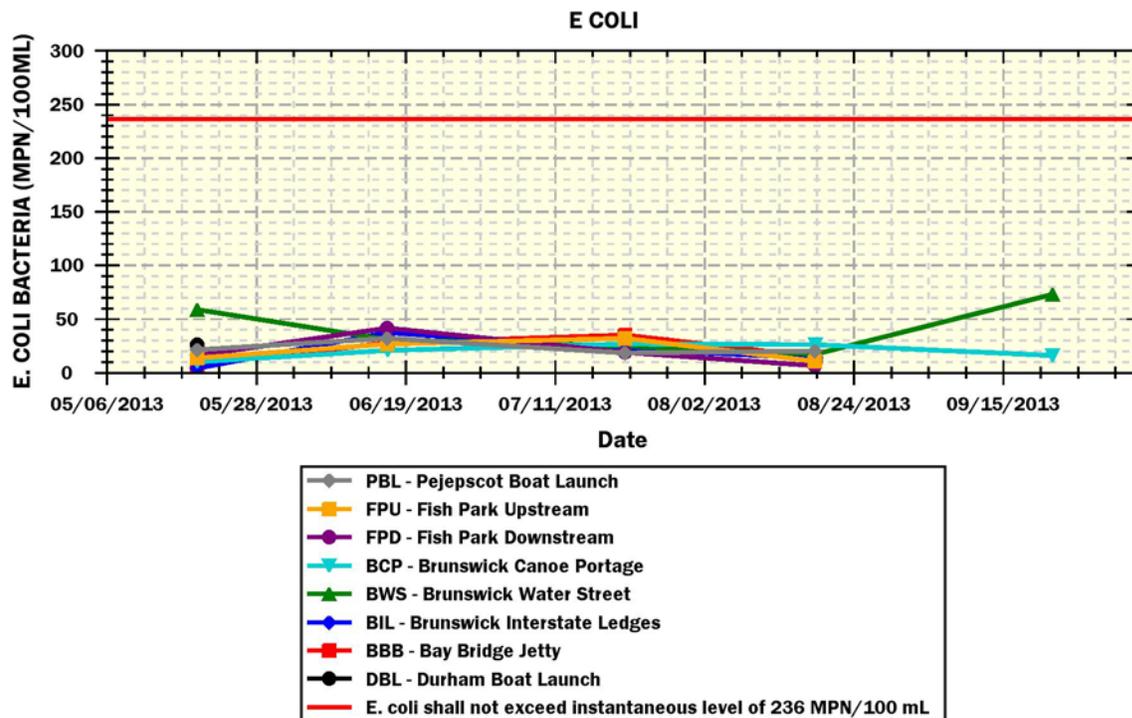


Table 5-2-6: A summary of minimum, maximum, and geometric mean values (MPN/100mL) for bacteria at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

| Site | Bacteria Type | # of Samples | Minimum Value | Maximum Value | Geometric Mean |
|------|----------------|--------------|---------------|---------------|----------------|
| BBB | <i>E. coli</i> | 4 | 7 | 35 | 18 |
| BCP | <i>E. coli</i> | 5 | 10 | 27 | 18 |
| BIL | <i>E. coli</i> | 4 | 4 | 37 | 14 |
| BWS | <i>E. coli</i> | 5 | 17 | 73 | 36 |
| DBL | <i>E. coli</i> | 1 | 26 | 26 | 26 |
| FBU | <i>E. coli</i> | 4 | 11 | 32 | 19 |
| FPD | <i>E. coli</i> | 4 | 6 | 41 | 17 |
| PBL | <i>E. coli</i> | 4 | 18 | 32 | 22 |

E. coli bacteria ranged from 4/100 ml. to 73/100 ml. None of the sites had values exceeding the instantaneous criterion of 236/100 ml for both Class C and Class B. Also, none of the sites exceeded the Class C criterion for geometric mean of 126/100 ml or Class B criterion of 64/100 ml. Typically, observed high bacterial levels are associated with stormwater runoff and/or combined sewer overflows. There were significant rain events in August and September. However, none of the sampling events coincided with significant rain events.

Discussion and Recommendations

There are numerous sources of pollution and other stresses to the Androscoggin River sites monitored by the Friends of Merrymeeting Bay that could potentially have an impact on water quality. Some of those sources of pollution and stress may include:

- Point source pollution (pollution originating from a direct discharge including wastewater treatment plant discharge, combined sewer overflows and overboard discharges).
- Non-point source pollution (e.g., eroded soil, fertilizers, pesticides, heavy metals, petroleum residues, road salt, septic systems, wildlife and pet feces) and polluted stormwater originating from urban impervious surfaces (e.g., streets, parking lots, driveways, rooftops), agriculture, and forestry.
- Ponds and impoundments (which often create more pond-like aquatic habitat conditions that may have higher water temperatures and lower dissolved oxygen concentrations than free-flowing waters).
- Natural effects of wetlands (such as contributing waters to a stream/river that have low dissolved oxygen levels due to the decomposition of large amounts of organic matter, respiration of abundant plant matter, and low re-aeration rates that are characteristic of many wetlands).

The following are recommendations for future monitoring:

- Some of the sites are very similar. Friends of Merrymeeting Bay might consider dropping some sites that are close to each other. They should also consider adding new sites, including streams draining to the Androscoggin River.
- Bacteria monitoring should include a mix of sampling events to include both dry and runoff events. If possible, volunteer leaders could try to collect 1-2 bacteria samples during/after rain events.
- Continue monitoring at all stations (or at least a subset of sites) to develop a long-term trend database.

Appendix A-1. 2013 water quality data for "Approved" and "Non-Approved" sites. Non-Approved sites do not yet meet official VRMP sample location criteria and/or require further inspection and review.

* Sampling depths are only reported for Tier 1 VRMP sites.

** "N" = normal environmental sample ; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "TSS" = total suspended solids.

Refer to Appendix A-2 for observational data and quality assurance/quality control (QA/QC) notes.

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | * Sample Depth | Depth Unit | Water Temp (DEG C) | ** D.O. Sat. (%) | ** D.O. (MG/L) | ** Spec. Cond. (US/CM) | Salinity (PPTH) | Turbidity (NTU) | Total Diss. Solids (MG/L) | ** TSS (MG/L) | E Coli Bacteria (MPN/100ML) | Enterococci (MPN/100ML) |
|--|----------------------------------|-----------|---------|--------------------------|----------------|------------|--------------------|------------------|----------------|------------------------|-----------------|-----------------|---------------------------|---------------|-----------------------------|-------------------------|
| Androscoggin River, Friends of Merrymeeting Bay - Approved Sites: | | | | | | | | | | | | | | | | |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 5/19/2013 | 8:10 AM | N | | | 15.7 | 88.5 | 8.79 | 52 | | | | | 7.3 | |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 6/16/2013 | 7:50 AM | N | | | 17 | 101.1 | 9.75 | 49 | | | | | 27.9 | |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 7/21/2013 | 7:30 AM | N | | | 25.4 | 93.5 | 8.01 | 71 | | | | | 35 | |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 8/18/2013 | 8:00 AM | N | | | 20.8 | 85.2 | 7.81 | 56 | | | | | 14.8 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 5/19/2013 | 7:30 AM | N | | | 15.1 | 90.1 | 9.1 | 75 | | | | | 58.3 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 5/19/2013 | 7:30 AM | D | | | | | | | | | | | 55.4 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 6/16/2013 | 7:30 AM | N | | | 16.9 | 101.9 | 9.87 | 86 | | | | | 30.9 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 7/21/2013 | 7:50 AM | N | | | 25.6 | 86.7 | 7.9 | 81 | | | | | 25 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 8/18/2013 | 8:00 AM | N | | | 20.8 | 88.2 | 8 | 94 | | | | | 17.3 | |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 9/22/2013 | 7:00 AM | N | | | 17.4 | 95.8 | 9.56 | 65 | | | | | 72.7 | |

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | * Sample Depth | Depth Unit | Water Temp (DEG C) | ** D.O. Sat. (%) | ** D.O. (MG/L) | ** Spec. Cond. (US/CM) | Salinity (PPTH) | Turbidity (NTU) | Total Diss. Solids (MG/L) | ** TSS (MG/L) | E Coli Bacteria (MPN/100ML) | Enterococci (MPN/100ML) |
|-------------------------------|----------------------------------|-----------|---------|--------------------------|----------------|------------|--------------------|------------------|----------------|------------------------|-----------------|-----------------|---------------------------|---------------|-----------------------------|-------------------------|
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 5/19/2013 | 7:45 AM | N | | | 15.7 | 92.4 | 9.4 | 60 | | | | | 9.6 | |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 6/16/2013 | 7:40 AM | N | | | 16.8 | 93.6 | 8.7 | 48 | | | | | 20.3 | |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 7/21/2013 | 7:45 AM | N | | | 25.5 | 81.1 | 6.61 | 72 | | | | | 26.6 | |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 8/18/2013 | 7:45 AM | N | | | 20.8 | 83.2 | 7.56 | 60 | | | | | 25.9 | |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 9/22/2013 | 7:15 AM | N | | | 17.4 | 96.5 | 8.82 | 65 | | | | | 15.8 | |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 9/22/2013 | 7:15 AM | D | | | | | | | | | | | 20.1 | |

Androscoggin River, Friends of Merrymeeting Bay - Non-approved Sites:

| | | | | | | | | | | | | | | | | |
|-----|----------------------------------|-----------|---------|---|--|--|------|------|------|----|--|--|--|--|------|--|
| DBL | ANDROSCOGGIN RIVER - A158 - FOMB | 5/19/2013 | 7:10 AM | N | | | 14.9 | 86 | 8.7 | 58 | | | | | 26.2 | |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 5/19/2013 | 8:00 AM | N | | | 16 | 90 | 8.9 | 60 | | | | | 4.1 | |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 6/16/2013 | 7:55 AM | N | | | 16.9 | 94.3 | 9.4 | 47 | | | | | 37.3 | |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 7/21/2013 | 6:30 AM | N | | | 25.6 | 81.5 | 6.6 | 70 | | | | | 21.8 | |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 8/18/2013 | 7:30 AM | N | | | 20.7 | 84.6 | 7.56 | 60 | | | | | 13.2 | |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 5/19/2013 | 7:45 AM | N | | | 16.1 | 90 | 9 | 59 | | | | | 16 | |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 6/16/2013 | 7:30 AM | N | | | 16.7 | 97.2 | 9.4 | 47 | | | | | 41.4 | |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 7/21/2013 | 6:15 AM | N | | | 25.7 | 72.2 | 6.3 | 71 | | | | | 18.7 | |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 8/18/2013 | 7:15 AM | N | | | 21.2 | 85.1 | 7.66 | 61 | | | | | 6.3 | |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 5/19/2013 | 7:35 AM | N | | | 16 | 90.7 | 9 | 59 | | | | | 13.2 | |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 6/16/2013 | 7:10 AM | N | | | 16.8 | 95.1 | 9.2 | 47 | | | | | 26.6 | |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 6/16/2013 | 7:10 AM | D | | | 16.8 | 95.1 | 9.2 | 47 | | | | | 18.7 | |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 7/21/2013 | 6:20 AM | N | | | 25.7 | 81.2 | 6.65 | 71 | | | | | 31.6 | |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 8/18/2013 | 7:15 AM | N | | | 21.2 | 84.6 | 7.66 | 61 | | | | | 10.7 | |

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | * Sample Depth | Depth Unit | Water Temp (DEG C) | ** D.O. Sat. (%) | ** D.O. (MG/L) | ** Spec. Cond. (US/CM) | Salinity (PPTH) | Turb- idity (NTU) | Total Diss. Solids (MG/L) | ** TSS (MG/L) | E Coli Bacteria (MPN/ 100ML) | Entero- cocci (MPN/ 100ML) |
|---------------------------|---------------------------------|-----------|---------|-----------------------------------|----------------------|---------------|-----------------------|------------------------|----------------------|---------------------------------|--------------------|-------------------------|------------------------------------|---------------------|---------------------------------------|-------------------------------------|
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 5/19/2013 | 6:40 AM | N | | | 15.6 | 88.7 | 8.9 | 61 | | | | | 21.1 | |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 5/19/2013 | 6:40 AM | D | | | 15.6 | 88.8 | 9 | 61 | | | | | 17.3 | |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 6/16/2013 | 6:45 AM | N | | | 16.5 | 91.8 | 9.1 | 49 | | | | | 31.8 | |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 7/21/2013 | 6:00 AM | N | | | 25.7 | 74.3 | 8.07 | 73 | | | | | 18.1 | |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 8/18/2013 | 6:15 AM | N | | | 20.8 | 84.6 | 7.61 | 64 | | | | | 19.9 | |

Appendix A-2. 2013 observational data and quality assurance/quality control (QA/QC) notes for "approved" and "non-approved" sites.
 ** "N" = normal environmental sample; "D" = field duplicate; "L" = lab duplicate
 Refer to Appendix A-1 for water quality data

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | Flow | Stage | Air Temp (°C) | Sample Location | Current Weather | Air Condition | Past 24HR Weather | Habitat | Tide Stage | Water Appearance | Comments |
|--|----------------------------------|-----------|---------|--------------------------|-----------|-------|---------------|-----------------|-----------------|---------------|----------------------|---------|------------|------------------|---|
| Androscoggin River, Friends of Merrymeeting Bay - Approved Sites: | | | | | | | | | | | | | | | |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 5/19/2013 | 8:10 AM | N | BASE FLOW | MED | 12.8 | WADING | MOSTLY CLOUDY | BREEZE | MOSTLY CLOUDY | RIFFLE | | DARKLY STAINED | WADEABLE/MID-DEPTH |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 6/16/2013 | 7:50 AM | N | BASE FLOW | HIGH | 18.3 | WADING | CLEAR | CALM | CLEAR | RUN | | | EXTREMELY HIGH TIDE WADEABLE/MID-DEPTH |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 7/21/2013 | 7:30 AM | N | BASE FLOW | MED | 23.2 | WADING | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. |
| BAY BRIDGE JETTY (BBB) | ANDROSCOGGIN RIVER - A231 - VRMP | 8/18/2013 | 8:00 AM | N | | LOW | 17 | BANK | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 5/19/2013 | 7:30 AM | N | BASE FLOW | MED | 12.8 | WADING | MOSTLY CLOUDY | BREEZE | MOSTLY CLOUDY | RIFFLE | | DARKLY STAINED | WADEABLE/MID-DEPTH |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 5/19/2013 | 7:30 AM | D | | | | WADING | | | | | | | WADEABLE/MID-DEPTH |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 6/16/2013 | 7:30 AM | N | BASE FLOW | HIGH | 18.3 | WADING | CLEAR | CALM | CLEAR | RUN | | TURBID | EXTREMELY HIGH TIDE WADEABLE/MID-DEPTH |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 7/21/2013 | 7:50 AM | N | | | 25.2 | WADING | CLEAR | CALM | CLEAR | | | | WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. DID NOT RECORD OBSERVATIONAL DATA. |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 8/18/2013 | 8:00 AM | N | BASE FLOW | LOW | 17.2 | WADING | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. |
| WATER STREET MOORING (WSM) | ANDROSCOGGIN RIVER - A281 - VRMP | 9/22/2013 | 7:00 AM | N | BASE FLOW | HIGH | 18.2 | BANK | CLOUDY, SHOWERS | | CLOUDY | RUN | | DARKLY STAINED | WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 5/19/2013 | 7:45 AM | N | BASE FLOW | MED | 15 | WADING | PARTLY CLOUDY | CALM | CLEAR, PARTLY CLOUDY | RUN | | DARKLY STAINED | WADEABLE/1.5 FT BELOW SURFACE |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 6/16/2013 | 7:40 AM | N | BASE FLOW | HIGH | | WADING | CLEAR | | CLEAR | RUN | | DARKLY STAINED | LOTS OF PINE POLLEN NO VERTICAL DEPTH RECORDED. |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 7/21/2013 | 7:45 AM | N | BASE FLOW | MED | 21.4 | WADING | CLEAR | CALM | CLEAR, LIGHT RAIN | RUN | | DARKLY STAINED | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. NO VERTICAL DEPTH RECORDED. |

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | Flow | Stage | Air Temp (°C) | Sample Location | Current Weather | Air Condition | Past 24HR Weather | Habitat | Tide Stage | Water Appearance | Comments |
|-------------------------------|----------------------------------|-----------|---------|--------------------------|-----------|-------|---------------|-----------------|--------------------|---------------|-------------------|---------|------------|------------------|---|
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 8/18/2013 | 7:45 AM | N | | | 17 | | CLEAR | CALM | CLEAR | | | | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. VRMP DATASHEET NOT COMPLETED. |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 9/22/2013 | 7:15 AM | N | BASE FLOW | HIGH | 17.5 | BANK | CLOUDY, LIGHT RAIN | | CLOUDY, SHOWERS | RUN | | DARKLY STAINED | NON-WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. |
| BRUNSWICK CANOE PORTAGE (BCP) | ANDROSCOGGIN RIVER - A299 - VRMP | 9/22/2013 | 7:15 AM | D | | | | BANK | | | | | | | NON-WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTE. |

Androscoggin River, Friends of Merrymeeting Bay - Non-approved Sites:

| | | | | | | | | | | | | | | | |
|-----|----------------------------------|-----------|---------|---|-----------|-----|------|--------|--------|------|-------------------|-----|--|----------------|--|
| DBL | ANDROSCOGGIN RIVER - A158 - FOMB | 5/19/2013 | 7:10 AM | N | | LOW | 10 | BANK | CLOUDY | CALM | CLEAR, CLOUDY | RUN | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 5/19/2013 | 8:00 AM | N | | LOW | 13 | WADING | CLOUDY | CALM | CLEAR, CLOUDY | RUN | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 6/16/2013 | 7:55 AM | N | | | 16.5 | BANK | CLEAR | CALM | CLEAR | | | | NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 7/21/2013 | 6:30 AM | N | | | 21.4 | BANK | CLEAR | | CLEAR, LIGHT RAIN | | | | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. NO VERTICAL DEPTH RECORDED. DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| BIL | ANDROSCOGGIN RIVER - A24 - FOMB | 8/18/2013 | 7:30 AM | N | BASE FLOW | LOW | 17.2 | BANK | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | WADEABLE/1.5 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 5/19/2013 | 7:45 AM | N | | LOW | 12 | WADING | CLOUDY | CALM | CLEAR, CLOUDY | RUN | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 6/16/2013 | 7:30 AM | N | | | 14 | BANK | CLEAR | CALM | CLEAR | | | | NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 7/21/2013 | 6:15 AM | N | | | 21.4 | BANK | CLEAR | | CLEAR, LIGHT RAIN | | | | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. NO VERTICAL DEPTH RECORDED. DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| FPD | ANDROSCOGGIN RIVER - A45 - FOMB | 8/18/2013 | 7:15 AM | N | BASE FLOW | LOW | 17 | BANK | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 5/19/2013 | 7:35 AM | N | | LOW | 12 | WADING | CLOUDY | CALM | CLEAR, CLOUDY | RUN | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 6/16/2013 | 7:10 AM | N | | | 14 | BANK | CLEAR | CALM | CLEAR | | | | NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 6/16/2013 | 7:10 AM | D | | | | BANK | | | | | | | NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 7/21/2013 | 6:20 AM | N | | | 21.4 | BANK | CLEAR | | CLEAR, LIGHT RAIN | | | | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. NO VERTICAL DEPTH RECORDED. DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| FBU | ANDROSCOGGIN RIVER - A47 - FOMB | 8/18/2013 | 7:15 AM | N | BASE FLOW | LOW | 16.9 | BANK | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 5/19/2013 | 6:40 AM | N | | LOW | 11.5 | WADING | CLOUDY | CALM | CLEAR, CLOUDY | RUN | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 5/19/2013 | 6:40 AM | D | | | | WADING | | | | | | | NON-WADEABLE/3 FT BELOW SURFACE D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. OBSERVATIONAL DATA PARTIALLY COMPLETED. |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 6/16/2013 | 6:45 AM | N | | | 14 | WADING | CLEAR | CALM | CLEAR | | | | WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |

| Organization Site Code | VRMP Site ID | Date | Time | ** Sample Type Qualifier | Flow | Stage | Air Temp (°C) | Sample Location | Current Weather | Air Condition | Past 24HR Weather | Habitat | Tide Stage | Water Appearance | Comments |
|------------------------|---------------------------------|-----------|---------|--------------------------|-----------|-------|---------------|-----------------|-----------------|---------------|-------------------|---------|------------|------------------|--|
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 7/21/2013 | 6:00 AM | N | | | 21.4 | BANK | CLEAR | | CLEAR, LIGHT RAIN | | | | D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. NO VERTICAL DEPTH RECORDED. DID NOT RECORD ANY OF THE OBSERVATIONAL DATA. |
| PBL | ANDROSCOGGIN RIVER - A71 - FOMB | 8/18/2013 | 6:15 AM | N | BASE FLOW | LOW | 15.2 | BANK | CLEAR | CALM | CLEAR | RUN | | DARKLY STAINED | NON-WADEABLE/MID-DEPTH D.O. METER- DID NOT ALLOW IT TO WARM UP FOR AT LEAST 20 MINUTES. |