Section 3-2
Androscoggin River (Friends of Merrymeeting Bay)

Refer to Chapter 2 of this document for where to find information about sampling methods, sampling sites, and quality assurance.

Results

E. coli Bacteria

Water quality monitoring by the Friends of Merrymeeting Bay (FOMB) detected some exceedances of state Class C instantaneous criteria for *E. coli* bacteria at the Water Street Mooring (WSM) and Brunswick Canoe Mooring (BCM) sites on 8/23/2009 (Figures 3-2-1 & 3-2-2; Appendix A).

Specific Conductance

Specific conductance at the FOMB sites were fairly similar to each other on any given date. Values ranged from about 40 to 93 µS/cm during the year and, with the exception of relatively high values on 7/26/2009, there was a slight upward trend moving from the summer into the fall (Figure 3-2-3; Appendix A).

Dissolved Oxygen

At the shallow water site BBB, dissolved oxygen (D. O.) values were observed to be well above Class C standards on all monitoring dates, ranging between 7.5 and 9.8 mg/L (Figures 3-2-4 & 3-2-5; Appendix A).

At site BCM, dissolved oxygen values were observed to be above Class C standards on all monitoring dates, ranging between 6.6 and 9.9 mg/L (Figures 3-2-7 & 3-2-8; Appendix A). In most cases, depth profiles showed that D. O. values generally decreased by about 0.1 mg/L from waters near the surface down to 5-m below the water surface.

At site WSM, dissolved oxygen (D. O.) values were observed to be above Class C standards on all monitoring dates, ranging between 7.4 and 9.8 (Figures 3-2-10 & 3-2-11; Appendix A). D. O. values generally varied only 0.1 to 0.2 mg/L from surface to near the bottom of the river on any given date. One interesting exception was on 7/12/2009 where D. O. values actually increased

by 0.3 mg/L from 9.5 to 9.8 mg/L from the upper 2-m of water down to the 3-, 4-, and 5-m depths of water.

Water Temperature

Water temperatures at site BBB ranged between 17.5 and 20.9 ^{o}C (Figure 3-2-6; Appendix A).

Water temperatures monitored at site BCM were found to range between 17 and 25 ^{o}C and were generally fairly uniform through the depth profile with one exception: on 7/12/2009 water temperature was 18.0 ^{o}C in the upper 3-m of water and 17.0 ^{o}C at 4- and 5-m meters below the water surface (Figure 3-2-9; Appendix A).

Water temperatures at site WSM were generally pretty uniform from near the surface down to the lower depths of the river at this site with temperatures ranging between 17.6 and 25.3 ^{o}C (Figure 3-2-12; Appendix A).

Discussion

E. coli Bacteria

E. coli bacteria concentrations only exceeded Class C instantaneous state water quality criteria on one monitoring date, which may be viewed as positive from a water quality results point of view. Only one monitoring date was noted as having stormflow conditions; increased sampling

under stormflow conditions may have generated different results. (The date where exceedances were found was not noted as being under stormflow conditions, which was not the expected situation.) Additional monitoring may provide a broader picture of the bacteria situation at these monitoring sites.

Dissolved Oxygen

Dissolved oxygen levels did vary with depth at sites BCM and WSM, though the differences were only about 0.1 to 0.2 mg/L from near the river surface down to near the bottom of the river. Given that weather patterns vary from year to year, greater differences in D. O. levels over depth profiles may be encountered in other years. D. O. levels monitored by FOMB in 2009 were always above the instantaneous Class C standard of 5.0 mg/L. (There was one date [8/23/2009] where D. O. concentrations were below the Class B standard of 7.0 mg/L.) At all three sites, the lowest D. O. values were observed when the water temperatures were the highest: BBB (8/9/2009); BCM and WSM (8/23/2009).

Sources of Pollution and Other Stresses to the River

There are numerous sources of pollution and other stresses to the Androscoggin River watershed in the region sampled by the Friends of Merrymeeting Bay that could potentially have an impact on water quality. Some of those sources of pollution and stress in the densely populated and heavily developed cities of Brunswick, Topsham, and neighboring towns include:

- Nonpoint source pollution (e.g., eroded soil, fertilizers, pesticides, heavy metals, petroleum residues, road salt, wildlife and pet feces) and polluted stormwater originating from urban impervious surfaces (e.g., streets, parking lots, driveways, rooftops), agriculture, and forestry
- Dams and impoundments (which often create more pond-like aquatic habitat conditions that may have higher water temperatures and lower dissolved oxygen concentrations than if the river section was free-flowing)
- Point sources (e.g., wastewater treatment plants, industrial discharges) of pollution.

Note: This pilot year VRMP report does not attempt investigate more closely how natural land features, land use, human infrastructure, and human populations may impact water quality. More in-depth investigations into these sources of stresses to water quality and aquatic habitats, including additional mapping and geospatial analyses, may be considered in future years as time permits.

Friends of Merrymeeting Bay -
Androscoggin River Sampling Sites.
Created By Cynthia Montanez on Oct. 29, 2010.

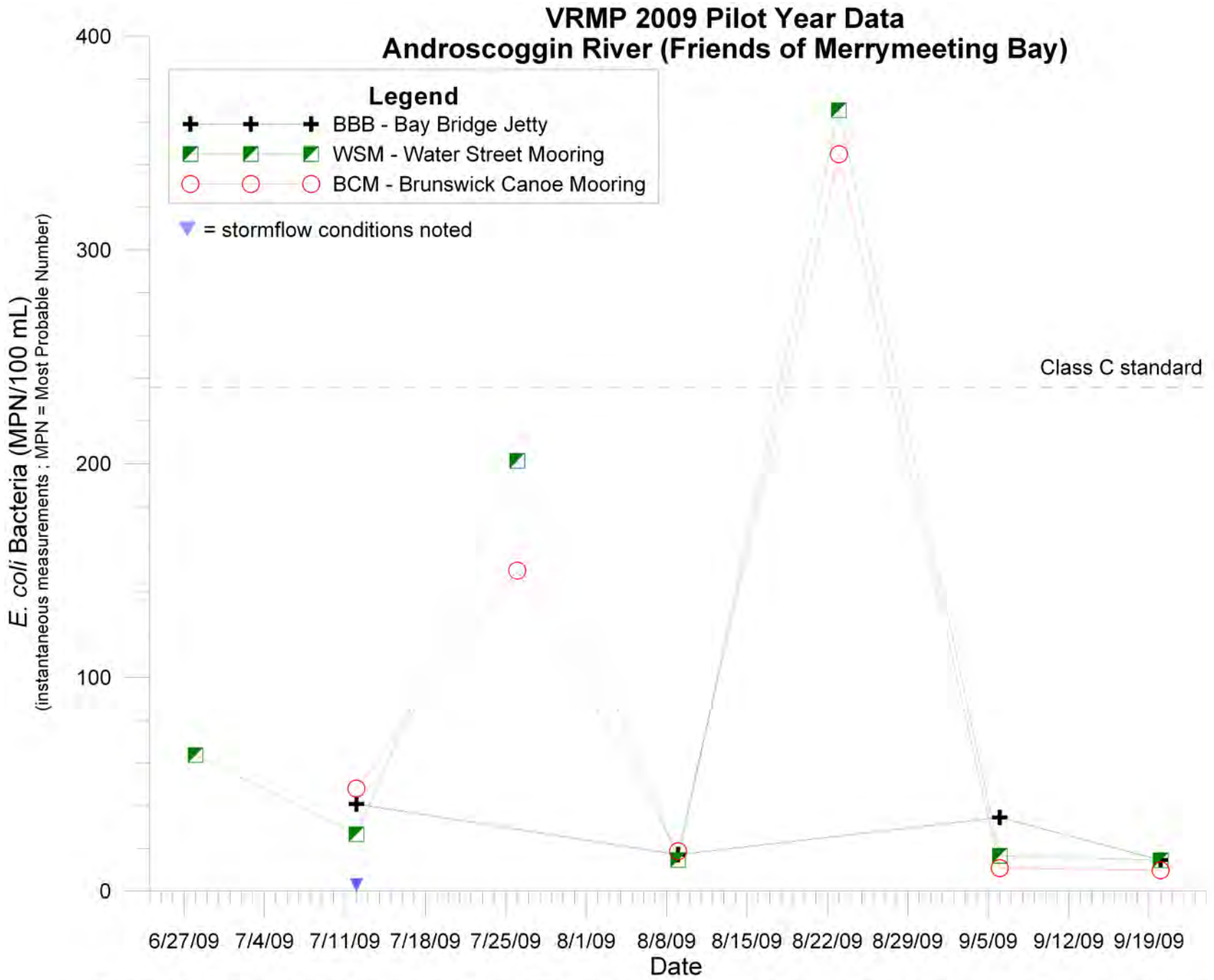


Figure 3-2-1. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

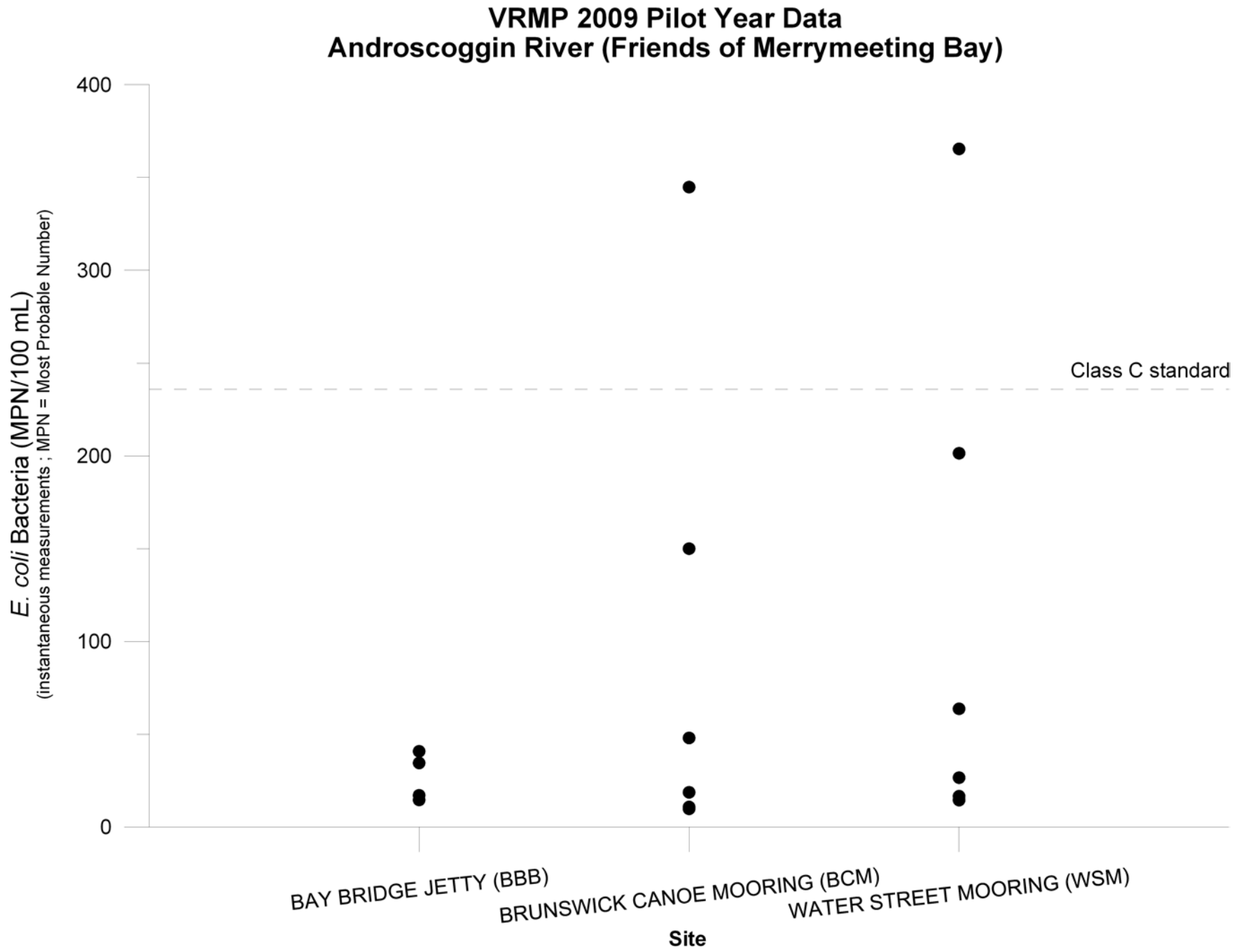


Figure 3-2-2. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

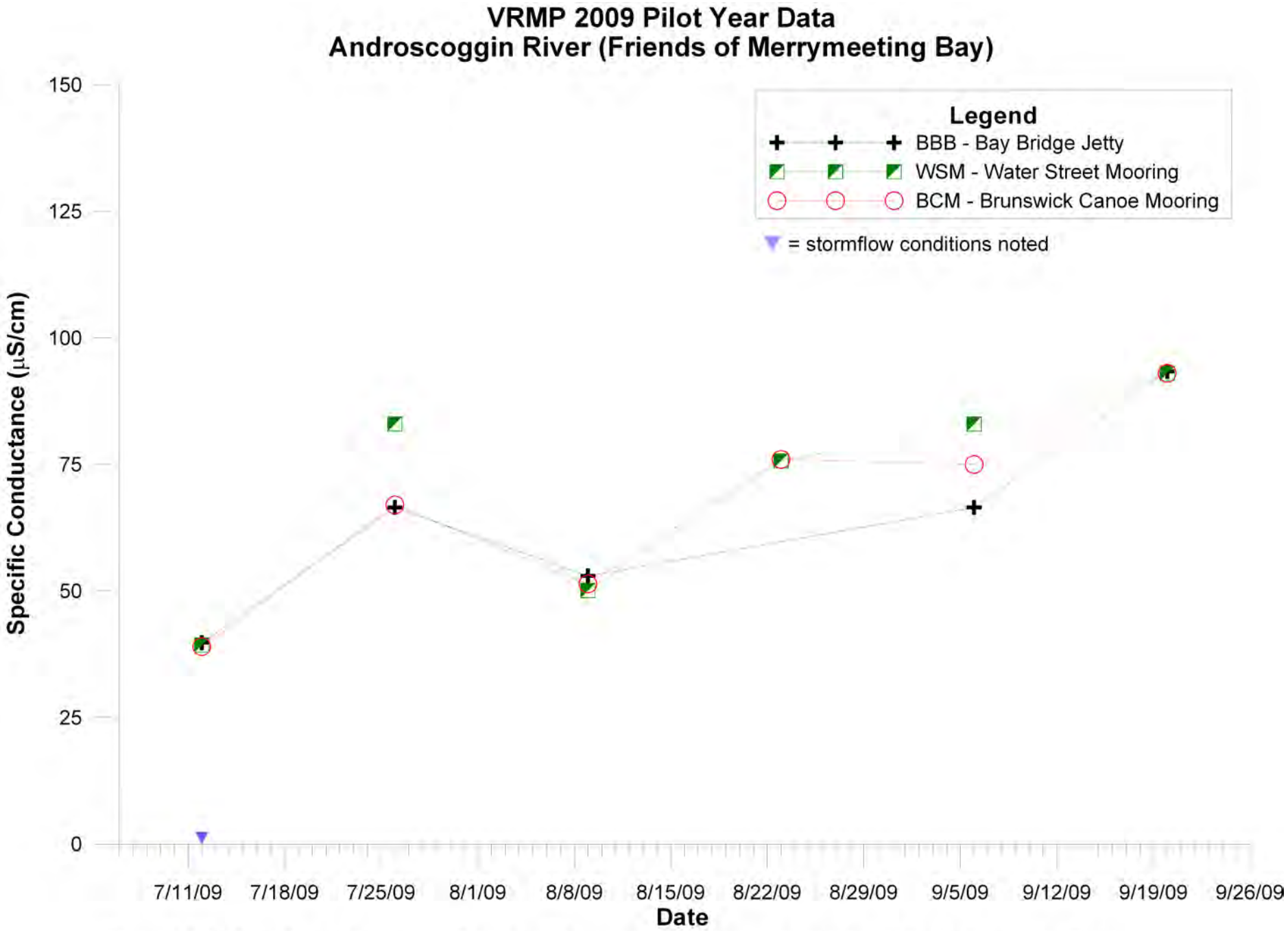


Figure 3-2-3. Specific conductance at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

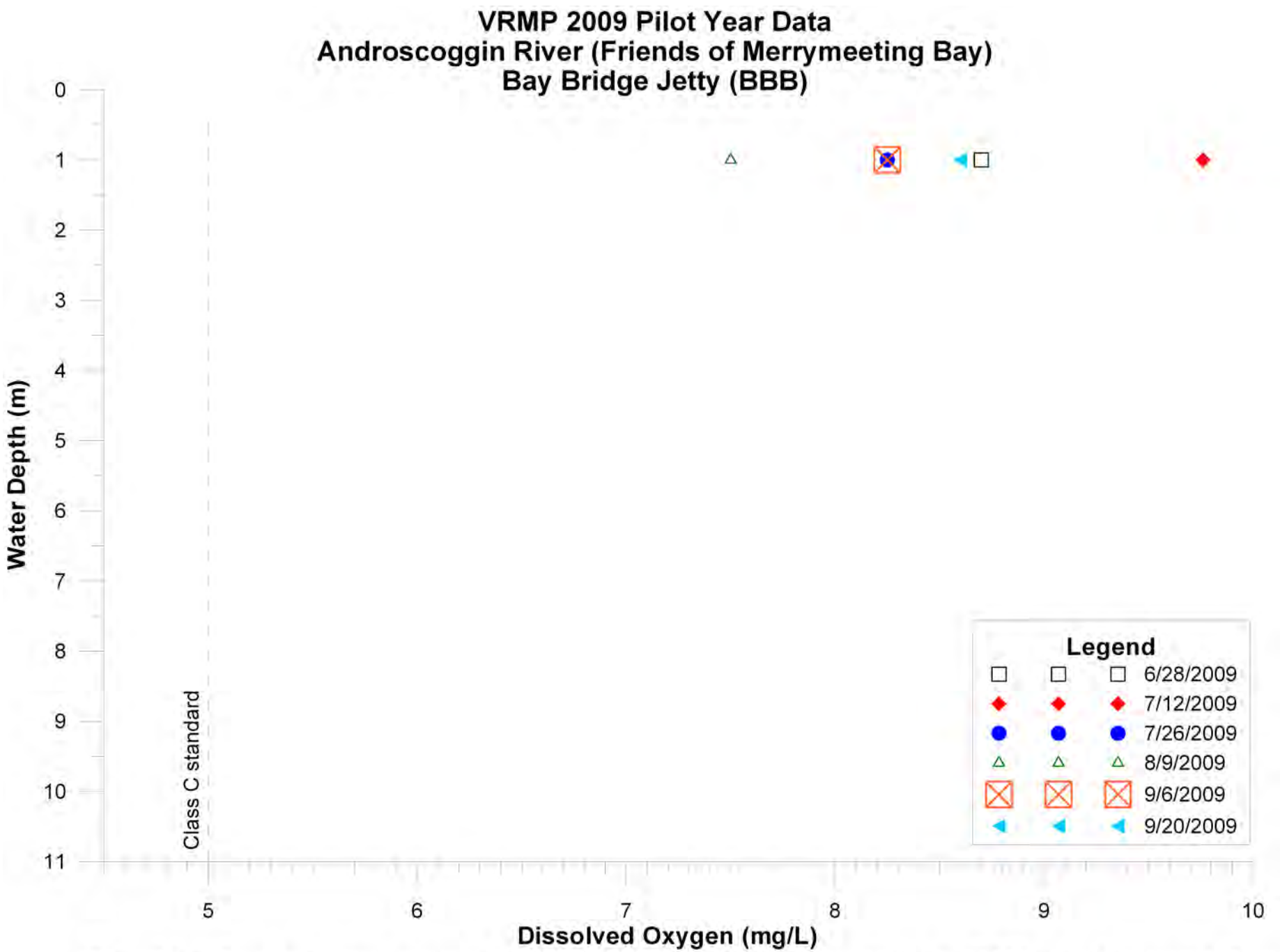


Figure 3-2-4. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "BBB" on the Androscoggin River.

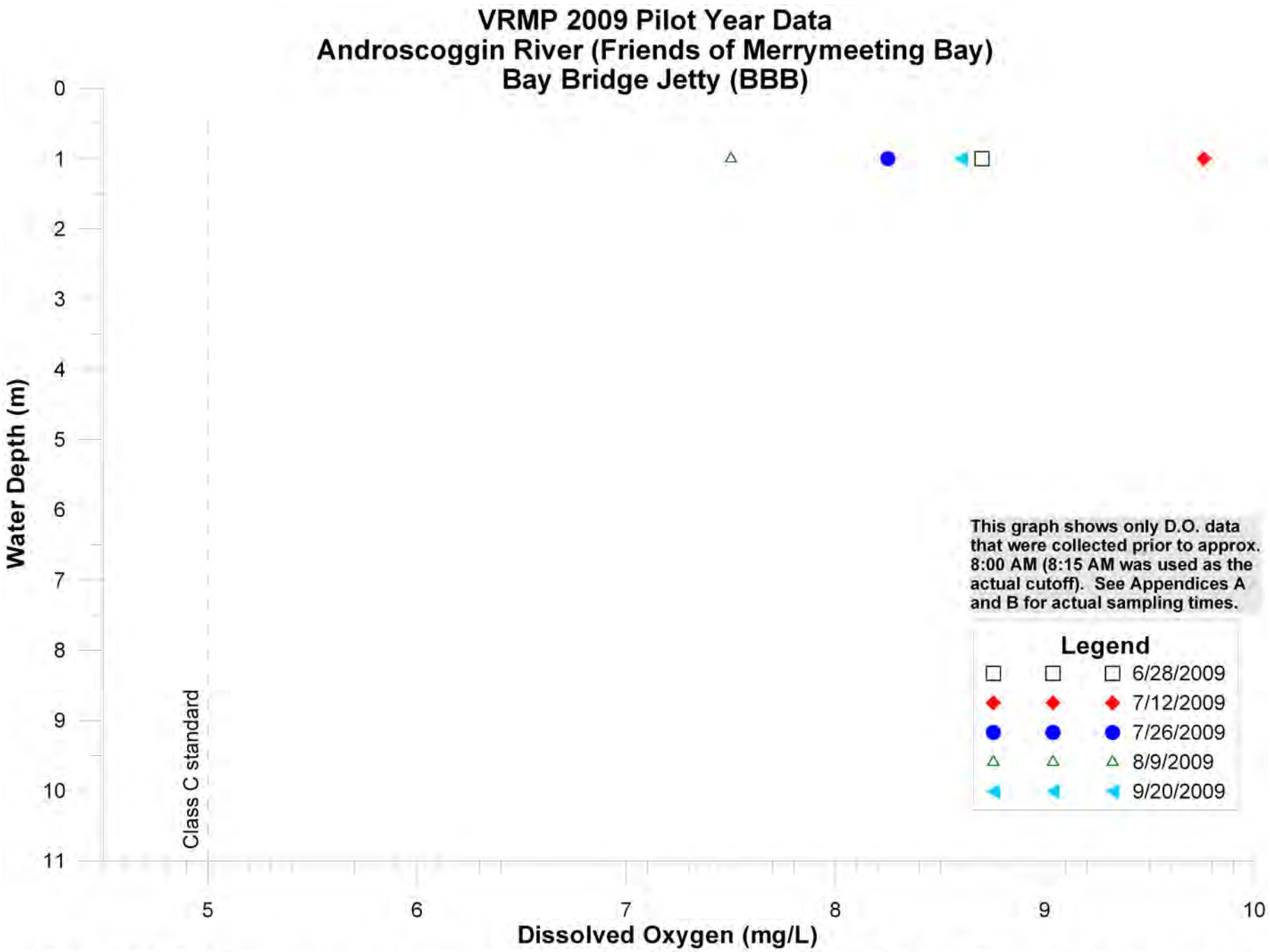


Figure 3-2-5. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "BBB" on the Androscoggin River.

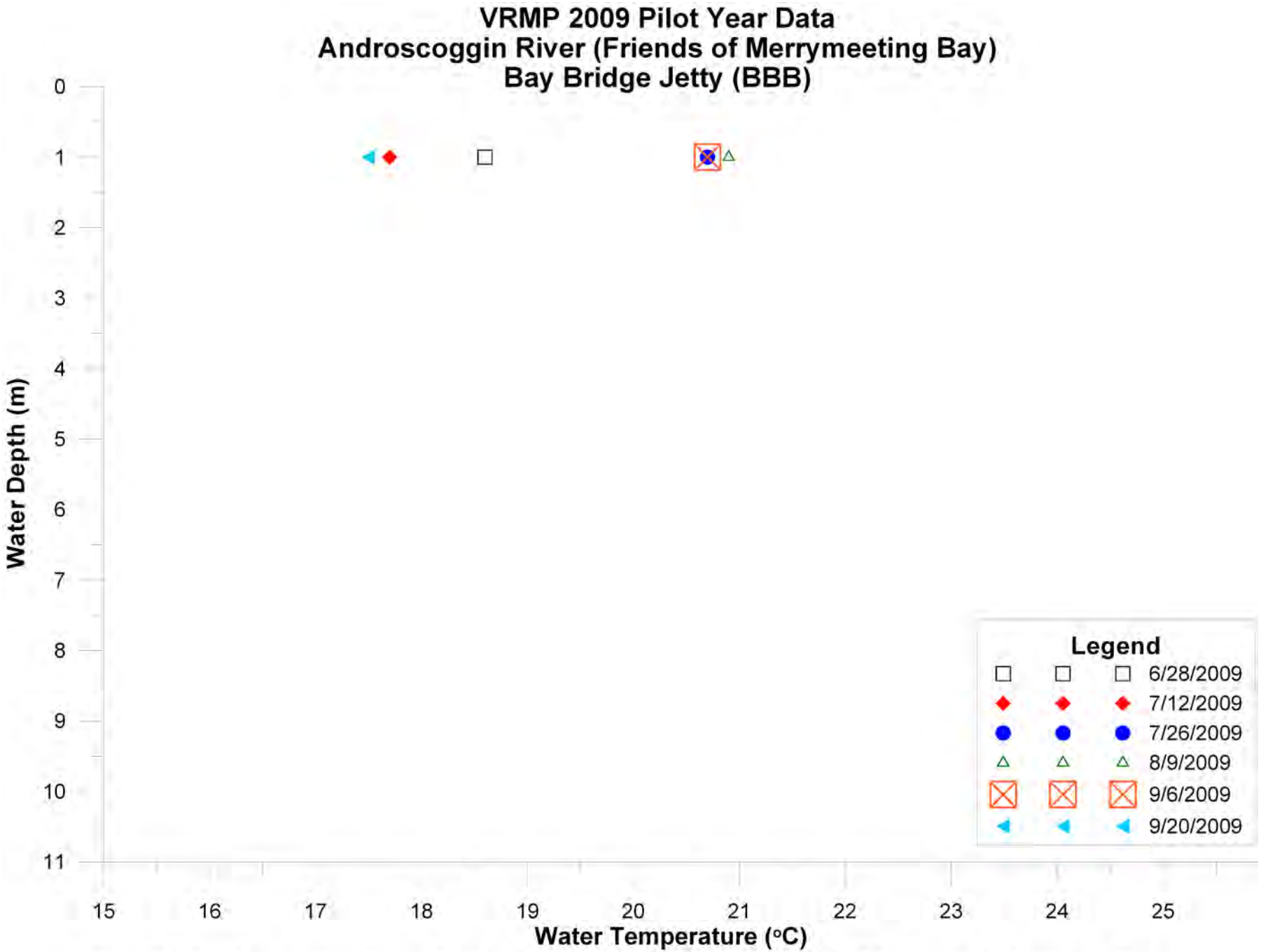


Figure 3-2-6. Water temperatures at Friends of Merrymeeting Bay monitoring site "BBB" on the Androscoggin River.

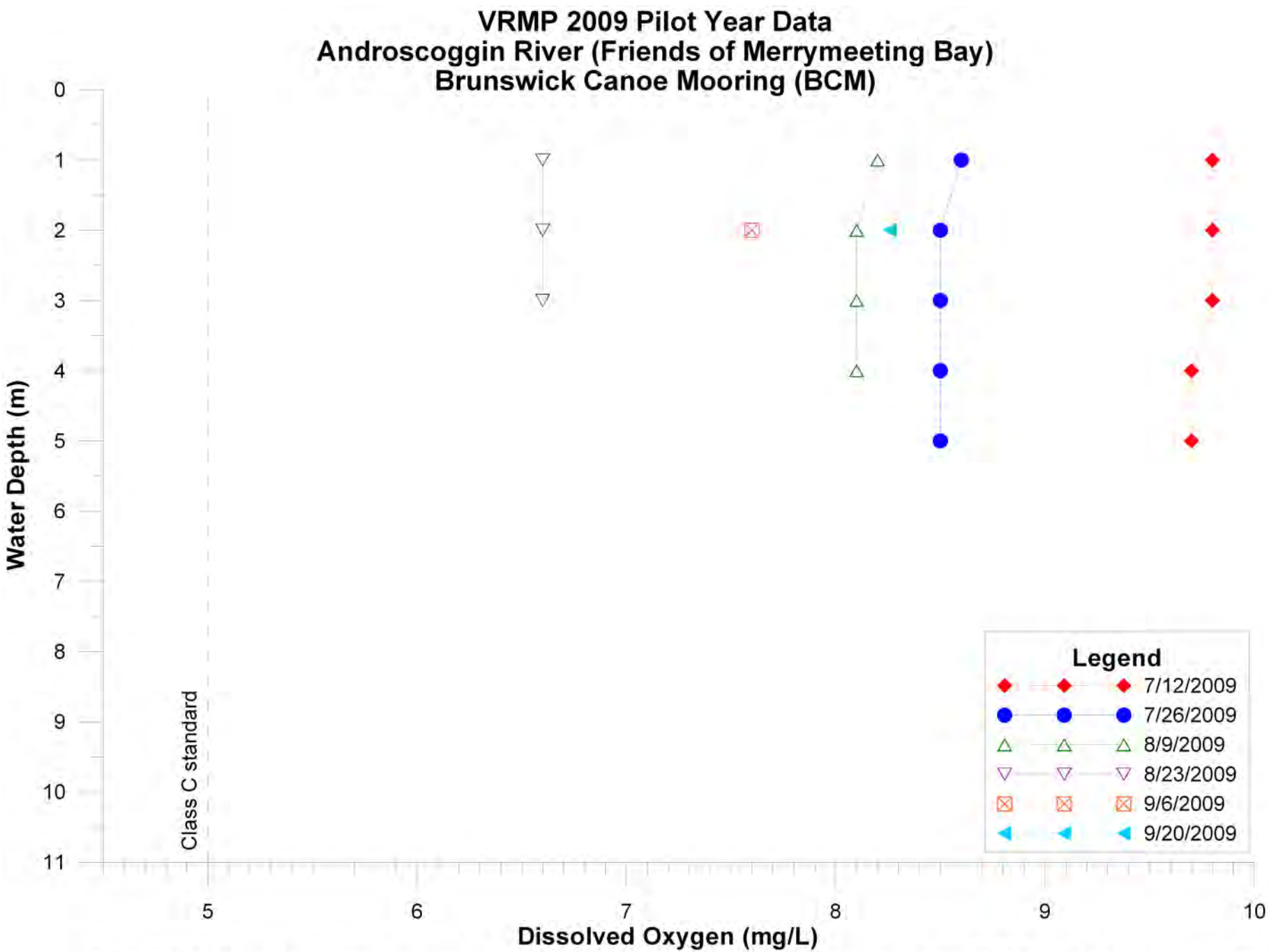


Figure 3-2-7. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "BCM" on the Androscoggin River.

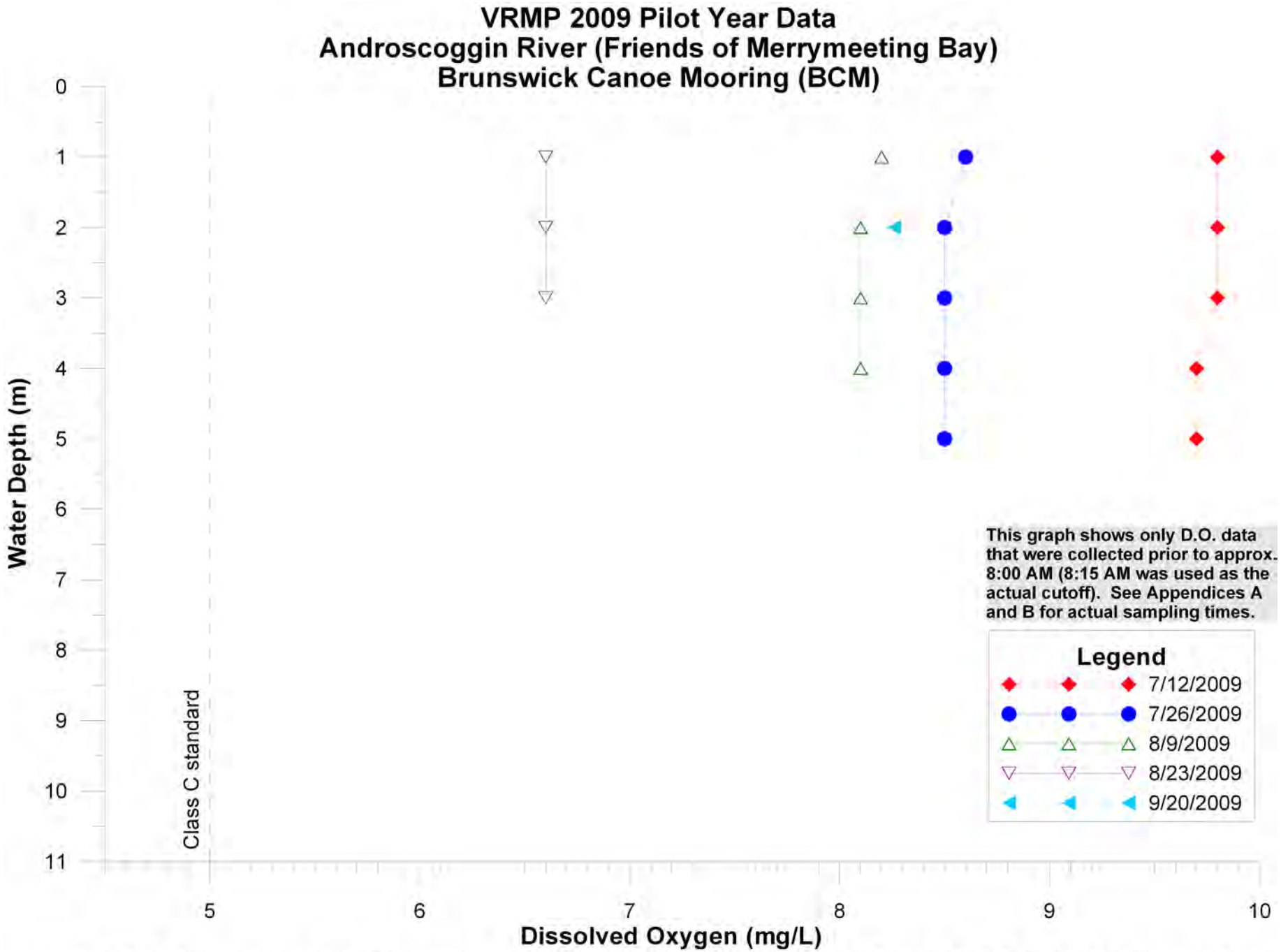


Figure 3-2-8. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "BCM" on the Androscoggin River.

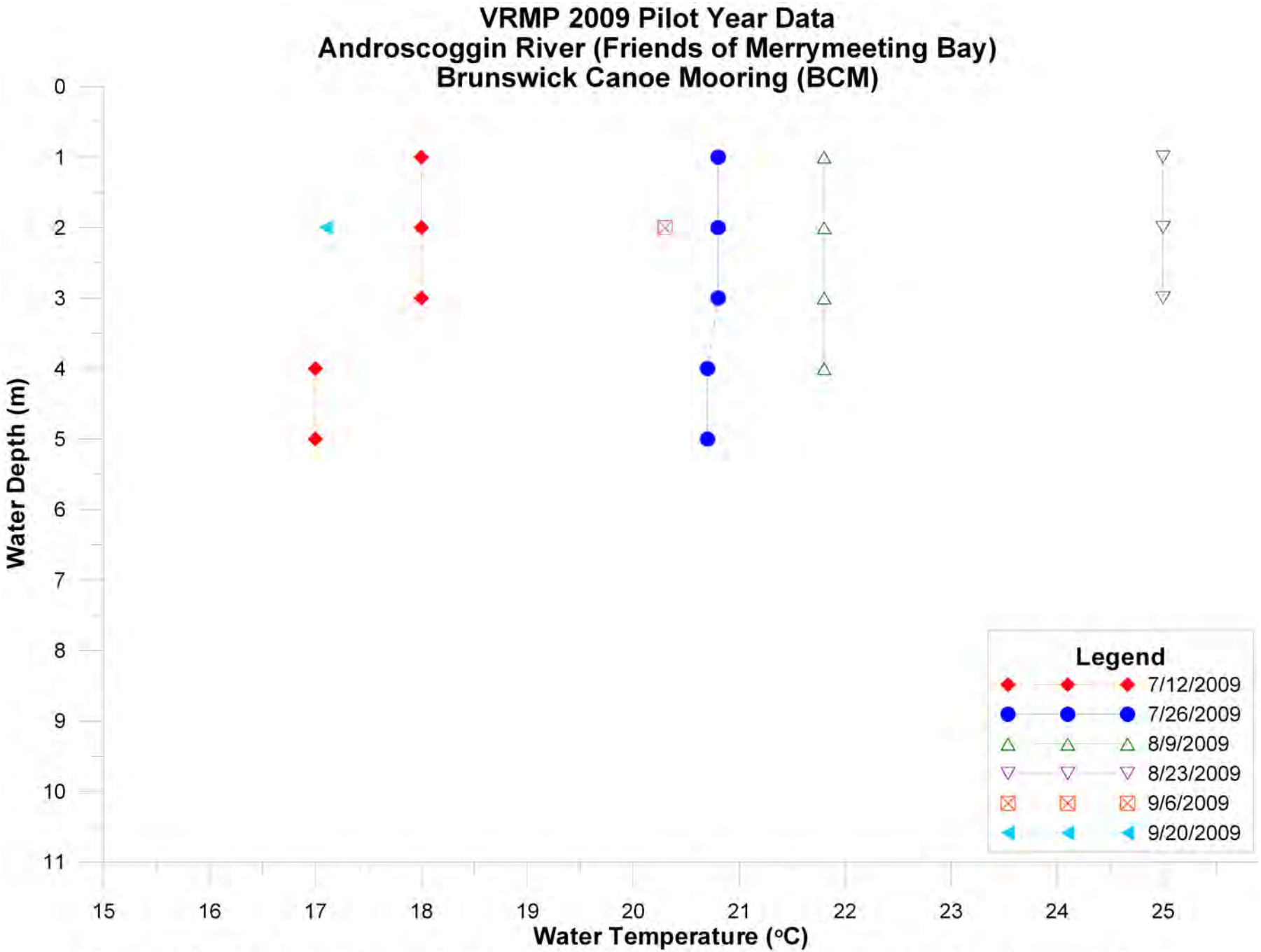


Figure 3-2-9. Water temperatures at Friends of Merrymeeting Bay monitoring site "BCM" on the Androscoggin River.

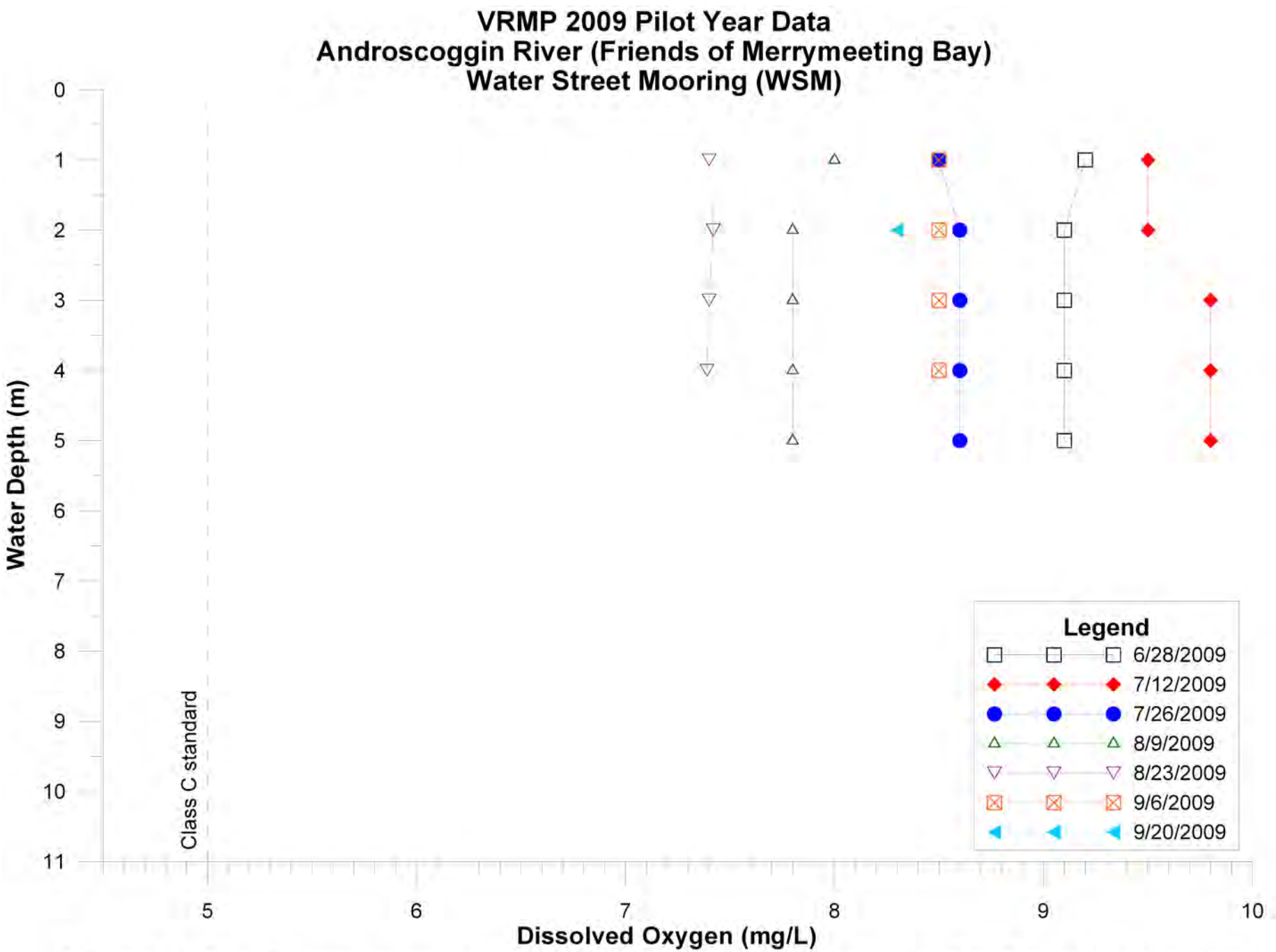


Figure 3-2-10. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "WSM" on the Androscoggin River.

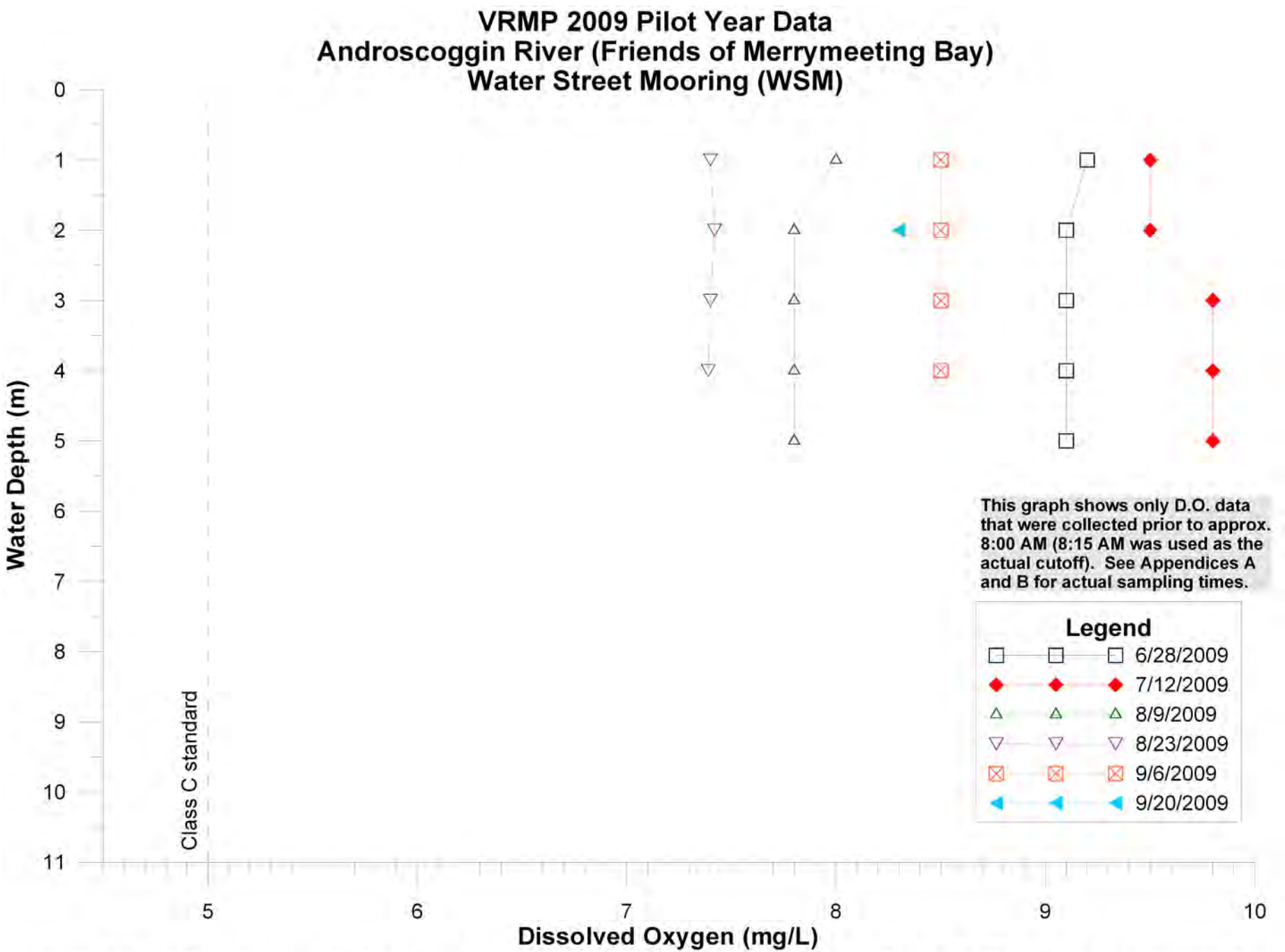


Figure 3-2-11. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "WSM" on the Androscoggin River.

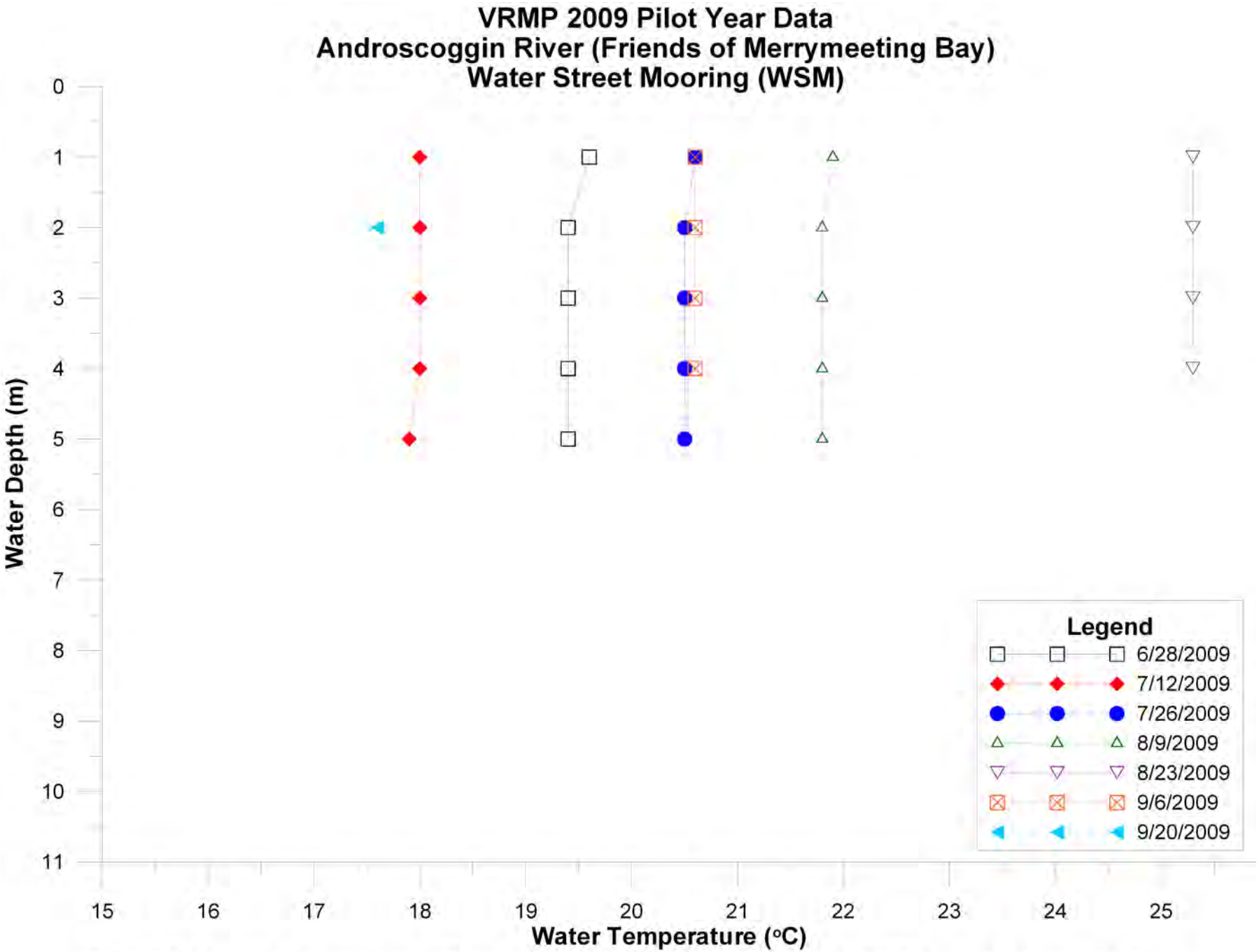


Figure 3-2-12. Water temperatures at Friends of Merrymeeting Bay monitoring site "WSM" on the Androscoggin River.

Section 5-1
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). Friends of Merrymeeting Bay 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. During this time their monitoring has extended up the Androscoggin at times (depending on volunteers) to Livermore Falls. They 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 miles in Maine).[1] The headwaters are Umbagog Lake in 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 Bethel, 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 2010 [pending approval] Integrated Water Quality Monitoring and Assessment Report" lists segments of the main stem in 3 categories:

- The main stem, upstream of Gulf Island Pond is listed in Category 4-A (Rivers and Streams with Impaired Use, TMDL completed). Causes of impairment are phosphorus, dissolved oxygen, total suspended solids, biological oxygen demand, and algal blooms. Also Category 4-A is Lewiston-Auburn variable mileage, CSO affected. Cause of impairment is E.Coli.
- A number of segments are listed in Category 4-B (Rivers and Streams Impaired by Pollutants-Pollution Control Requirements Expected to Result in Attainment). The cause of non-attainment is dioxin.
- A number of segments are listed in Category 5-D (Rivers and Streams Impaired by Legacy Pollutants). 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 in primarily the lower part of the river. By the late 1800s, many textile and lumber mills were in operation from primarily Lewiston to Brunswick. Pulp and paper mills that are still in operation today were established in the late 1800s in New Hampshire, Rumford and Jay. Beginning in the late 1920s, Central Maine Power built hydroelectric dams that impounded much of the river from Lewiston

[1] Maine Rivers Website- Androscoggin River Profile

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 toxics.

The primary purpose of monitoring performed by FOMB done under the Volunteer River Monitoring Program 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. FOMB will continue to gather data from sample stations and through methods not accepted by DEP and for a subset of stations acceptable to DEP. For 2010, three stations met VRMP requirements for sample location and methods. Due to interest in classification upgrade, these stations also met requirements for VRMP "Tier 1" data. Tier 1 has higher level requirements for vertical sampling depth and dissolved oxygen equipment checks. This report provides the data and analysis for the three approved Tier 1 sites. Five additional sites are reported here also. For these sites, both the monitor and equipment were certified by VRMP in 2010. These additional five sites however do not meet the requirements for being approved sites and some methods may not be approved.

Methods

The volunteers monitored the Androscoggin River in 2010 at three Tier 1 approved stations [BBB, WSM, BCM] and five non-approved stations [DBL, BIL, FBD, FPU, PBL] on the main stem. Table 1 provides a list of the sites and Figures 1A-1C are maps of sampling site locations.

Table 1: Sampling Sites

VRMP Site ID	Organization Site Code	Sample Location	Class
Androscoggin River-A231-VRMP	BBB	Bay Bridge Jetty	C
Androscoggin River-A281-VRMP	WSM	Water Street Mooring	C
Androscoggin River-A299-VRMP	BCM	Brunswick Canoe Mooring	C
Androscoggin River-A158-FOMB	DBL	Durham Boat Launch	C
Androscoggin River- A24-FOMB	BIL	Brunswick Interstate Ledges	C
Androscoggin River-A45-FOMB	FBD	Fish Park Down	C
Androscoggin River-A47-FOMB	FPU	Fish Park Up	C
Androscoggin River-A71-FOMB	PBL	Pejepscot Boat Launch	C

[2] Androscoggin River Alliance Website-Androscoggin River slideshow

Figure 1A: Map of All Sampling Sites

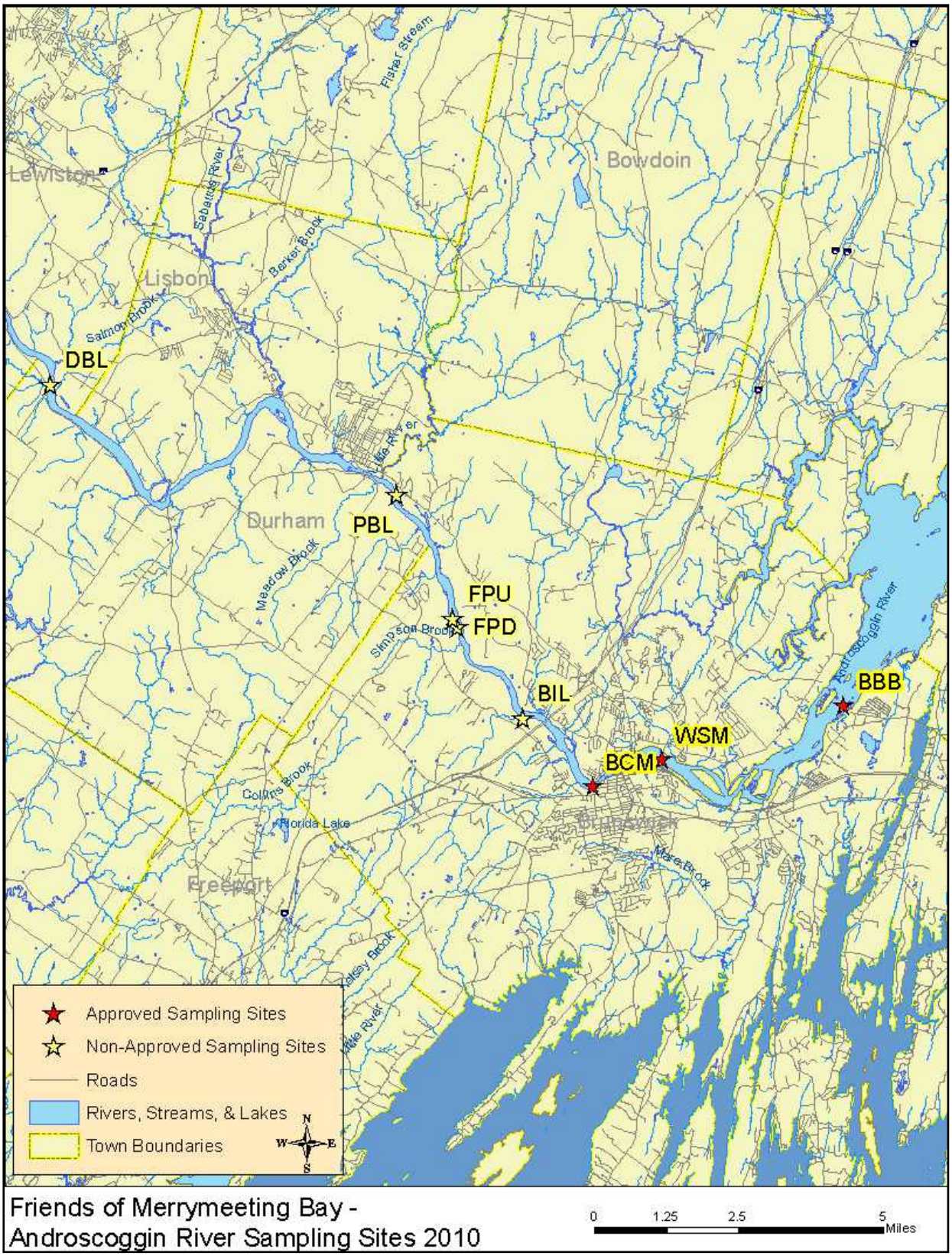
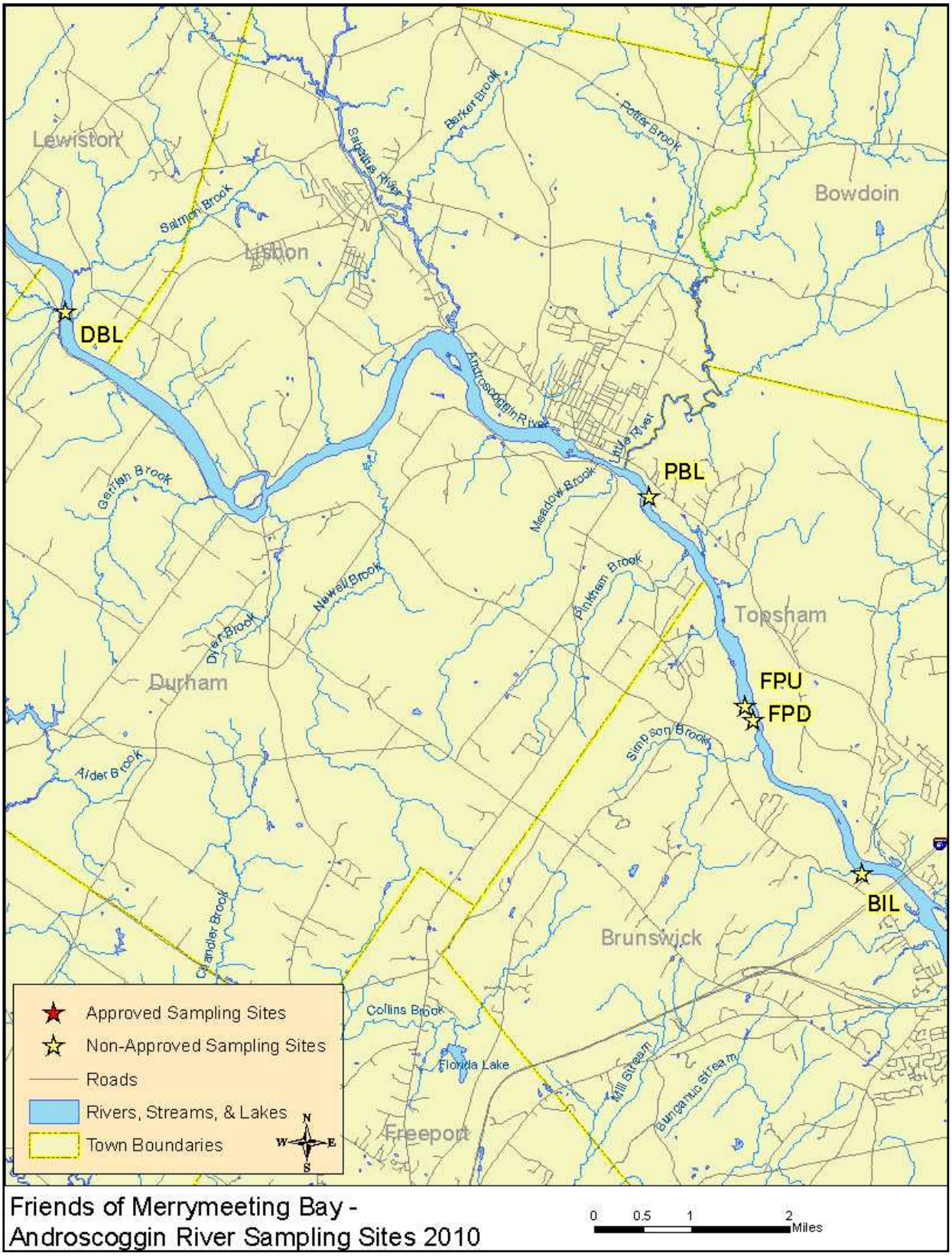


Figure 1B: Map of Approved Sampling Sites

Figure 1C: Map of Non-Approved Sampling Sites



Monitoring was conducted from May through 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. The approved sites used a DEP designed bacteria sampling device (which uses sterile whirl-paks for water collection). Bacteria samples were delivered to Bowdoin College for analysis by FOMB volunteers.

The approved sites met VRMP requirements for sampling laterally and vertically in the river to obtain well-mixed representative samples. Two of the sites were sampled from a boat attached to a mooring and one site from a jetty allowing for representative, well-mixed areas of the river to be monitored. Tier 1 requirements also require that rivers/streams that are ≥ 3 meters in depth sample at 1 meter increments to obtain vertical profiles for dissolved oxygen and temperature.

Results

Dissolved Oxygen

Dissolved oxygen was measured 1-5 times at each of the eight sampling sites. Monitoring occurred from May through September. Class C criteria for dissolved oxygen are a minimum of 5.0 mg/l (milligrams/liter) or 60% saturation. To meet water quality criteria, both concentration and saturation standards must be met. Table 2 and Table 3 provide a summary of dissolved oxygen concentration and percent saturation for each site including minimum, maximum and average values.

Table 2: Dissolved Oxygen Concentration (mg/l) Summary

Site	Approved Site	# of Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	5	6.4	10.7	8.2
WSM	Y	5	6.9	11.0	8.6
BCM	Y	5	7.0	11.3	8.3
DBL	N	1	7.0	7.0	7.0
BIL	N	5	7.3	10.6	8.3
FPD	N	5	7.2	10.6	8.3
FPU	N	5	7.2	10.6	8.3
PBL	N	5	7.3	10.5	8.4

Table 3: Dissolved Oxygen Saturation (%) Summary

Site	Approved Site	# of Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	5	78	99	88
WSM	Y	5	81	103	92
BCM	Y	3	75	88	83
DBL	N	1	82	82	82
BIL	N	5	85	99	89
FPD	N	5	85	99	89
FPU	N	5	85	99	89
PBL	N	5	86	97	90

Dissolved oxygen concentrations measured at Androscoggin River approved sites ranged from 6.4 milligrams/liter to 11.3 mg/l. At Site BBB, the lowest readings occurred in mid-July (6.4 mg/l) and mid-August (7.2 mg/l). Site WSM was similar with lowest readings in mid-July (7.2 mg/l) and mid-August (6.9 mg/l). Site BCM also had its lowest readings in mid-July and mid-August (both 7.0 mg/l). Dissolved oxygen profiles were done at Site WSM at depths from 0-4 meters and at Site BCM at depths from 1-3 meters. Readings were the same or very similar throughout the profile. Dissolved oxygen never dropped below the Class C standard of 5.0 milligrams/liter. Dissolved oxygen percent saturation ranged from 78%-103% and did not go below the Class C standard of 60%.

Dissolved oxygen concentrations measured at Androscoggin River non-approved sites ranged from 7.0 mg/l -10.6 mg/l. Site DBL was sampled only once in mid-August and had the lowest reading for these sites at 7.0 mg/l. Sites BIL, FPU, FPD and PBl were all very similar. The lowest readings all around 7.2-7.3 mg/l occurred during mid-July and mid-August sampling events. Dissolved oxygen never dropped below the Class C standard of 5.0 milligrams/liter. Dissolved oxygen percent saturation ranged from 78%-103%. It did not go below the Class C standard of 60%.

Friends of Merrymeeting Bay volunteers do a good job of getting out early in the morning to sample. All sampling occurred by 8:15 am or earlier. This is the recommended time to sample because dissolved oxygen is lowest at this time of day. Dissolved oxygen is also affected by flow conditions. During high flow conditions, more oxygen is added to the river from the atmosphere, as the water is more turbulent and there is more opportunity for reaeration. If flow during the summer months is higher or lower than generally normal, then this will affect the dissolved oxygen.

Water Temperature

Temperature was also measured 1-5 times at each of the eight sampling sites. Monitoring occurred from May through 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.

Table 4 provides a summary of temperature values for each site including minimum, maximum and average values.

Table 4: Temperature (° Celsius) Summary

Site	Approved Site	# of Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	5	12.7	25.1	19.8
WSM	Y	5	12.2	25.3	19.8
BCM	Y	5	12.4	25.3	19.8
DBL	N	1	22.6	22.6	22.6
BIL	N	5	12.4	25.1	19.8
FPD	N	5	12.2	25.1	19.8
FPU	N	5	12.3	25.2	19.6
PBL	N	5	11.9	24.4	19.4

Temperatures measured at all the Androscoggin River sites ranged from 11.9˚-25.3˚ C (Celsius). All of the sites were very similar. The lowest values occurred in May with temperatures around 12˚. In June, temperatures ranged from 18-19˚ at all the sites. Temperatures became high in July and August ranging from 23-25˚. In September, temperatures dropped back down to 18-19˚. Temperature profiles were done at Site WSM at depths from 0-4 meters and at Site BCM at depths from 1-3 meters. Readings were the same or very similar throughout the profile.

Specific Conductance

Specific conductance was measured 1-5 times at each of the eight sampling sites as well. Monitoring occurred from June through 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. Table 5 provides a summary of specific conductance values for each site including minimum, maximum and average values.

Table 5: Specific Conductance (micro-ohms/centimeter) Summary

Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
BBB	Y	4	54	115	87
WSM	Y	4	54	112	103
BCM	Y	3	41	115	75
DBL	N	1	95	95	95
BIL	N	5	55	119	89
FPD	N	4	78	118	97
FPU	N	5	55	118	89
PBL	N	5	58	116	87

Specific conductance at all the sites ranged from 54-115 µS/cm, which are elevated from natural background values, reflecting upstream point and non-point source discharges. The sites were all very similar with minimum ranging from 41-78 (exclusive of Site DBL which was only sampled once) and maximum ranging from 112-118 µS/cm, which shows that sources are farther upstream.

Bacteria

E. Coli bacteria was also measured 1-5 times at each of the eight sampling sites. Monitoring occurred from May through September. Most if not all samples were taken during baseflow conditions. 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."

Table 6 provides a summary of bacteria values for each site including minimum, maximum and geometric means. 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.

Table 6: Bacteria Most Probable Number (MPN) Summary

Site	Bacteria Type	# of Samples	Minimum Value	Maximum Value	Geometric Mean
BBB	E. Coli	5	8	90	26
WSM	E. Coli	5	9	86	26
BCM	E. Coli	4	20	123	38
DBL	E. Coli	1	22	22	22
BIL	E. Coli	5	7	148	28
FPD	E. Coli	4	5	160	38
FPU	E. Coli	5	5	152	27
PBL	E. Coli	5	6	225	35

None of the sampling sites exceeded the instantaneous criterion or geometric mean criterion. The non-approved sites generally had higher individual values. This may be due to a difference in method used by volunteers at the approved sites versus the non-approved sites.

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).
- Nonpoint 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 is characteristic of many wetlands).

The following are recommendations for future monitoring:

- Most if not all the sampling events were done during baseflow conditions. If possible, it might be worthwhile trying to capture 1 or 2 stormflow events to see how bacteria levels compare to baseflow. This might be difficult however, since the volunteers sample once a month on a set schedule in order to coordinate with the bacteria lab analysis.
- Continue monitoring at all stations (or at least a subset of sites) to develop a long term trend database.

Appendix A-1. 2010 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)	E Coli Bacteria (MPN/ 100ML)
Androscoggin River - Friends of Merrymeeting Bay (Approved Sites)													
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	5/15/2010	8:00 AM	N						54			13.4
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	5/15/2010	8:00 AM	N	2.0	M	12.7	99.5	10.66				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	6/13/2010	7:15 AM	N						84.9			110.6
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	6/13/2010	7:15 AM	N	1.0	M	18.7	87.8	8.23				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	6/13/2010	7:15 AM	D									69.7
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	7/11/2010	7:00 AM	N						95			72.4
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	7/11/2010	7:00 AM	N	2.0	M	25.1	77.9	6.45				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	8/14/2010	7:10 AM	N									8.4
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	8/14/2010	7:10 AM	N	1.0	M	23.8	85	7.2				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	9/19/2010	7:55 AM	N						114.6			17.5
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMP	9/19/2010	7:55 AM	N	1.0	M	18.6	92	8.48				
WATER STREET MOORING (WSM)	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N						53.6			8.6
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N	1.0	M	12.2	102.7	11				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N	2.0	M	12.3	102.7	11				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N	3.0	M	12.2	102.5	11.01				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N	4.0	M	12.2	102.5	11.03				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N						79.8			28.8
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N	.0	M	19	100.1	9.3				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N	1.0	M	18.9	100.1	9.3				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N	2.0	M	18.9	100.1	9.3				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N	3.0	M	18.9	100.1	9.3				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	6/13/2010	8:00 AM	N	4.0	M	18.9	100.1	9.28				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N						93.4			52.9
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N	.0	M	25.3	87	7.2				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N	1.0	M	25.3	87.3	7.17				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N	2.0	M	25.3	87	7.19				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N	3.0	M	25.3	87	7.2				
WATER STREE	ANDROSCOGGIN RIVER - A281 - VRMP	7/11/2010	8:00 AM	N	4.0	M	25.3	87	7.19				

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)	E Coli Bacteria (MPN/ 100ML)
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N									9.7
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N	.0	M	23.8	82.1	7				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N	1.0	M	23.7	81.5	6.9				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N	2.0	M	23.7	81.5	6.9				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N	3.0	M	23.7	82	7				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	8/14/2010	8:00 AM	N	4.0	M	23.7	81.5	6.9				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N						112.3			86
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N	.0	M	18.7	90.4	8.4				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N	1.0	M	18.7	89.8	8.4				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N	2.0	M	18.7	89.8	8.4				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N	3.0	M	18.7	89.8	8.4				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	9/19/2010	7:10 AM	N	4.0	M	18.7	89.8	8.4				
BRUNSWICK CANOE MOORING (BCM)	ANDROSCOGGIN RIVER - A299 - VRMP	5/16/2010	8:00 AM	N						40.9			8.5
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	5/16/2010	8:00 AM	N	1.0	M	12.4		11.28				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	5/16/2010	8:00 AM	N	2.0	M	12.4		11.24				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	5/16/2010	8:00 AM	N	3.0	M	12.4		11.22				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	6/13/2010	8:00 AM	N						70.5			20.1
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	6/13/2010	8:00 AM	N	1.0	M	19	88.5	8.25				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	6/13/2010	8:00 AM	N	2.0	M	19	88.5	8.25				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	7/11/2010	8:00 AM	N									41.7
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	7/11/2010	8:00 AM	N	1.0	M	25.3	85	7				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	7/11/2010	8:00 AM	N	2.0	M	25.3	85	7				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	7/11/2010	8:00 AM	D	1.0	M	25.3	85	7				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	8/15/2010	8:15 AM	N									19.7
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	8/15/2010	8:15 AM	N	1.0	M	23.8	75.4	7.04				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	8/15/2010	8:15 AM	N	2.0	M	23.8	75.5	7.05				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	8/15/2010	8:15 AM	N	3.0	M	23.8	75.5	7.05				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	9/19/2010	8:00 AM	N						114.6			143.9
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	9/19/2010	8:00 AM	N	1.0	M	18.6		8.1				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	9/19/2010	8:00 AM	N	2.0	M	18.6		8.1				
BRUNSWICK CA	ANDROSCOGGIN RIVER - A299 - VRMP	9/19/2010	8:00 AM	D									101.7
Androscoggin River - Friends of Merrymeeting Bay (Non-Approved Sites)													
Durham Boat Launch (DBL)	ANDROSCOGGIN RIVER - A158 - FOMB	8/15/2010	7:10 AM	N						95.5			19.7
DBL	ANDROSCOGGIN RIVER - A158 - FOMB	8/15/2010	7:10 AM	N	1.0	M	22.6	81.6	7				
DBL	ANDROSCOGGIN RIVER - A158 - FOMB	8/15/2010	7:10 AM	D						95.5			24.6

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)	E Coli Bacteria (MPN/ 100ML)
DBL	ANDROSCOGGIN RIVER - A158 - FOME	8/15/2010	7:10 AM	D	1.0	M	22.6	81.6	7				
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - FOMB	5/16/2010	8:15 AM	N						55.3			8.5
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	5/16/2010	8:15 AM	N	1.0	M	12.4	99.4	10.6				
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	6/13/2010	8:10 AM	N						79.8			16.9
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	6/13/2010	8:10 AM	N	1.0	M	18.9	89.3	8.3				
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/11/2010	8:10 AM	N						94.1			81.6
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/11/2010	8:10 AM	N	1.0	M	25.1	88.3	7.3				
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/11/2010	8:10 AM	D						94.1			159.7
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/11/2010	8:10 AM	D	1.0	M	25.1	88.3	7.3				
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/15/2010	8:15 AM	N						99.5			7.3
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/15/2010	8:15 AM	N	1.0	M	23.9	85.3	7.3				
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	9/19/2010	7:45 AM	N						118.6			148.3
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	9/19/2010	7:45 AM	N	1.0	M	18.7	84.6	7.9				
Fish Park Down (FPD)	ANDROSCOGGIN RIVER - A45 - FOMB	5/16/2010	7:55 AM	N						55.8			5.2
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	5/16/2010	7:55 AM	N	1.0	M	12.2	98.8	10.6				
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	5/16/2010	7:55 AM	D									5.2
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	6/13/2010	7:50 AM	N						78.4			17.5
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	6/13/2010	7:50 AM	N	1.0	M	19	89.4	8.3				
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/11/2010	7:40 AM	N						93.8			160.7
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/11/2010	7:40 AM	N	1.0	M	25.1	89.5	7.4				
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	8/15/2010	7:55 AM	N						99.8			8.6
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	8/15/2010	7:55 AM	N	1.0	M	24	85	7.2				
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	9/19/2010	7:17 AM	N						117.8			133.3
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	9/19/2010	7:17 AM	N	1.0	M	18.7	85	7.9				
Fish Park Up (FBU)	ANDROSCOGGIN RIVER - A47 - FOMB	5/16/2010	7:45 AM	N						54.8			5.2
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	5/16/2010	7:45 AM	N	1.0	M	12.3	98.6	10.6				
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	6/13/2010	7:35 AM	N						78.4			18.5
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	6/13/2010	7:35 AM	N	1.0	M	18.9	89.3	8.3				
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	6/13/2010	7:35 AM	D						78.4			16.1
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	6/13/2010	7:35 AM	D	1.0	M		89.3	8.3				
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	7/11/2010	7:20 AM	N						93.3			91
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	7/11/2010	7:20 AM	N	1.0	M	25.2	89	7.3				
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	8/15/2010	7:45 AM	N						99.6			12.1
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	8/15/2010	7:45 AM	N	1.0	M	22.9	85	7.2				
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	9/19/2010	7:05 AM	N						118.3			152.9
FBU	ANDROSCOGGIN RIVER - A47 - FOMB	9/19/2010	7:05 AM	N	1.0	M	18.7	85	8				

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)	E Coli Bacteria (MPN/ 100ML)
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - FOMB	5/16/2010	7:20 AM	N						58.5			6.3
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	5/16/2010	7:20 AM	N	1.0	M	11.9	97.4	10.5				
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	6/13/2010	6:55 AM	N						72.6			36.9
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	6/13/2010	6:55 AM	N	1.0	M	18.3	88.4	8.3				
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	7/11/2010	7:00 AM	N						91.1			224.7
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	7/11/2010	7:00 AM	N	1.0	M	24.4	89.2	7.4				
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	8/15/2010	6:50 AM	N						99.2			18.7
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	8/15/2010	6:50 AM	N	1.0	M	23.9	86.3	7.3				
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/19/2010	6:15 AM	N						115.8			42.8
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/19/2010	6:15 AM	N	1.0	M	18.5	89.3	8.3				
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/19/2010	6:15 AM	D									74.3
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/19/2010	6:15 AM	D	1.0	M	18.5	89.3	8.3				

Appendix A-2. 2010 observational data and quality assurance/quality control (QA/QC) notes for "approved" and "non-approved" sites.
** "N" = normal environmental sample; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "TSS" = total suspended solids
Refer to Appendix A-1 for water quality data

Organization Site Code	VRMP Site ID	Date	Time	Sample Type Qualifier	Flow	Stage	Air Temp. (DEG C)	Sample Location	Current Weather	Air Condi-tion	Past 24HR Weather	Habitat	Tide Stage	Water Appear-ance	Comments
Androscoggin River - Friends of Merrymeeting Bay (Approved Sites)															
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	5/15/2010	8:00 AM	N	BASEF	MEDIUM	14	BRIDGE	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	5/15/2010	8:00 AM	N	BASEF	MEDIUM		BRIDGE	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	N			18.3	WADING	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	N				WADING	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	D				WADING							WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N	BASEFLOW		22.7	WADING	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N	BASEFLOW			WADING	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	8/14/2010	7:10 AM	N	BASEFLOW		18.2	WADING	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	8/14/2010	7:10 AM	N	BASEFLOW			WADING	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	9/19/2010	7:55 AM	N			13.1	WADING	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JE	ANDROSCOGGIN RIV	9/19/2010	7:55 AM	N				WADING	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	WADEABLE/MID-DEPTH
WATER STREET MOORING (WSM)	ANDROSCOGGIN RIVER - A281 - VRMP	5/15/2010	7:20 AM	N	BASEF	MEDIUM	14	BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	5/15/2010	7:20 AM	N	BASEF	MEDIUM		BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	5/15/2010	7:20 AM	N	BASEF	MEDIUM		BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	5/15/2010	7:20 AM	N	BASEF	MEDIUM		BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	5/15/2010	7:20 AM	N	BASEF	MEDIUM		BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N			18.3	BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N				BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N				BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N				BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N				BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N				BOAT	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW		22.7	BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW			BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW			BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW			BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW			BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEFLOW			BOAT	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW		18.2	BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW			BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW			BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW			BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW			BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	8/14/2010	8:00 AM	N	BASEFLOW			BOAT	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N			13.1	BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N				BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N				BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N				BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N				BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
WATER STREE	ANDROSCOGGIN RIV	9/19/2010	7:10 AM	N				BOAT	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BRUNSWICK CANOE MOORING (BCM)	ANDROSCOGGIN RIVER - A299 - VRMP	5/16/2010	8:00 AM	N			15.9	BOAT		CALM	CLEAR				CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.

Organization Site Code	VRMP Site ID	Date	Time	Sample Type Qualifier	Flow	Stage	Air Temp. (DEG C)	Sample Location	Current Weather	Air Condi-tion	Past 24HR Weather	Habitat	Tide Stage	Water Appear-ance	Comments
BRUNSWICK C	ANDROSCOGGIN RIV	5/16/2010	8:00 AM	N				BOAT		CALM	CLEAR				NO OBSERVATIONAL DATA. DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	5/16/2010	8:00 AM	N				BOAT		CALM	CLEAR				CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	5/16/2010	8:00 AM	N				BOAT		CALM	CLEAR				CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N		LOW	18	BOAT	CLOUDY, PARTLY C		CLEAR, PARTLY CL	RUN		DARKLY	DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N		LOW		BOAT	CLOUDY, PARTLY C		CLEAR, PARTLY CL	RUN		DARKLY	DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	6/13/2010	8:00 AM	N		LOW		BOAT	CLOUDY, PARTLY C		CLEAR, PARTLY CL	RUN		DARKLY	DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEF	LOW	23.8	BOAT	PARTLY C	BREEZE	MOSTLY CLOUDY, F	RUN		DARKLY STAINED	
BRUNSWICK C	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEF	LOW		BOAT	PARTLY C	BREEZE	MOSTLY CLOUDY, F	RUN		DARKLY STAINED	
BRUNSWICK C	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	N	BASEF	LOW		BOAT	PARTLY C	BREEZE	MOSTLY CLOUDY, F	RUN		DARKLY STAINED	
BRUNSWICK C	ANDROSCOGGIN RIV	7/11/2010	8:00 AM	D				BOAT							
BRUNSWICK C	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N	BASEF	LOW	18.8	BOAT	CLEAR		CLEAR	RUN			
BRUNSWICK C	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N	BASEF	LOW		BOAT	CLEAR		CLEAR	RUN			
BRUNSWICK C	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N	BASEF	LOW		BOAT	CLEAR		CLEAR	RUN			
BRUNSWICK C	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N	BASEF	LOW		BOAT	CLEAR		CLEAR	RUN			
BRUNSWICK C	ANDROSCOGGIN RIV	9/19/2010	8:00 AM	N	BASEF	LOW	17.9	BOAT	CLEAR	CALM	CLEAR	RUN		DARKLY	DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	9/19/2010	8:00 AM	N	BASEF	LOW		BOAT	CLEAR	CALM	CLEAR	RUN		DARKLY	DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	9/19/2010	8:00 AM	N	BASEF	LOW		BOAT	CLEAR	CALM	CLEAR	RUN		DARKLY	SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
BRUNSWICK C	ANDROSCOGGIN RIV	9/19/2010	8:00 AM	D				BOAT							DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE (ANALYST PORTION). NO VALUE FOR D.O. IN % SATURATION. NO VERTICAL DEPTH DESCRIPTION FOR CONDUCTIVITY.
Androscoggin River - Friends of Merrymeeting Bay (Non-Approved Sites)															
Durham Boat Launch (DBL)	ANDROSCOGGIN RIVER - A158 - FOMB	8/15/2010	7:10 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
DBL	ANDROSCOGGIN RIV	8/15/2010	7:10 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
DBL	ANDROSCOGGIN RIV	8/15/2010	7:10 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE

Organization Site Code	VRMP Site ID	Date	Time	Sample Type Qualifier	Flow	Stage	Air Temp. (DEG C)	Sample Location	Current Weather	Air Condi-tion	Past 24HR Weather	Habitat	Tide Stage	Water Appear-ance	Comments
DBL	ANDROSCOGGIN RIV	8/15/2010	7:10 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - FOMB	5/16/2010	8:15 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	5/16/2010	8:15 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	6/13/2010	8:10 AM	N			17.7	BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	6/13/2010	8:10 AM	N				BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	7/11/2010	8:10 AM	N				BANK	CLOUDY, I	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
BIL	ANDROSCOGGIN RIV	7/11/2010	8:10 AM	N				BANK	CLOUDY, I	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
BIL	ANDROSCOGGIN RIV	7/11/2010	8:10 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
BIL	ANDROSCOGGIN RIV	7/11/2010	8:10 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
BIL	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	8/15/2010	8:15 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
BIL	ANDROSCOGGIN RIV	9/19/2010	7:45 AM	N			7	BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
BIL	ANDROSCOGGIN RIV	9/19/2010	7:45 AM	N				BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NOT APPROVED SITE. NON-WADEABLE/3 FT BELOW
Fish Park Down (FPD)	ANDROSCOGGIN RIVER - A45 - FOMB	5/16/2010	7:55 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	5/16/2010	7:55 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	5/16/2010	7:55 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	6/13/2010	7:50 AM	N			17.7	BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	6/13/2010	7:50 AM	N				BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	7/11/2010	7:40 AM	N				BANK	CLOUDY, I	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	7/11/2010	7:40 AM	N				BANK	CLOUDY, I	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	8/15/2010	7:55 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	8/15/2010	7:55 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	9/19/2010	7:17 AM	N			7	BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FPD	ANDROSCOGGIN RIV	9/19/2010	7:17 AM	N				BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
Fish Park Up (FBU)	ANDROSCOGGIN RIVER - A47 - FOMB	5/16/2010	7:45 AM	N				BANK	CLEAR	CALM	CLOUDY, MOSTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	5/16/2010	7:45 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	6/13/2010	7:35 AM	N			17.7	BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. SLIGHT OILY SHEEN. NON-WADEABLE/3 FT BELOW

Organization Site Code	VRMP Site ID	Date	Time	Sample Type Qualifier	Flow	Stage	Air Temp. (DEG C)	Sample Location	Current Weather	Air Condi-tion	Past 24HR Weather	Habitat	Tide Stage	Water Appear-ance	Comments
FBU	ANDROSCOGGIN RIV	6/13/2010	7:35 AM	N				BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. SLIGHT OILY SHEEN. NON-WADEABLE/3 FT BELOW
FBU	ANDROSCOGGIN RIV	6/13/2010	7:35 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. SLIGHT OILY SHEEN. NON-WADEABLE/3 FT BELOW
FBU	ANDROSCOGGIN RIV	6/13/2010	7:35 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. SLIGHT OILY SHEEN. NON-WADEABLE/3 FT BELOW
FBU	ANDROSCOGGIN RIV	7/11/2010	7:20 AM	N				BANK	CLOUDY, F	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	7/11/2010	7:20 AM	N				BANK	CLOUDY, F	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	8/15/2010	7:45 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	8/15/2010	7:45 AM	N				BANK			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	9/19/2010	7:05 AM	N			7	BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLING FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
FBU	ANDROSCOGGIN RIV	9/19/2010	7:05 AM	N				BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLING FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - FOMB	5/16/2010	7:20 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	5/16/2010	7:20 AM	N				BANK	CLEAR	CALM	CLEAR, PARTLY CLOUDY, MOSTLY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	6/13/2010	6:55 AM	N			17.7	BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	6/13/2010	6:55 AM	N				BANK	PARTLY C	CALM	PARTLY CLOUDY, SHOWERS, LIGHT				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N				BANK	CLOUDY, F	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N				BANK	CLOUDY, F	CALM	MOSTLY CLOUDY, LIGHT RAIN				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	8/15/2010	6:50 AM	N				WADING			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	8/15/2010	6:50 AM	N				WADING			CLEAR, PARTLY CLOUDY				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	9/19/2010	6:15 AM	N			7	BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	9/19/2010	6:15 AM	N				BANK			CLEAR				NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	9/19/2010	6:15 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE
PBL	ANDROSCOGGIN RIV	9/19/2010	6:15 AM	D				BANK							NO OBSERVATIONAL DATA. SAMPLED FROM BANK. NON-WADEABLE/3 FT BELOW SURFACE

Section 5-1
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 miles in Maine).[1] The headwaters are Umbagog Lake in 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 Bethel, 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 2010 Integrated Water Quality Monitoring and Assessment Report" lists segments of the main stem in 3 categories:

- The main stem, upstream of Gulf Island Pond, is listed in Category 4-A (Rivers and Streams with Impaired Use, TMDL completed). Causes of impairment are phosphorus, dissolved oxygen, total suspended solids, biological oxygen demand, and algal blooms. In addition, Category 4-A is Lewiston-Auburn variable mileage, CSO affected. Cause of impairment is *E.coli*.
- A number of segments are listed in Category 4-B (Rivers and Streams Impaired by Pollutants-Pollution Control Requirements Expected to Result in Attainment). The cause of non-attainment is dioxin.
- A number of segments are listed in Category 5-D (Rivers and Streams Impaired by Legacy Pollutants). 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 New Hampshire, Rumford, and Jay. Beginning in the late 1920s,

[1] Maine Rivers Website- Androscoggin River Profile

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 toxics.

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. FOMB will continue to gather data from sample stations using methods not accepted by DEP, as well as for a subset of stations acceptable to DEP. For 2011, three stations met VRMP requirements for sample location and methods. This report provides the data and analysis for the three approved sites. Five additional sites are reported here also. For these sites, both the monitor and equipment were certified by VRMP in 2011. These additional five sites, however, do not meet the requirements for being approved sites, and some methods may not be approved.

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 2011 at three approved stations [BBB, BWS, BCP] and five non-approved stations [DBL, BIL, FPD, FPU, PBL] on the main stem (Table 5-1-1 and Figures 5-1-1 through 5-1-3).

Table 5-1-1: 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-A158-FOMB	DBL	Durham Boat Launch	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

[2] Androscoggin River Alliance Website-Androscoggin River slideshow

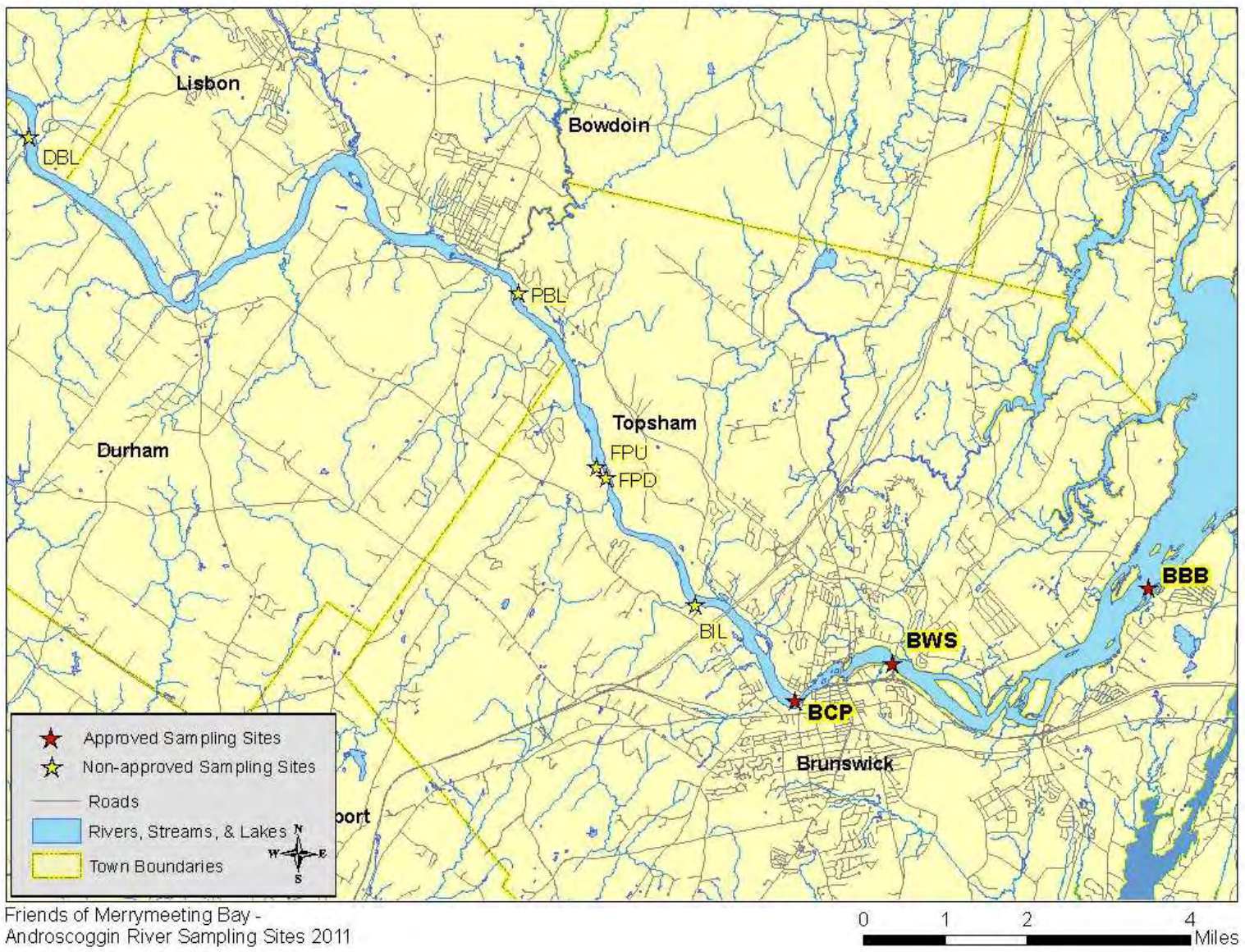


Figure 5-1-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

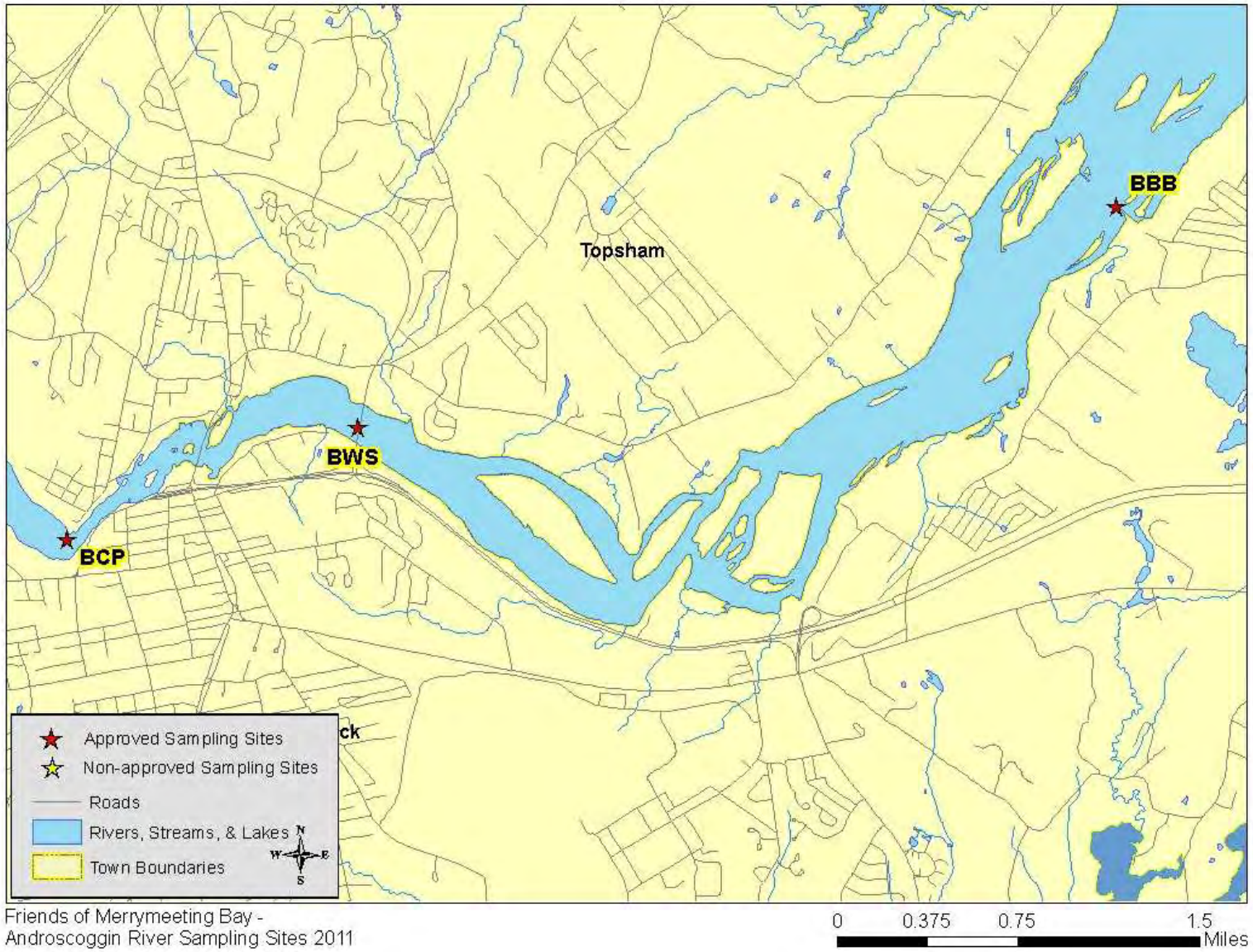


Figure 5-1-2: Map of approved Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

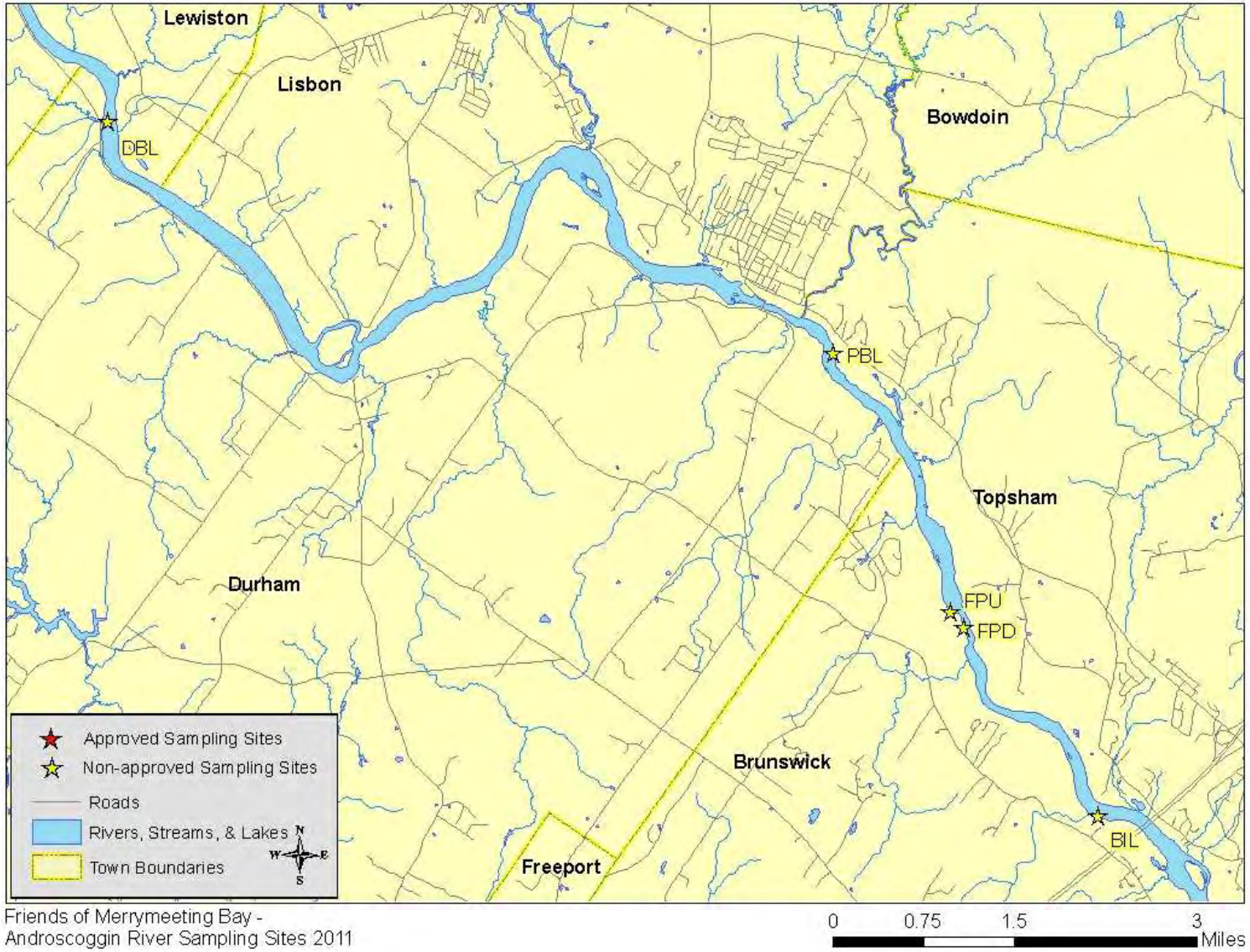


Figure 5-1-3: Map of non-approved Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

Monitoring was conducted from April through October, 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.

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 was sampled from a jetty allowing for representative, well-mixed areas of the river to be monitored.

Results

Refer to Appendices A-1 and A-2 in discussion of individual site data and trends, as well as graphed data (Figures 5-1-5 through 5-1-14), at the end of this section of the report.

Dissolved Oxygen

Dissolved oxygen (DO) was measured 2-7 times at each of the eight sampling sites (Table 5-1-2 and Table 5-1-3). Monitoring occurred from April through October. Class C criteria for DO are a minimum of 5.0 mg/l (milligrams/liter) or 60% saturation, whichever is higher. To meet water quality criteria, both concentration and saturation standards must be met.

Table 5-1-2: 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 Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	7	7.1	13.5	9.4
BWS	Y	7	7.7	13.7	9.8
BCP	Y	6	7.2	15.3	8.8
DBL	N	2	7.8	14.5	11.2
BIL	N	7	7.0	14.7	9.6
FPD	N	7	7.0	14.9	9.6
FPU	N	7	7.1	14.4	9.4
PBL	N	7	7.2	14.2	9.5

Table 5-1-3: 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 Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	7	84.9	107.4	94.0
BWS	Y	7	91.0	107.1	97.8
BCP	Y	5	82.8	115.0	94.6
DBL	N	2	84.0	112.8	98.4
BIL	N	7	84.5	115.2	95.0
FPD	N	7	85.5	114.5	95.7
FPU	N	7	85.3	111.6	94.6
PBL	N	7	85.2	111.5	94.8

Dissolved oxygen concentrations measured at Androscoggin River approved sites ranged from 7.0 mg/l to 15.3 mg/l. At site BBB, the lowest readings occurred in mid-July (7.1 mg/l) and mid-August (7.2 mg/l). Site BWS was similar with lowest readings in mid-July (8.3 mg/l) and mid-August (7.7 mg/l). Site BCP had its lowest readings in mid-June (8.0 mg/l) and mid-July (7.2 mg/l). Dissolved oxygen never dropped below the Class C standard of 5.0 mg/l. Dissolved oxygen percent saturation ranged from 82.8%-115% and did not go below the Class C standard of 60%.

Dissolved oxygen concentrations measured at Androscoggin River non-approved sites ranged from 7.0 mg/l -14.9 mg/l. Site DBL was sampled only two times (once in mid-April and once in mid-June) and was not included in this analysis. The remaining sites BIL, FPU, FPD, and PBL were all very similar. The lowest readings, all around 7.0-7.2 mg/l occurred during mid-July sampling events. Dissolved oxygen never dropped below the Class C standard of 5.0 mg/l. Dissolved oxygen percent saturation ranged from 84.5%-115.2% and did not go below the Class C standard of 60%.

Friends of Merrymeeting Bay volunteers do a good job of getting out early in the morning to sample. All but five of the forty-five samples sampling occurred by 8:15 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. If the intent is to assess low DO concentrations for water quality classification, including early or late season measurements will skew the results. For example, the average water temperature for all sampling sites (sans DBL) from April through October is 16.3°C; for June through September it is 21.1 °C. The corresponding average DO concentrations are 9.4 mg/l and 8.0 mg/l respectively.

Water Temperature

Temperature was also measured 2-7 times at each of the eight sampling sites (Table 5-1-4). Monitoring occurred from April through October. 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.

Table 5-1-4: 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 Sampling Events	Minimum Value	Maximum Value	Average Value
BBB	Y	7	5.0	24.3	16.5
BWS	Y	7	4.9	24.7	16.4
BCP	Y	4	4.9	19.2	11.8
DBL	N	2	4.8	18.9	11.9
BIL	N	7	4.9	25.1	16.7
FPD	N	7	4.8	25.5	16.8
FPU	N	7	4.7	25.3	16.8
PBL	N	7	5.1	25.5	16.8

Temperatures measured at all the Androscoggin River sites ranged from 4.7˚-25.5˚C (Celsius). All of the sites were very similar, except BCP, which lacked mid-summer readings – this skewed maximum and average values. The lowest values occurred in April with temperatures around just below 5.0˚C. In June, temperatures ranged from 18.9-19.5˚C at all the sites. Temperatures became high in July and August ranging from 23.6-25.5˚C. In October, temperatures dropped back down to 13.5-13.7˚C.

Specific Conductance

Specific conductance was measured 2-7 times at each of the eight sampling sites as well (Table 5-1-5). Monitoring occurred from April through October. 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.

Table 5-1-5: A summary of minimum, maximum, and average specific conductance values (micro-ohms/cm, µS/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	7	35	125	67
BWS	Y	7	58	136	86
BCP	Y	5	53	131	80
DBL	N	2	35	69	52
BIL	N	7	39	137	75
FPD	N	7	38	138	74
FPU	N	7	38	137	74
PBL	N	7	38	140	75

Specific conductance at all the sites ranged from 35-140 µS/cm, which are elevated from natural background values, reflecting upstream point and non-point source discharges. The sites were all very similar with minimum values ranging from 35-58 (exclusive of Site DBL, which was only sampled twice) and maximum ranging from 69-140 µS/cm, which shows that sources are farther upstream.

Bacteria

Escherichia coli bacteria was also measured 7 times at each of the three approved sampling sites (Table 5-1-6). Monitoring occurred from April through October. 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."

Results for the non-approved sites were not included, since non-approved methods are used for collection at those sites. 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.

Table 5-1-6: 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	*E. coli*	7	22	816	81
BWS	*E. coli*	7	24	457	73
BCP	*E. coli*	7	10	687	58

Each one of these sites have maximum values exceeding the instantaneous criterion (see Appendix A-1 and Figure 5-1-14 at the end of this report). All of these exceedances occurred on

the same sampling date (10/16/11). Typically, observed high bacterial levels are associated with stormwater runoff and/or combined sewer overflows. Rainfall totals at the weather station at Highland Green in Topsham included 1.22 inches of rain during the period from 10/13 to 10/14 (Figure 5-1-4). Stormwater travel times from the Brunswick/Topsham urban area to the first two upstream sample stations is shorter than 24 hours, however, and there are no combined sewer overflows or waste water discharges directly upstream.

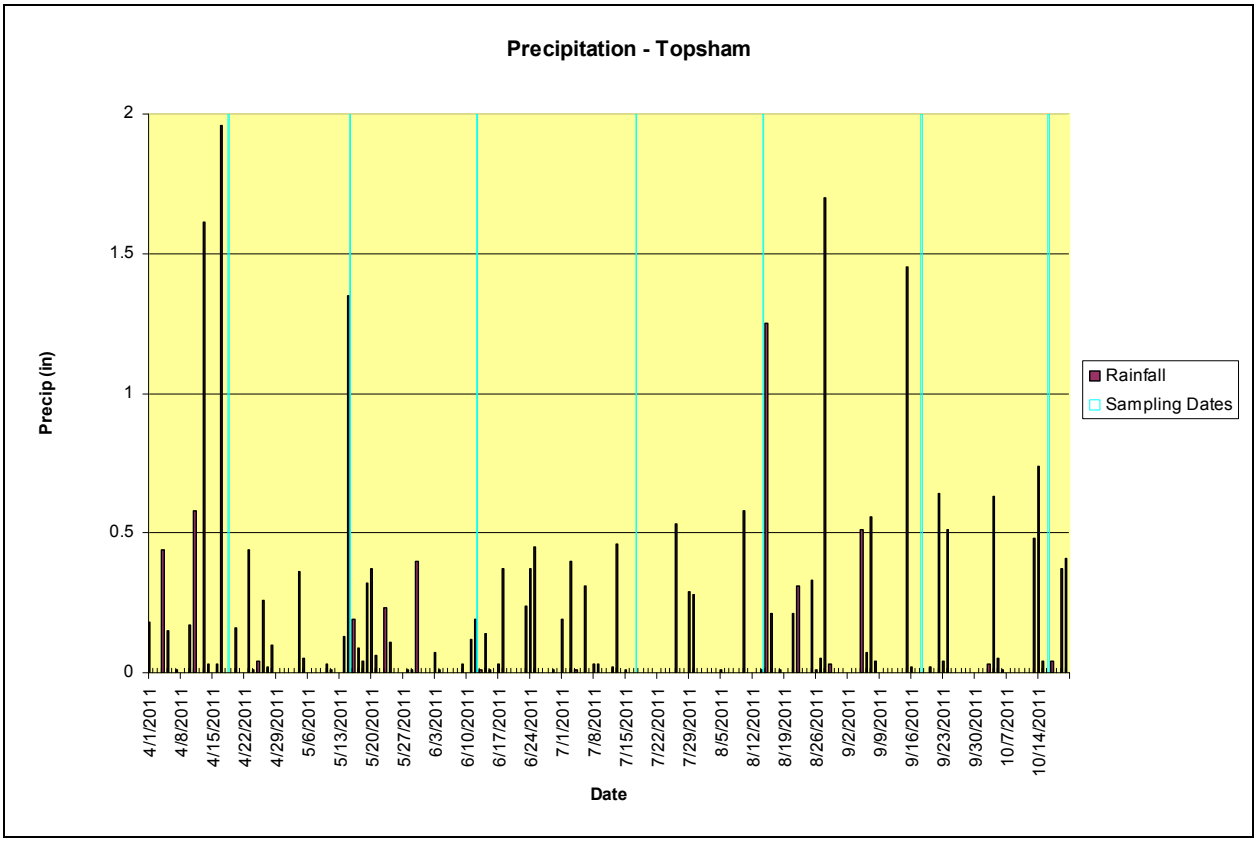


Figure 5-1-4: Seasonal precipitation measured at Highland Green, Topsham.

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:

- This is the first year the sampling season was extended to April and October. As noted in the discussion of temperature effects on dissolved oxygen, river temperatures are substantially lower in April and dissolved oxygen concentrations are proportionally higher. There is a good argument for collecting as much water quality data as possible, but if a primary goal of FOMB is to demonstrate the river meets minimum DO criterion for reclassification, they should reconsider the values of extending the season.
- Continue monitoring at all stations (or at least a subset of sites) to develop a long term trend database.

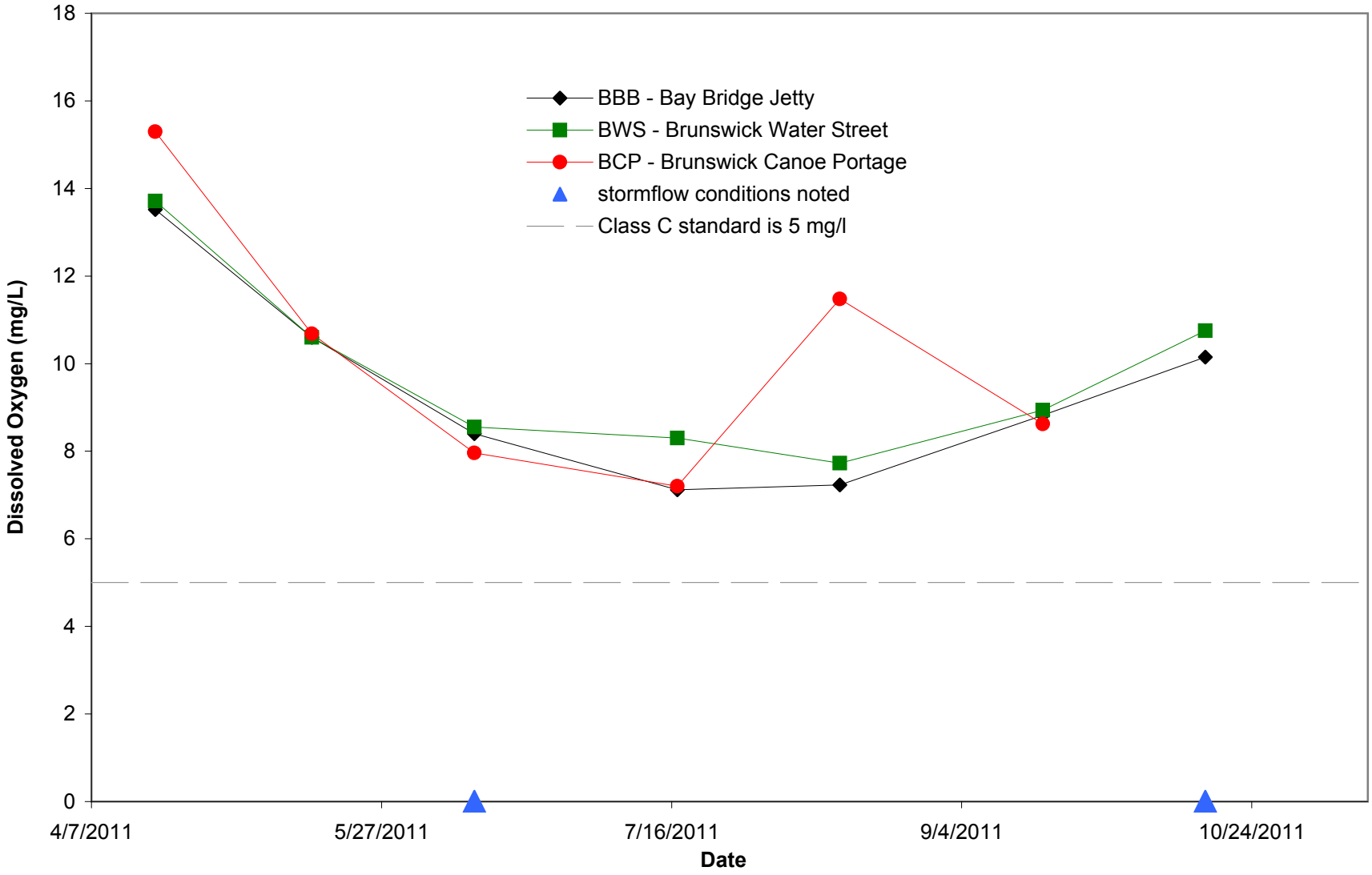


Figure 5-1-5. Dissolved oxygen concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

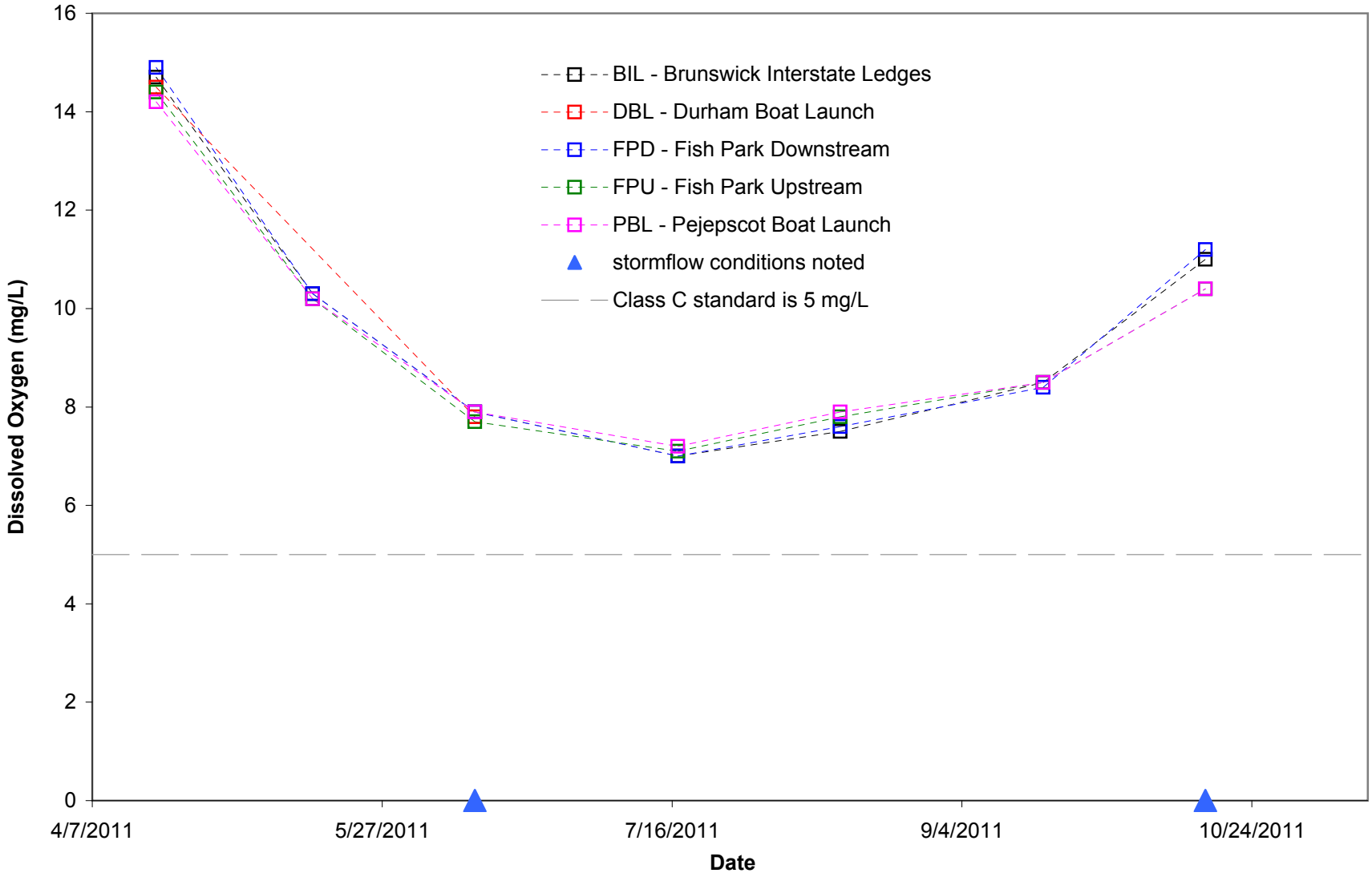


Figure 5-1-6. Dissolved oxygen concentrations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

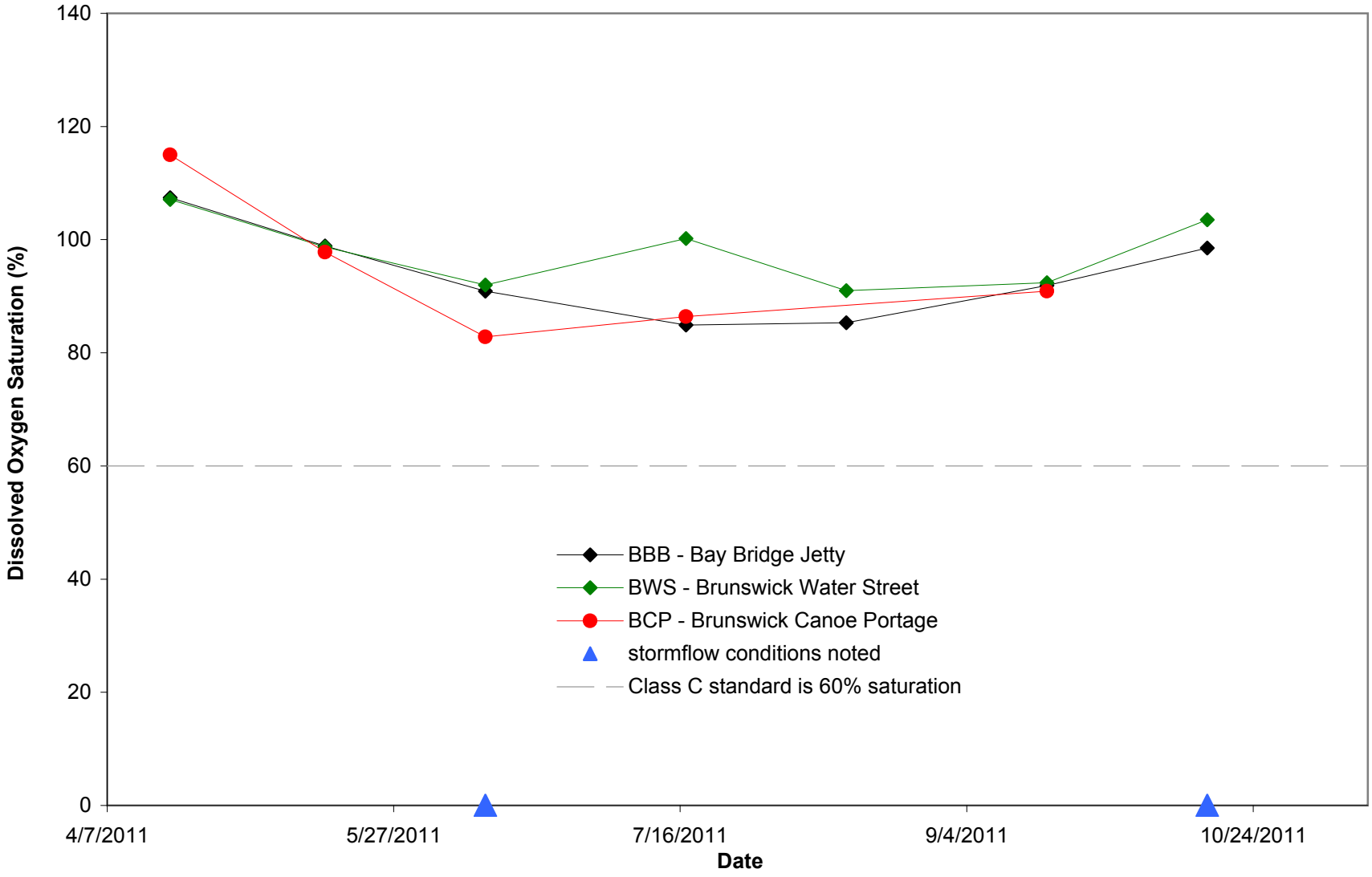


Figure 5-1-7. Dissolved oxygen % saturations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

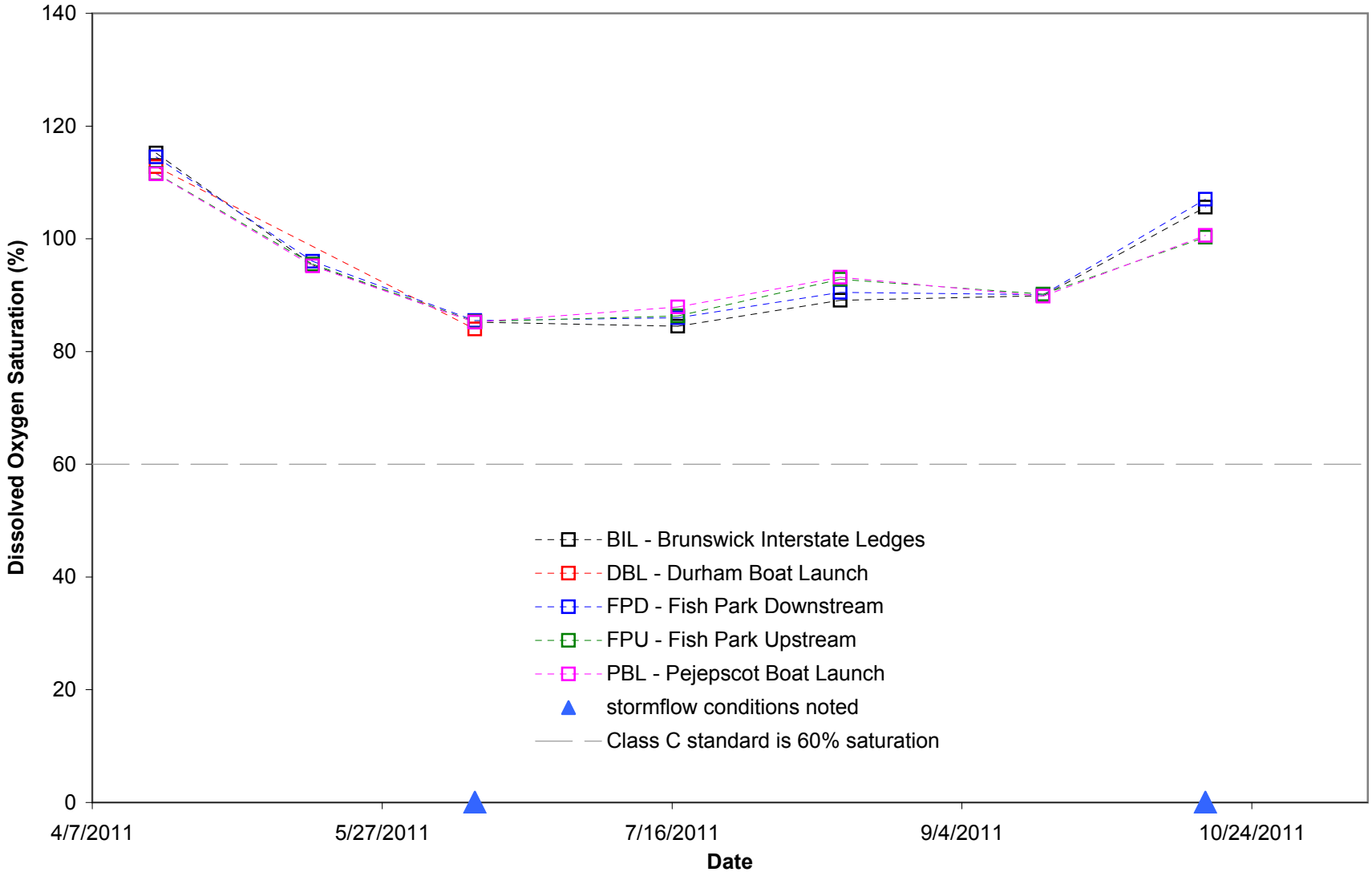


Figure 5-1-8. Dissolved oxygen % saturations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

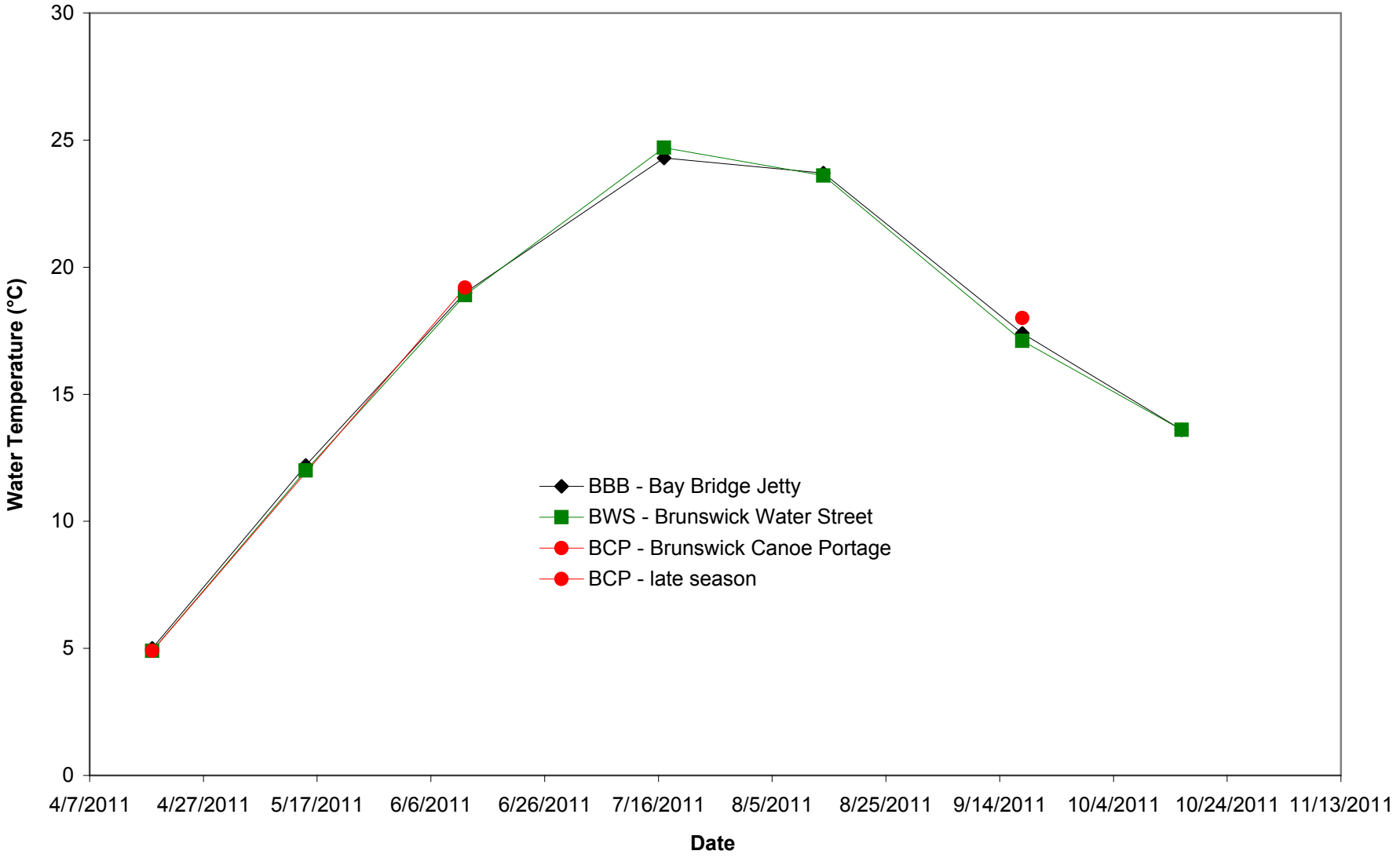


Figure 5-1-9. Water temperatures at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

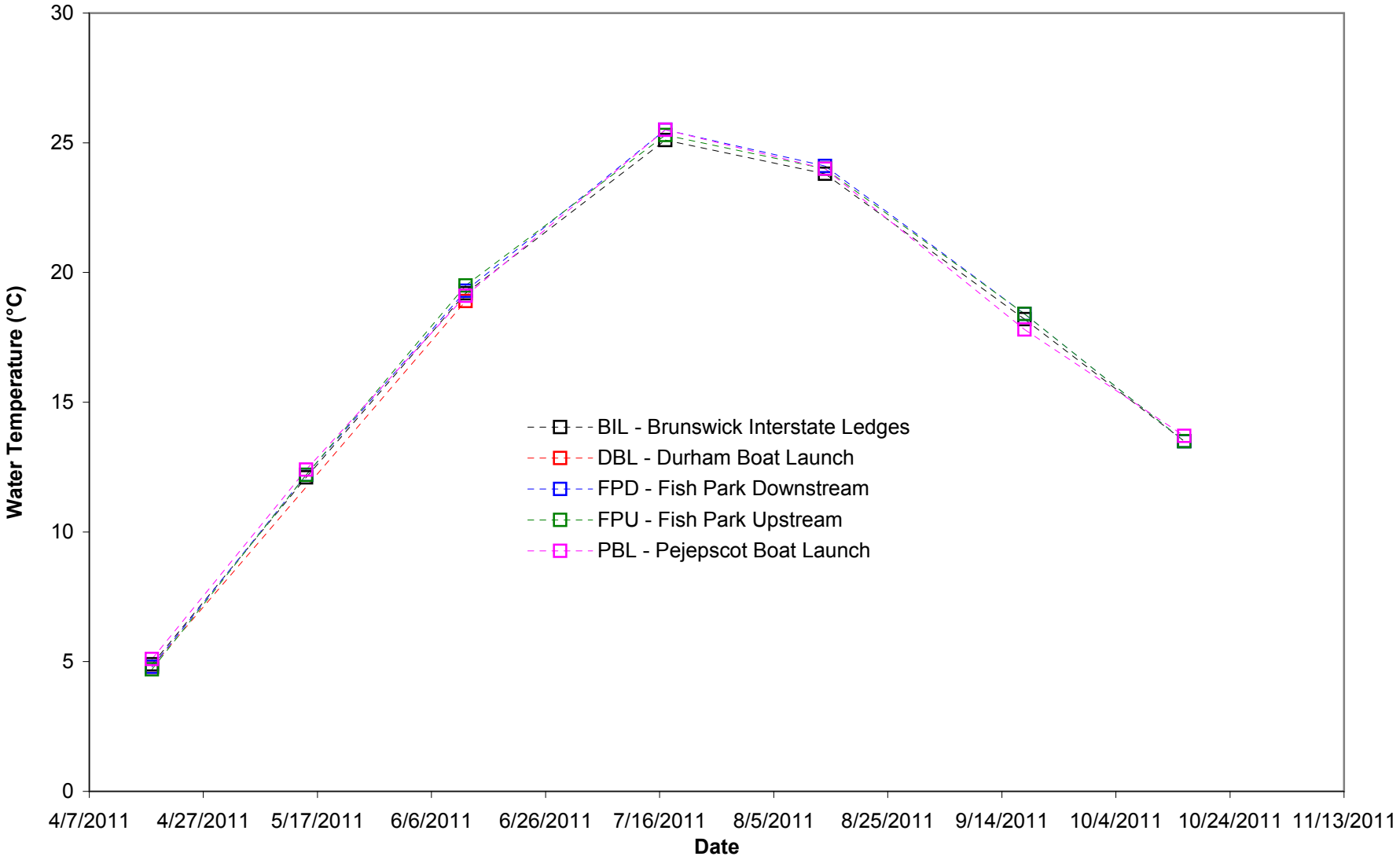


Figure 5-1-10. Water temperatures at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

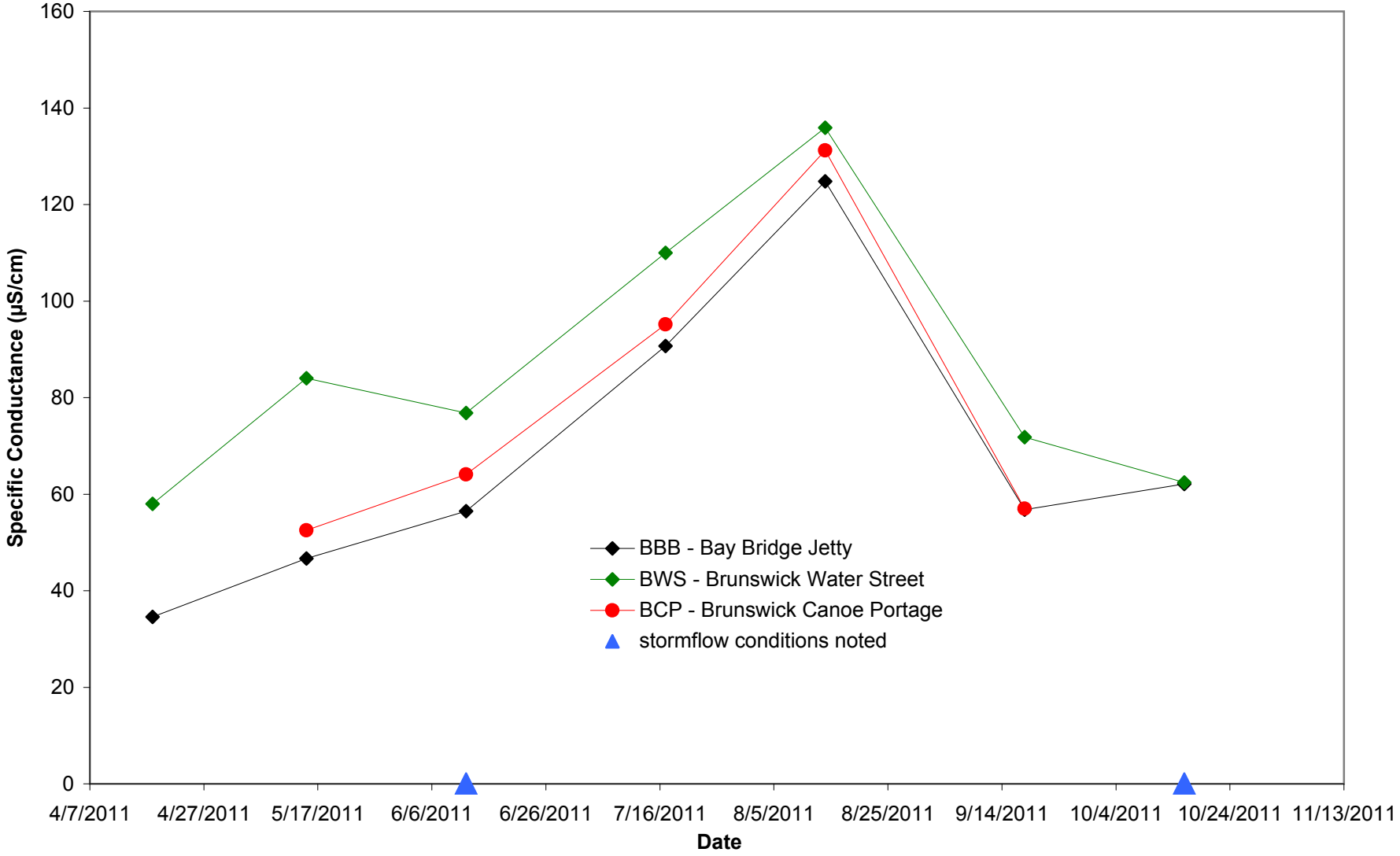


Figure 5-1-11. Specific conductance at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

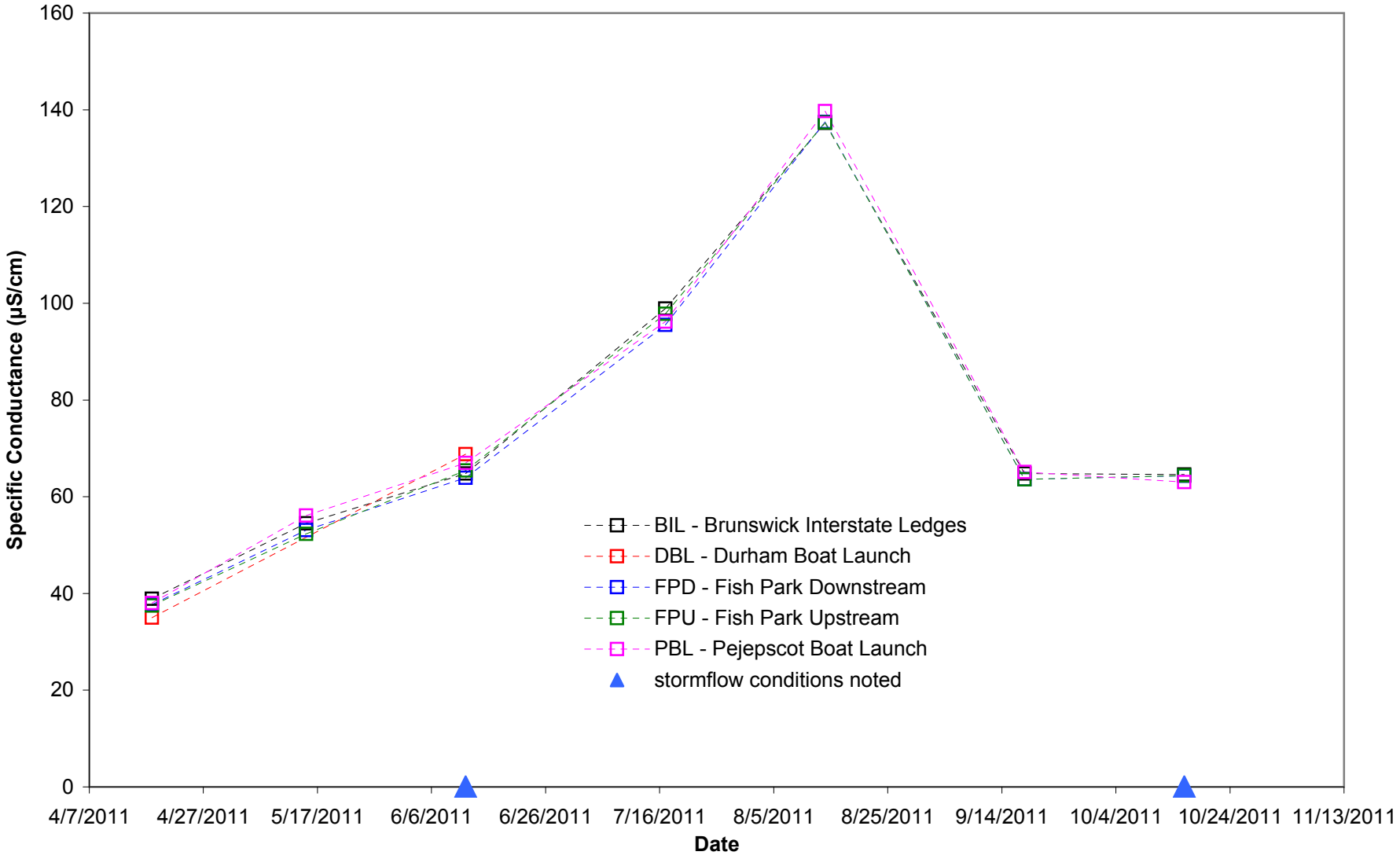


Figure 5-1-12. Specific conductance at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

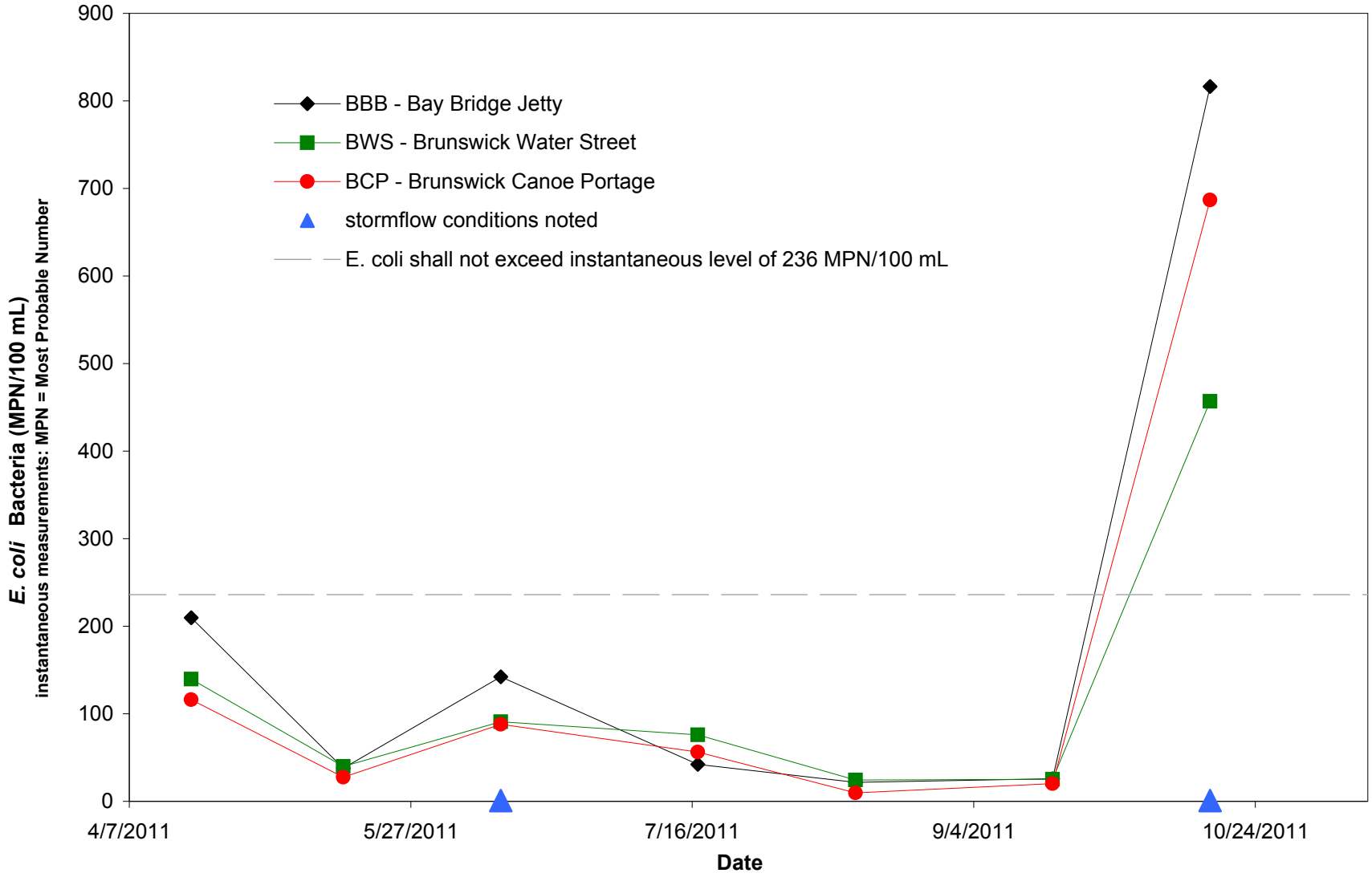


Figure 5-1-13. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

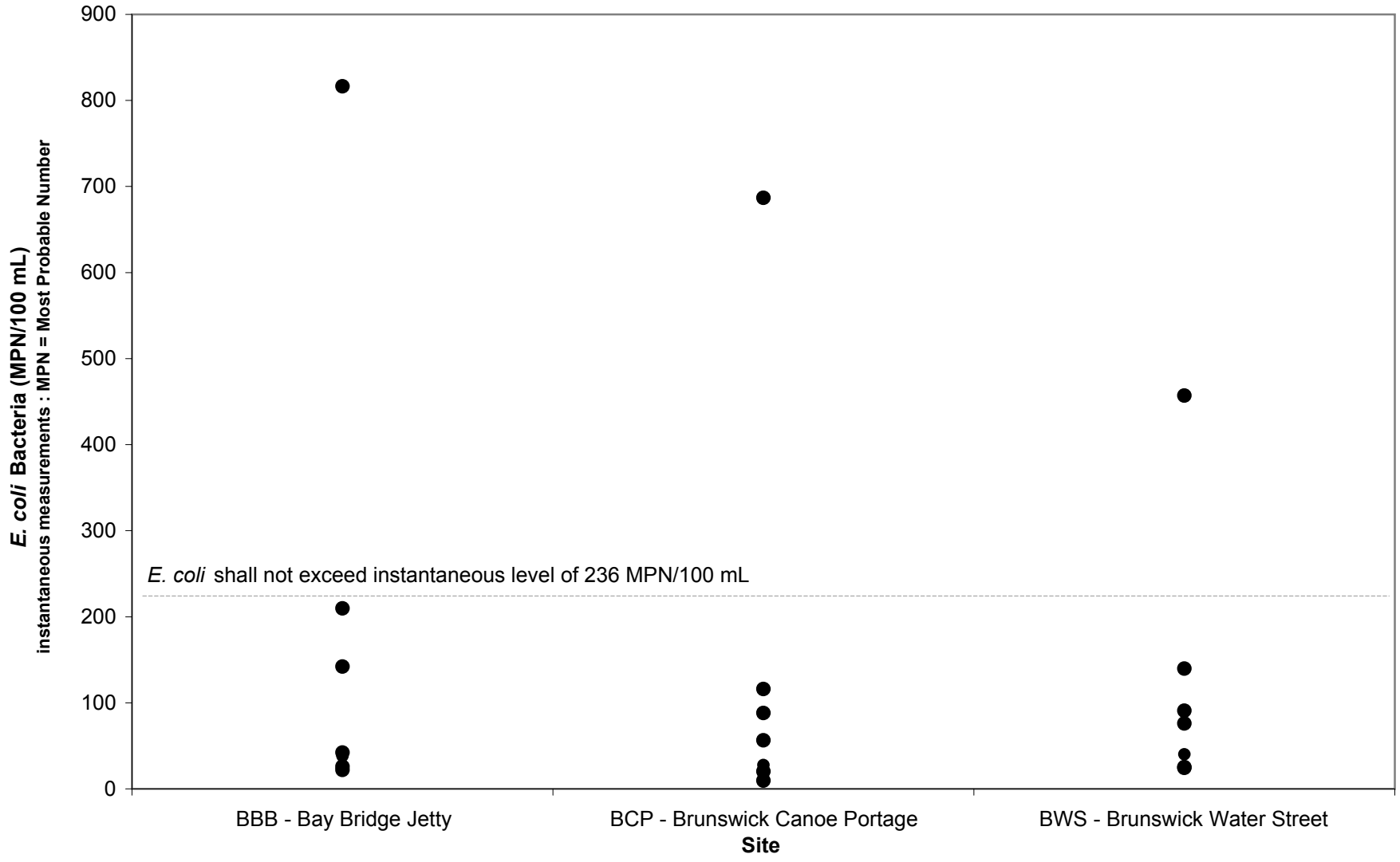


Figure 5-1-14. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

Appendix A-1. 2011 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)	Turbid-ity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)
Androscoggin River - Friends of Merrymeeting Bay (Approved Sites)														
BBB -BAY BRIDGE JETTY	ANDROSCOGGIN RIVER-A231-VRMP	4/18/2011	7:20 AM	N			5	107.4	13.52	34.6				209.8
BBB	ANDROSCOGGIN RIVER-A231-VRMP	5/15/2011	7:40 AM	N			12.2	98.9	10.6	46.7				37.9
BBB	ANDROSCOGGIN RIVER-A231-VRMP	5/15/2011	7:40 AM	D										34.1
BBB	ANDROSCOGGIN RIVER-A231-VRMP	6/12/2011	7:55 AM	N			19	90.9	8.4	56.5				142.1
BBB	ANDROSCOGGIN RIVER-A231-VRMP	7/17/2011	7:00 AM	N			24.3	84.9	7.12	90.7				42.2
BBB	ANDROSCOGGIN RIVER-A231-VRMP	8/14/2011	7:50 AM	N			23.7	85.3	7.23	124.8				21.8
BBB	ANDROSCOGGIN RIVER-A231-VRMP	9/18/2011	7:50 AM	N			17.4	91.9	8.82	56.8				25.9
BBB	ANDROSCOGGIN RIVER-A231-VRMP	10/16/2011	9:20 AM	N			13.6	98.5	10.15	62.1				816.4
BCP - BRUNSWICK CANOE PORTAGE	ANDROSCOGGIN RIVER-A299BK-VRI	4/18/2011	8:00 AM	N			4.9	115	15.3					116
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	5/15/2011	7:45 AM	N				97.8	10.68	52.5				27.5
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	6/12/2011	8:05 AM	N			19.2	82.8	7.96	64.1				88
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	7/17/2011	8:00 AM	N				86.4	7.2	95.2				56.3
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	8/13/2011	8:00 AM	N					11.48	131.2				9.6
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	8/13/2011	8:00 AM	D										5.2
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	9/18/2011	8:10 AM	N			18	90.9	8.62	57				20.3
BCP	ANDROSCOGGIN RIVER-A299BK-VRI	10/16/2011	8:00 AM	N										686.7
BWS - BRUNSWICK WATER STREET	ANDROSCOGGIN RIVER-A281BK-VRI	4/18/2011	8:00 AM	N			4.9	107.1	13.71	58				139.6
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	5/15/2011	7:05 AM	N			12	98.7	10.6	84				39.9
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	6/12/2011	7:20 AM	N			18.9	92	8.55	76.8				90.8
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	6/12/2011	7:20 AM	D										185
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	7/17/2011	7:30 AM	N			24.7	100.2	8.3	110				75.9
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	8/14/2011	7:00 AM	N			23.6	91	7.73	135.9				24.3
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	9/18/2011	7:15 AM	N			17.1	92.4	8.94	71.8				25.3
BWS	ANDROSCOGGIN RIVER-A281BK-VRI	10/16/2011	8:50 AM	N			13.6	103.5	10.75	62.4				456.9

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)	Turbid- ity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)
Androscoggin River - Friends of Merrymeeting Bay (Non-approved Sites)														
BIL - BRUNSWICK INTERSTATE LEDGES	ANDROSCOGGIN RIVER-A24-FOMB	4/18/2011	8:00 AM	N			4.9	115.2	14.7	38.9				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	5/15/2011	7:55 AM	N			12.1	95.3	10.3	54.5				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	6/12/2011	8:05 AM	N			19.2	85.2	7.9	64.8				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	7/17/2011	7:55 AM	N			25.1	84.5	7	98.9				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	8/14/2011	8:00 AM	N			23.8	89.1	7.5	137.3				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	8/14/2011	8:00 AM	D			23.8	89.1	7.5	137.3				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	9/18/2011	8:15 AM	N			18.2	89.9	8.5	64.8				
BIL	ANDROSCOGGIN RIVER-A24-FOMB	10/16/2011	9:05 AM	N			13.5	105.6	11	64.6				
DBL - DURHAM BOAT LAUNCH	ANDROSCOGGIN RIVER-A158-FOMB	4/18/2011	7:00 AM	N			4.8	112.8	14.5	35				
DBL	ANDROSCOGGIN RIVER-A158-FOMB	4/18/2011	7:00 AM	D			4.8	112.8	14.5	35				
DBL	ANDROSCOGGIN RIVER-A158-FOMB	6/12/2011	7:00 AM	N			18.9	84	7.8	68.8				
FPU - FISH PARK UPSTREAM	ANDROSCOGGIN RIVER-A47-FOMB	4/18/2011	7:30 AM	N			4.7	111.6	14.4	37.5				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	5/15/2011	7:20 AM	N			12.2	95.5	10.2	52.3				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	6/12/2011	7:35 AM	N			19.5	85.3	7.7	65.4				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	6/12/2011	7:35 AM	D			19.2	85.3	7.7	65.4				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	7/17/2011	7:10 AM	N			25.3	86.3	7.1	97.8				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	7/17/2011	7:10 AM	D			25.3	86	7					
FPU	ANDROSCOGGIN RIVER-A47-FOMB	8/14/2011	7:05 AM	N			24	92.8	7.8	137.4				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	9/18/2011	7:45 AM	N			18.4	90.2	8.5	63.6				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	10/16/2011	8:35 AM	N			13.5	100.3	10.4	64.4				
FPU	ANDROSCOGGIN RIVER-A47-FOMB	10/16/2011	8:35 AM	D			13.5		10.4	64.4				
FPD - FISH PARK DOWNSTREAM	ANDROSCOGGIN RIVER-A45-FOMB	4/18/2011	7:45 AM	N			4.8	114.5	14.9	37.7				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	5/15/2011	7:30 AM	N			12.2	96	10.3	53.1				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	6/12/2011	7:45 AM	N			19.3	85.5	7.9	63.9				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	7/17/2011	7:25 AM	N			25.5	86	7	95.5				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	8/14/2011	7:20 AM	N			24.1	90.5	7.6	137.5				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	9/18/2011	7:55 AM	N			18.4	90.1	8.4	63.6				
FPD	ANDROSCOGGIN RIVER-A45-FOMB	10/16/2011	8:50 AM	N			13.5	107	11.2	64.3				

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)	Turbid-ity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)
PBL - PEJEPSCOT BOAT LAUNCH	ANDROSCOGGIN RIVER-A71-FOMB	4/18/2011	6:30 AM	N			5.1	111.5	14.2	38				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	5/15/2011	6:50 AM	N			12.4	95.2	10.2	56.1				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	5/15/2011	6:50 AM	D			12.4	95.2	10.2	54.5				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	6/12/2011	6:25 AM	N			19.1	85.2	7.9	67				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	7/17/2011	6:40 AM	N			25.5	87.9	7.2	96.2				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	8/14/2011	6:45 AM	N			24	93.2	7.9	139.7				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	9/18/2011	7:20 AM	N			17.8	89.8	8.5	65.1				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	9/18/2011	7:20 AM	D			17.8			65.1				
PBL	ANDROSCOGGIN RIVER-A71-FOMB	10/16/2011	8:10 AM	N			13.7	100.6	10.4	63				

Appendix A-2. 2011 observational data and quality assurance/quality control (QA/QC) notes for "approved" and "non-approved" sites.
** "N" = normal environmental sample; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "TSS"=total suspended solids
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 Appear-ance	Comments
Androscoggin River - Friends of Merrymeeting Bay (Approved Sites)															
BBB - BAY BRIDGE JETTY	ANDROSCOGGIN RIV	4/18/2011	7:20 AM	N		HIGH	3.5	WADING	PARTLY CLOUDY	BREEZE	PARTLY CLOUDY	RUN		DARKLY STAINED	VERY FAST CURRENT, VERY HIGH WATER. WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	5/15/2011	7:40 AM	N	BASE FLOW	MEDIUM	11.4	WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, HEAVY RAIN	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	5/15/2011	7:40 AM	D				WADING							WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	6/12/2011	7:55 AM	N		HIGH	15	WADING	HEAVY RAIN, SHOWER		CLOUDY, LIGHT RAIN, SHOWERS	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	7/17/2011	7:00 AM	N			24.7	WADING				RIFFLE		DARKLY STAINED	WADEABLE/MID-DEPTH TIME SAMPLED WAS NOT WRITTEN DOWN, SO ESTIMATE WAS DERIVED BY LOOKING AT START AND END TIME OF SAMPLING. DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	8/14/2011	7:50 AM	N	BASE FLOW	MEDIUM	20.9	WADING	CLOUDY, PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	9/18/2011	7:50 AM	N		HIGH	14.4	WADING	PARTLY CLOUDY	CALM	PARTLY CLOUDY	RUN		DARKLY STAINED	LOTS OF FISH JUMPING. WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BBB	ANDROSCOGGIN RIV	10/16/2011	9:20 AM	N	BASE FLOW	MEDIUM	13.8	WADING		STRONG WIND	CLEAR	RUN		DARKLY STAINED	VERY WINDY - DANGEROUS CURRENTS. VERY HIGH TIDE. WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BCP - BRUNSWICK CANOE PORTAGE	ANDROSCOGGIN RIV	4/18/2011	8:00 AM	N			5.3	BANK	CLEAR	CALM	CLEAR, HEAVY RAIN				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OBSERATIONAL DATA.
BCP	ANDROSCOGGIN RIV	5/15/2011	7:45 AM	N	BASE FLOW	MEDIUM	12	WADING	MOSTLY CLOUDY, SHOWERS	CALM	CLOUDY, SHOWERS	RUN		MEDIUM STAINED	WATER SAMPLING APPARATUS SNAPPED @ 1.5M-RETRIEVAL SUCCESSFUL, BUT UNSURE OF SAMPLE NON-WADEABLE/3 FT BELOW SURFACE, WATER SAMPLING APPARATUS SNAPPED @ 1.5M-RETRIEVAL SUCCESSFUL, BUT UNSURE OF SAMPLE NON-WADEABLE/3 FT BELOW SURFACE; WATER TEMPERATURE NOT RECORDED
BCP	ANDROSCOGGIN RIV	6/12/2011	8:05 AM	N	STORM FLOW	MEDIUM	14.8	WADING	HEAVY RAIN, SHOWER	CALM	LIGHT RAIN, MOSTLY CLOUDY, SHOWERS	RUN		MEDIUM STAINED	HEAVY RAIN PRIOR TO SAMPLING WADEABLE/MID-DEPTH
BCP	ANDROSCOGGIN RIV	7/17/2011	8:00 AM	N	BASE FLOW	MEDIUM		BOAT	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	SAMPLING DONE FROM BOAT-POISON IVY WAS THICK. NON-WADEABLE/3 FT BELOW SURFACE, SAMPLING DONE FROM BOAT-POISON IVY WAS THICK. NON-WADEABLE/3 FT BELOW SURFACE; WATER TEMPERATURE NOT 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
BCP	ANDROSCOGGIN RIV	8/13/2011	8:00 AM	N	BASE FLOW	LOW	22.3	WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	BOAT PARKED ALONG DOCK AND SLICK OF OILY BLUE TRAILING DOWNSTREAM. WADEABLE/1.5 FT BELOW SURFACE BOTH NON-WADEABLE (3 FT BELOW SURFACE) AND WADEABLE (1.5 FT BELOW SURFACE) CIRCLED ON FIELD SHEET., WATER TEMPERATURE NOT RECORDED; D.O. SATURATION OUTSIDE VALIDATION RANGE (134.7); BOAT PARKED ALONG DOCK AND SLICK OF OILY BLUE TRAILING DOWNSTREAM. WADEABLE/1.5 FT BELOW SURFACE; BOTH NON-WADEABLE (3 FT BELOW SURFACE) AND WADEABLE (1.5 FT BELOW SURFACE)
BCP	ANDROSCOGGIN RIV	8/13/2011	8:00 AM	D				WADING							BOAT PARKED ALONG DOCK AND SLICK OF OILY BLUE TRAILING DOWNSTREAM. WADEABLE/1.5 FT BELOW SURFACE BOTH NON-WADEABLE (3 FT BELOW SURFACE) AND WADEABLE (1.5 FT BELOW SURFACE) CIRCLED ON FIELD SHEET.
BCP	ANDROSCOGGIN RIV	9/18/2011	8:10 AM	N		HIGH	15.9	BANK	PARTLY CLOUDY	CALM	PARTLY CLOUDY	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH
BCP	ANDROSCOGGIN RIV	10/16/2011	8:00 AM	N	STORM FLOW	HIGH	13.8	BRIDGE	CLEAR	BREEZE	CLEAR, CLOUDY, SHOWERS	RUN		DARKLY STAINED	WAS NOT ABLE TO TEST FROM ROCKS-TESTED FROM SWINGING BRIDGE. NON-WADEABLE/3 FT BELOW SURFACE
BWS - BRUNSWICK WATER STREET	ANDROSCOGGIN RIV	4/18/2011	8:00 AM	N		HIGH	3.5	WADING	PARTLY CLOUDY	BREEZE	PARTLY CLOUDY	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	5/15/2011	7:05 AM	N	BASE FLOW	MEDIUM	11.6	WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, HEAVY RAIN	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	6/12/2011	7:20 AM	N		HIGH	14.5	WADING	HEAVY RAIN, SHOWER		CLOUDY, LIGHT RAIN, SHOWERS	RUN		DARKLY STAINED	D.O. TITRATION DUPLICATE=8.4 WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	6/12/2011	7:20 AM	D				WADING							D.O. TITRATION DUPLICATE=8.4 WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	7/17/2011	7:30 AM	N			25	WADING				RIFFLE		DARKLY STAINED	WADEABLE/MID-DEPTH TIME SAMPLED WAS NOT WRITTEN DOWN, SO ESTIMATE WAS DERIVED BY LOOKING AT START AND END TIME OF SAMPLING. DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	8/14/2011	7:00 AM	N	BASE FLOW	MEDIUM	20.9	WADING	CLOUDY, PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY	RUN		DARKLY STAINED	D.O. TITRATION DUPLICATE=7.8 MG/L WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	9/18/2011	7:15 AM	N		HIGH	14.6	WADING	PARTLY CLOUDY	CALM	PARTLY CLOUDY	RUN		DARKLY STAINED	D.O. DUPLICATE TITRATION=8.8 WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE
BWS	ANDROSCOGGIN RIV	10/16/2011	8:50 AM	N	BASE FLOW	MEDIUM	13.8	WADING		STRONG WIND	CLEAR	RUN		DARKLY STAINED	D.O. DUPLICATE TITRATION=10.8 MG/L WADEABLE/MID-DEPTH DID NOT COMPLETE CHAIN OF CUSTODY FOR LAB SAMPLE

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 Appear-ance	Comments
Androscoggin River - Friends of Merrymeeting Bay (Non-approved Sites)															
BIL - BRUNSWICK INTERSTATE LEDGES	ANDROSCOGGIN RIV	4/18/2011	8:00 AM	N			6.5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, CLOUDY, HEAVY RAIN, PARTLY CLOUDY				D.O. DUPLICATE TITRATION=13.4 (MG/L)- SHALLOWER THAN PROBE NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERATIONAL DATA.
BIL	ANDROSCOGGIN RIV	5/15/2011	7:55 AM	N			10	BANK	CLOUDY		CLEAR, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	6/12/2011	8:05 AM	N			12	BANK	MOSTLY CLOUDY, SHOWERS	CALM	CLOUDY, LIGHT RAIN				NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	7/17/2011	7:55 AM	N			22	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	8/14/2011	8:00 AM	N				BANK	PARTLY CLOUDY		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	8/14/2011	8:00 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	9/18/2011	8:15 AM	N			13	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIV	10/16/2011	9:05 AM	N			11.5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
DBL - DURHAM BOAT LAUNCH	ANDROSCOGGIN RIV	4/18/2011	7:00 AM	N			5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, CLOUDY, HEAVY RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERATIONAL DATA.
DBL	ANDROSCOGGIN RIV	4/18/2011	7:00 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERATIONAL DATA.
DBL	ANDROSCOGGIN RIV	6/12/2011	7:00 AM	N			10	BANK	MOSTLY CLOUDY, SHOWER	CALM	CLOUDY, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU - FISH PARK UPSTREAM	ANDROSCOGGIN RIV	4/18/2011	7:30 AM	N			6.5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, CLOUDY, HEAVY RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERATIONAL DATA.
FPU	ANDROSCOGGIN RIV	5/15/2011	7:20 AM	N			10	BANK	CLOUDY		CLEAR, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	6/12/2011	7:35 AM	N			10.8	BANK	MOSTLY CLOUDY, SHOWER	CALM	CLOUDY, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	6/12/2011	7:35 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	7/17/2011	7:10 AM	N			18	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	7/17/2011	7:10 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	8/14/2011	7:05 AM	N				BANK	PARTLY CLOUDY		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	9/18/2011	7:45 AM	N			9	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	10/16/2011	8:35 AM	N			11	BANK	PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIV	10/16/2011	8:35 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD - FISH PARK DOWN STREAM	ANDROSCOGGIN RIV	4/18/2011	7:45 AM	N			6.5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, CLOUDY, HEAVY RAIN, PARTLY CLOUDY				NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERATIONAL 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 Appear-ance	Comments
FPD	ANDROSCOGGIN RIV	5/15/2011	7:30 AM	N			10	BANK	CLOUDY		CLEAR, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIV	6/12/2011	7:45 AM	N			10.8	BANK	MOSTLY CLOUDY, SHOWER	CALM	CLOUDY, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIV	7/17/2011	7:25 AM	N			19	BANK	CLEAR		CLEAR				NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIV	8/14/2011	7:20 AM	N				BANK	PARTLY CLOUDY		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIV	9/18/2011	7:55 AM	N			9	BANK	CLEAR		CLEAR				NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIV	10/16/2011	8:50 AM	N			11.1	BANK	PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL - PEJEPSCOT BOAT LAUNCH	ANDROSCOGGIN RIV	4/18/2011	6:30 AM	N			4	BANK	PARTLY CLOUDY	BREEZE	CLEAR, CLOUDY, HEAVY RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	5/15/2011	6:50 AM	N			10	BANK	CLOUDY		CLEAR, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	5/15/2011	6:50 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	6/12/2011	6:25 AM	N			10.8	BANK	MOSTLY CLOUDY, SHOWER	CALM	CLOUDY, LIGHT RAIN				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	7/17/2011	6:40 AM	N			17.5	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	8/14/2011	6:45 AM	N				BANK	PARTLY CLOUDY		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	9/18/2011	7:20 AM	N			9	BANK	CLEAR		CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	9/18/2011	7:20 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIV	10/16/2011	8:10 AM	N			11.5	BANK	PARTLY CLOUDY	BREEZE	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.

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 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 Bethel, 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 2010 Integrated Water Quality Monitoring and Assessment Report" lists segments of the main stem in 3 categories:

- The main stem, upstream of Gulf Island Pond, is listed in Category 4-A (Rivers and Streams with Impaired Use, TMDL completed). Causes of impairment are phosphorus, dissolved oxygen, total suspended solids, biological oxygen demand, and algal blooms. In addition, Category 4-A is Lewiston-Auburn variable mileage, CSO affected. Cause of impairment is *E.coli*.
- A number of segments are listed in Category 4-B (Rivers and Streams Impaired by Pollutants-Pollution Control Requirements Expected to Result in Attainment). The cause of non-attainment is dioxin.
- A number of segments are listed in Category 5-D (Rivers and Streams Impaired by Legacy Pollutants). 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 New Hampshire, Rumford, and Jay. Beginning in the late 1920s, Central Maine Power built

[1] Maine Rivers Website- Androscoggin River Profile

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 toxics.

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 2012 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 Figures 5-2-1 through 5-2-3).

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-A158-FOMB	DBL	Durham Boat Launch	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

[2] Androscoggin River Alliance Website-Androscoggin River slideshow

2012 Androscoggin River Sampling Sites
Friends of Merrymeeting Bay

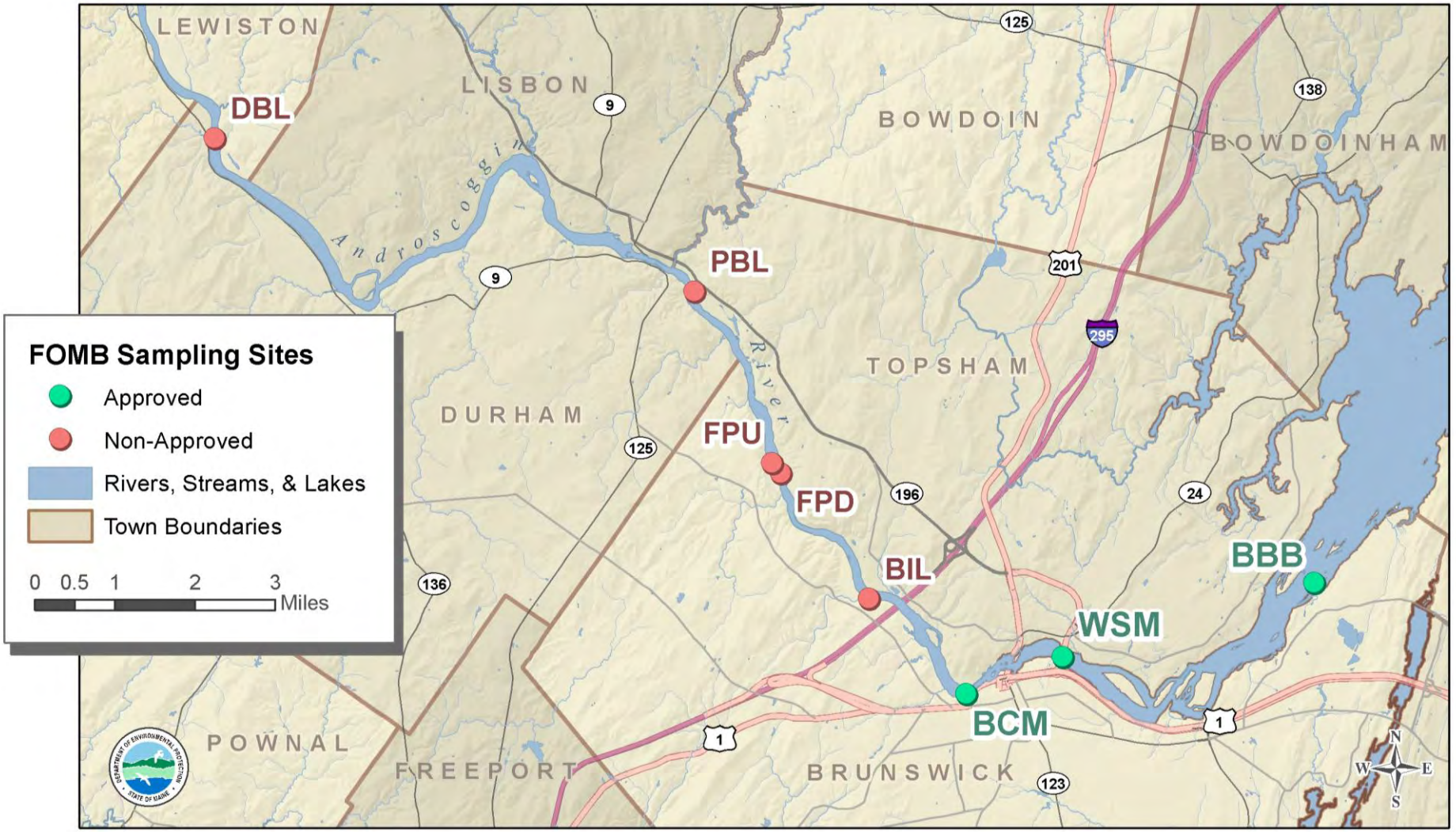


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

Monitoring was conducted from April through October, 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, as well as graphed data (Figures 5-2-5 through 5-2-14), at the end of this section of the report.

Precipitation

Figure 5-2-4 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 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.

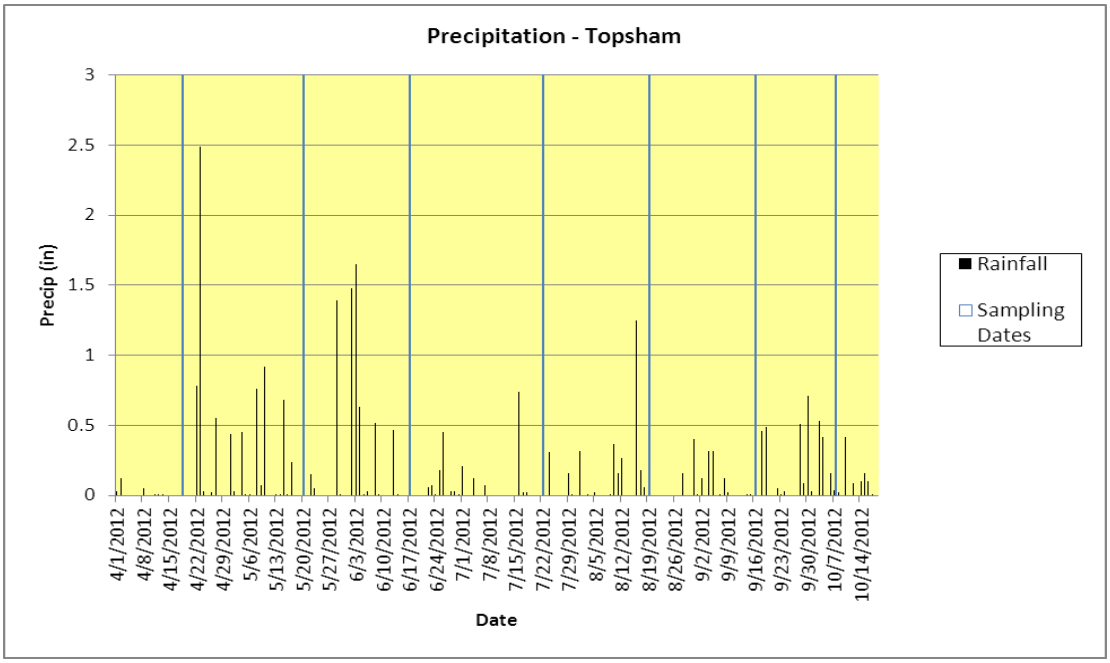


Figure 5-2-2: Seasonal precipitation measured at Highland Green, Topsham.

Dissolved Oxygen

Dissolved oxygen (DO) was measured 1-7 times at each of the eight sampling sites (Table 5-2-2 and Table 5-2-3). Monitoring occurred from April to October. Class C criteria for DO are a minimum of 5.0 mg/l (milligrams/liter) or 60% saturation, whichever is higher. To meet water quality criteria, both concentration and saturation standards must be met.

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	6	7.2	10.3	8.4
BWS	Y	5	7.6	10.7	8.9
BCP	Y	6	7.1	9.8	8.2
DBL	N	1	14.5	14.5	14.5
BIL	N	5	7.4	14.7	9.6
FPD	N	7	7.5	14.9	9.3
FPU	N	7	7.5	14.4	9.3
PBL	N	7	7.5	14.2	9.3

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	6	83.5	103.5	90.8
BWS	Y	5	87.6	105.4	96.8
BCP	Y	6	83.4	101.1	88.6
DBL	N	1	112.8	112.8	112.8
BIL	N	5	87.7	115.2	96.9
FPD	N	7	87.7	114.5	95.3
FPU	N	7	88.1	111.6	94.8
PBL	N	7	87.6	111.5	96.1

Dissolved oxygen concentrations measured at Androscoggin River approved sites ranged from 7.1 mg/l to 10.7 mg/l. The three sites are very similar, although BWS was slightly higher. The lowest values were the late July and/or mid-August sampling events. Site BBB values for July and August were both 7.2 mg/l. BWS lowest value was in August at 7.6 mg/l. Site BCP July and August values were 7.1mg/l and 7.4 mg/l, respectively.

Dissolved oxygen concentrations measured at Androscoggin River non-approved sites ranged from 7.4 mg/l -14.9 mg/l. Site DBL was sampled only 1 time-mid April. The remaining sites BIL, FPU, FPD, and PBL were all very similar. The lowest readings were all around 7.5-8.3 mg/l for the late July and mid-August sampling events. Dissolved oxygen never dropped below the Class C standard of 5.0 mg/l. Dissolved oxygen percent saturation ranged from 83.4%-115.2% and did not go below the Class C standard of 60%. [See graphs at end of report]

Friends of Merrymeeting Bay volunteers do a good job of getting out early in the morning to sample. All but 2 of the 44 measurements were taken by 8:15 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 1-7 times at each of the eight sampling sites (Table 5-2-4). Monitoring occurred from April through October. 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.

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	3	16.2	20.7	18.8
BWS	Y	5	14.9	24.5	19.6
BCP	Y	4	15.1	23.4	18.7
DBL	N	1	4.8	4.8	4.8
BIL	N	5	4.9	24.9	17.8
FPD	N	7	4.8	25.2	17.8
FPU	N	7	4.7	25.1	17.8
PBL	N	7	5.1	25.3	17.5

Temperatures measured at all the Androscoggin River sites ranged from 4.7˚-25.2˚C (Celsius).

All of the approved sites had very similar temperature for all but one date. The August value at Site BBB was lower than the other two sites (20.7°C vs. 22.7- 23.4°C) which were high. Temperature was not recorded in July for Sites BBB and BCP. The July value for Site WSM was the highest recorded (24.5°C). The non-approved sites were all very similar. Temperature was high in July and August ranging from 22.9-25.3°C.

Specific Conductance

Specific conductance was measured 1-7 times at each of the eight sampling sites as well (Table 5-2-5). Monitoring occurred from April through October. 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.

Table 5-2-5: A summary of minimum, maximum, and average specific conductance values (micro-ohms/cm, µS/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	6	58	108	81
BWS	Y	5	105	111	109
BCP	Y	5	54	86	70
DBL	N	1	35	35	35
BIL	N	5	39	92	66
FPD	N	7	38	100	74
FPU	N	7	38	94	74
PBL	N	7	38	99	75

Specific conductance at all the sites ranged from 35-111µS/cm, which are elevated somewhat from natural background values, reflecting upstream point and non-point source discharges.
Approved Sites BBB and BCP were very similar with minimum values 54-58 µS/cm and maximum values 86- 108 µS/cm. Site BWS was higher with values consistent through the season ranging from 105-111 µS/cm. The non-approved sites were all very similar with minimum values 38-39 µS/cm and maximum values 66-74 µS/cm (exclusive of Site DBL which was sampled only 1 time).

Bacteria

Escherichia coli bacteria were measured 6 times at each of the three approved sampling sites (Table 5-2-6). Monitoring occurred from April through October. 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."

Results for the non-approved sites were not included, since non-approved methods are used for collection at those sites. 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.

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	*E. coli*	6	10	78	34
BWS	*E. coli*	6	12	101	29
BCP	*E. coli*	6	7	71	19

None of these approved sites had maximum values exceeding the instantaneous criterion (see Appendix A-1 and the graphs at the end of this report). Typically, observed high bacterial levels are associated with stormwater runoff and/or combined sewer overflows. None of the sampling coincided with significant rain events. The only sampling date close to a significant rain event was the August 19th date. There was recorded 1.25" of rain at the Highland Green in Topsham monitoring station on 9/16/2013. The highest values for the three sites were for this date ranging from 71-101MPN/100 ml.

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:

- River temperatures are substantially lower in April and October, and dissolved oxygen concentrations are proportionally higher. There is a good argument for collecting as much water quality data as possible, but if a primary goal of FOMB is to demonstrate the river meets minimum DO criterion for reclassification, they should reconsider the value of extending the season.
- Bacteria monitoring should include a mix of sampling events to include both dry and runoff events. High bacteria levels appear to be related here, not surprisingly, to precipitation/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.

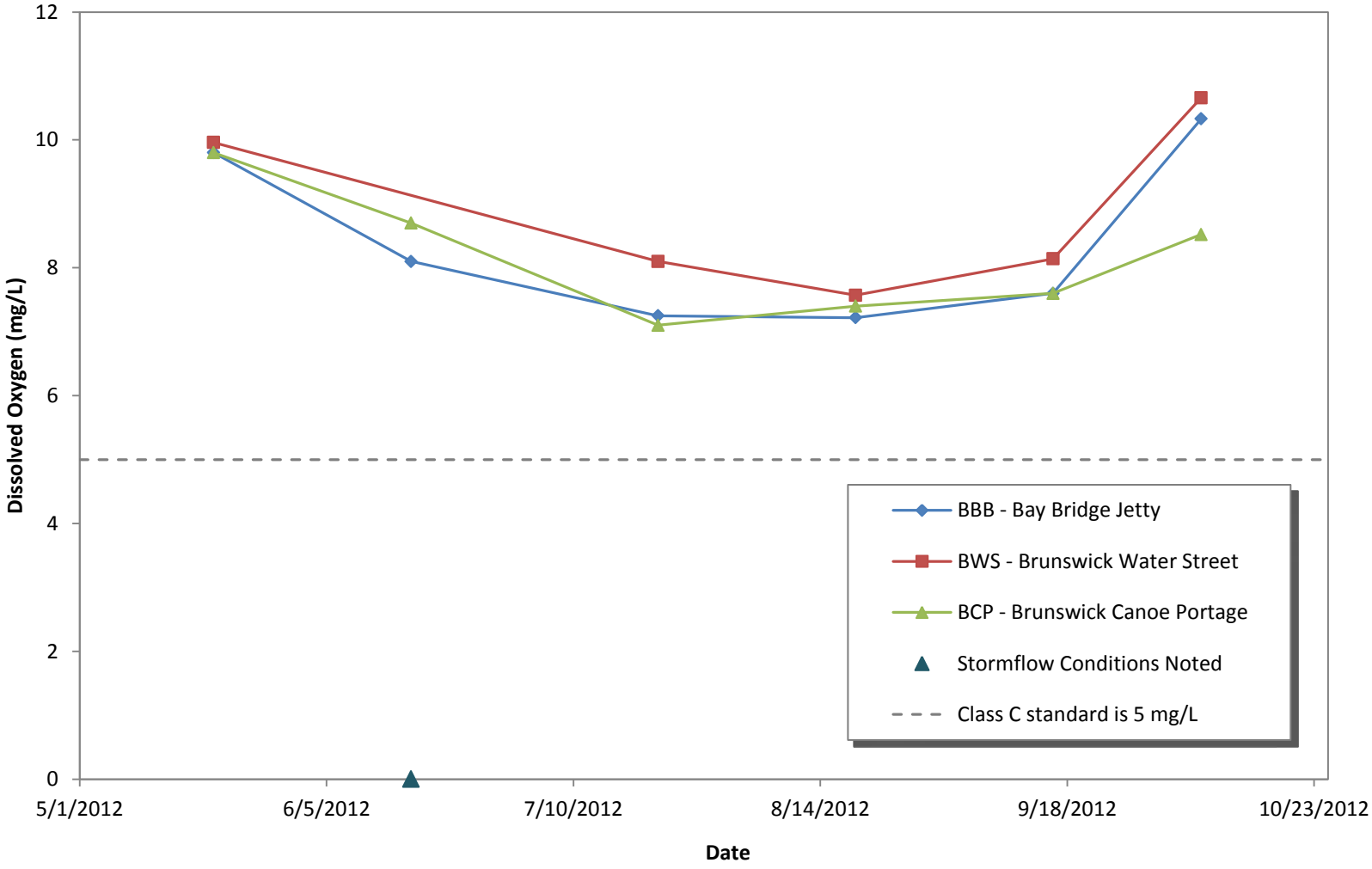


Figure 5-2-3. Dissolved oxygen concentrations of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

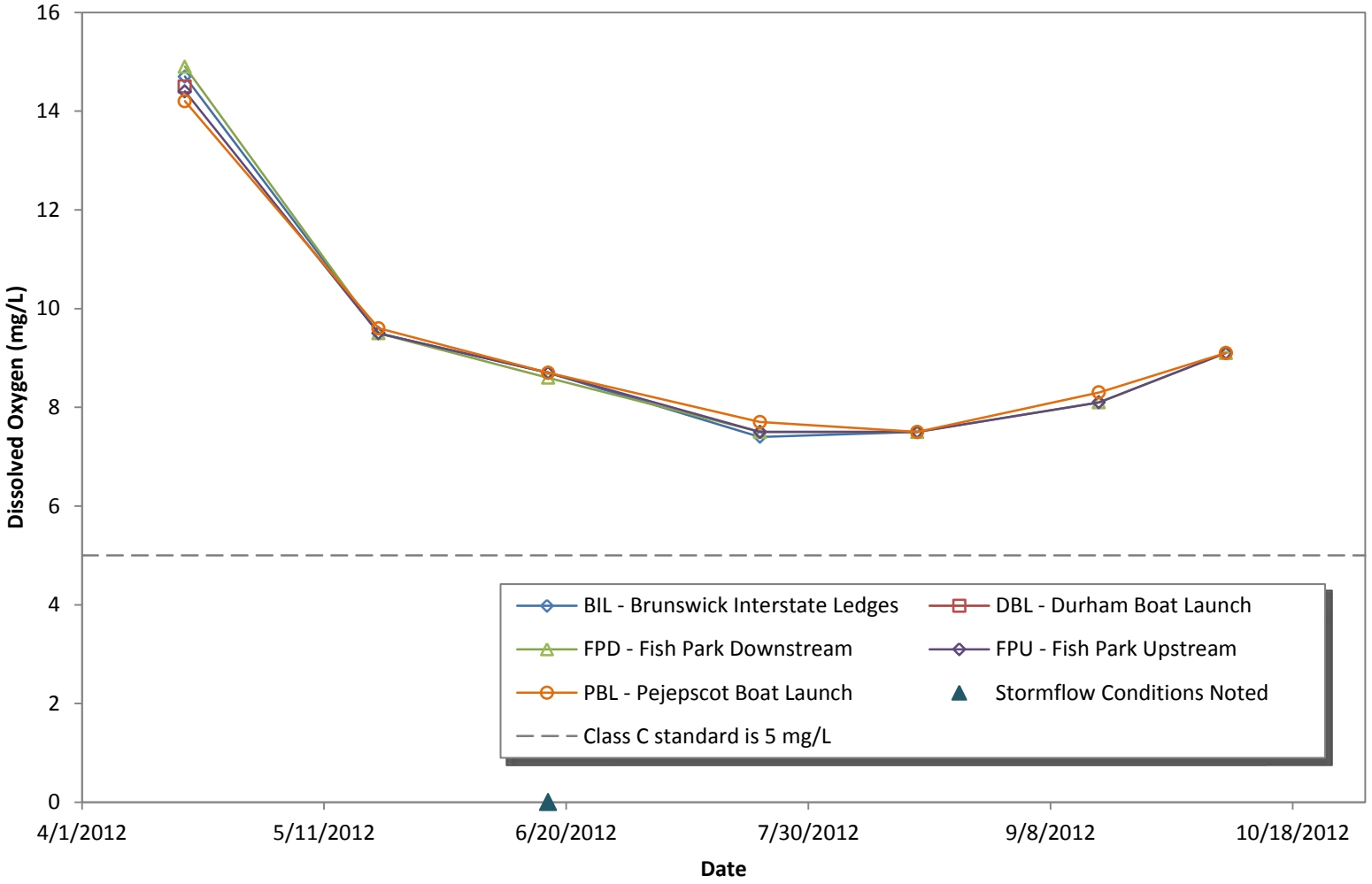


Figure 5-2-4. Dissolved oxygen concentrations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

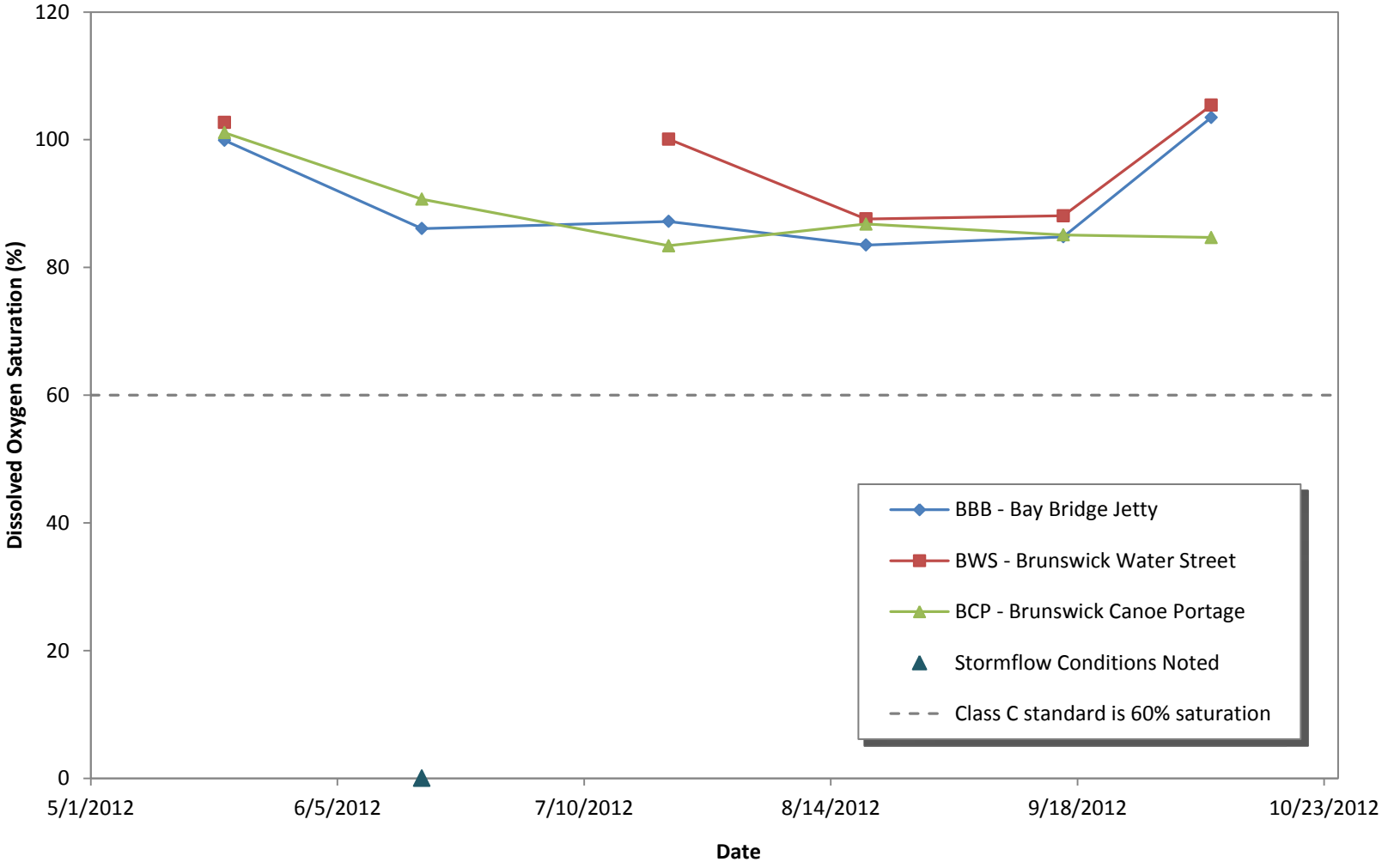


Figure 5-2-5. Dissolved oxygen % saturation of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

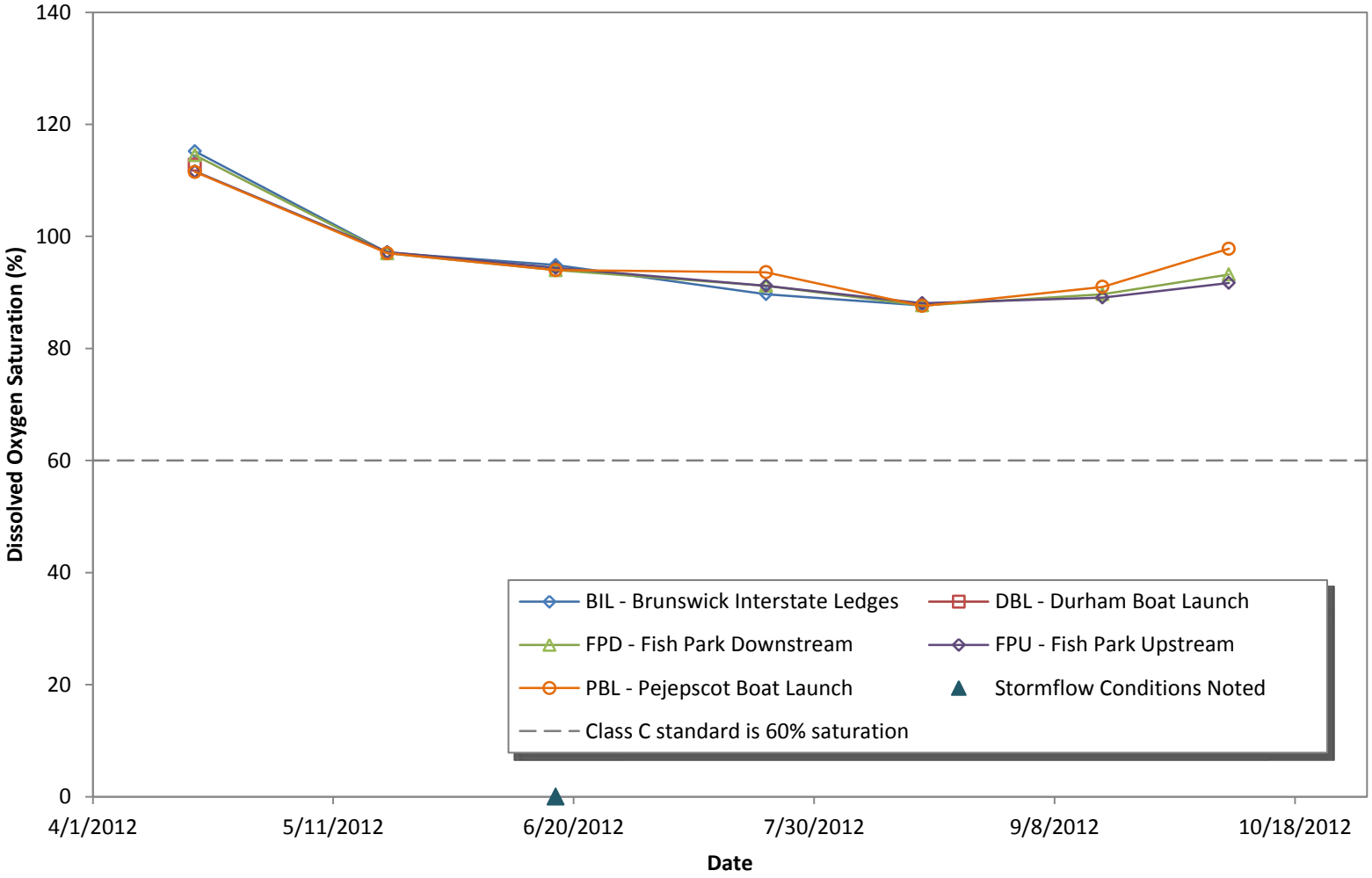


Figure 5-2-6. Dissolved oxygen % saturation at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

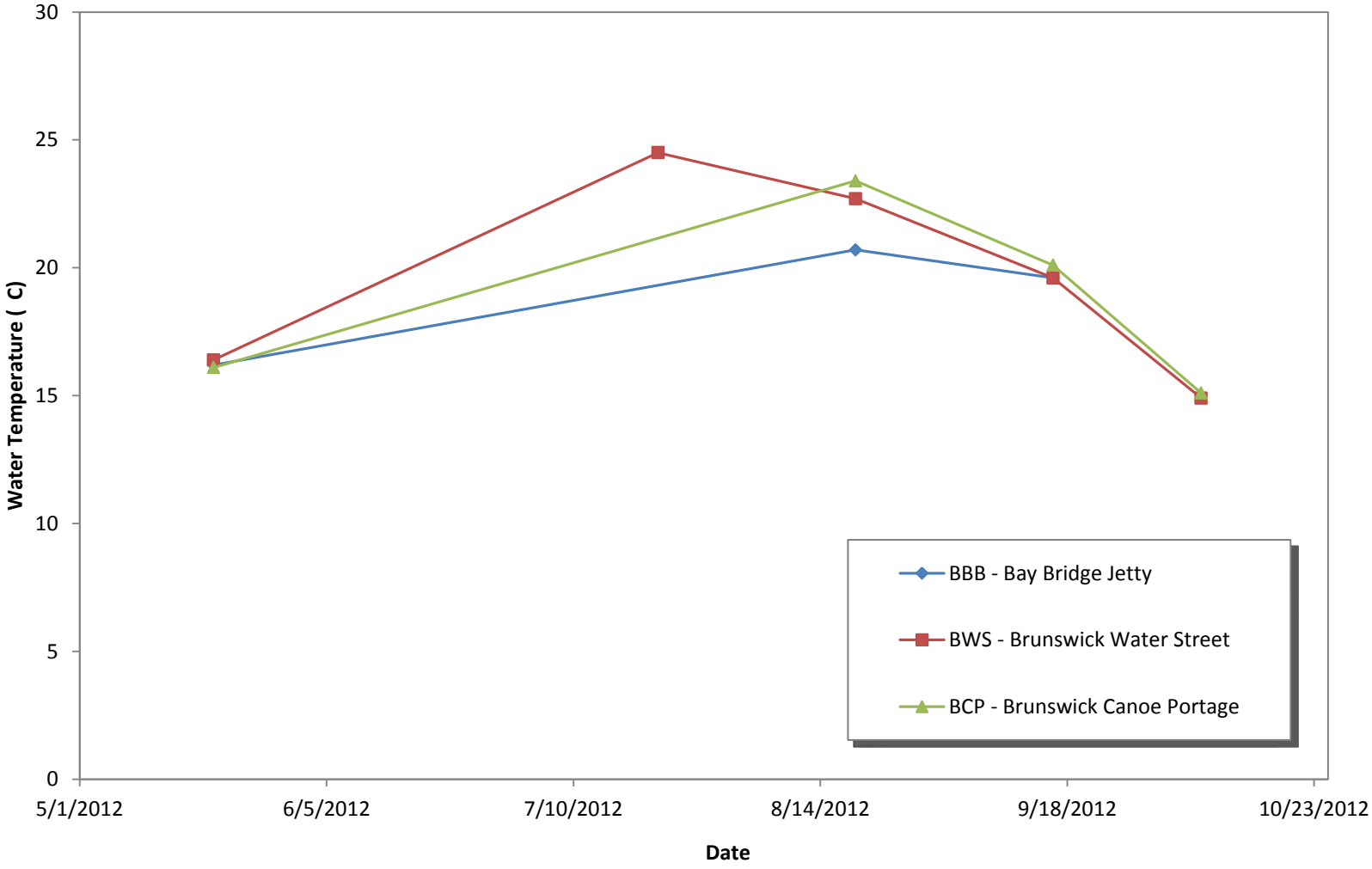


Figure 5-2-7. Water temperatures of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

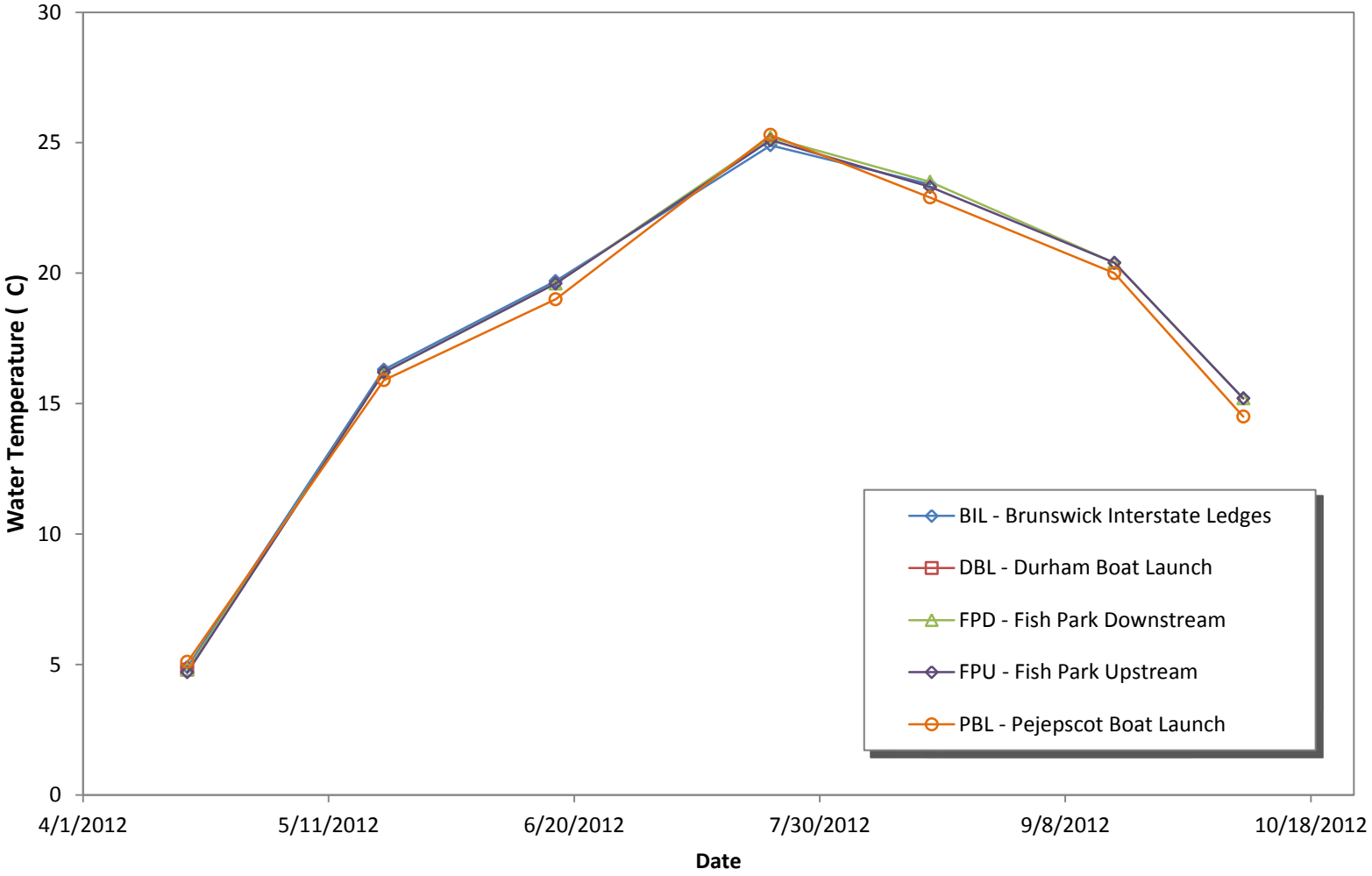


Figure 5-2-8. Water temperatures at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

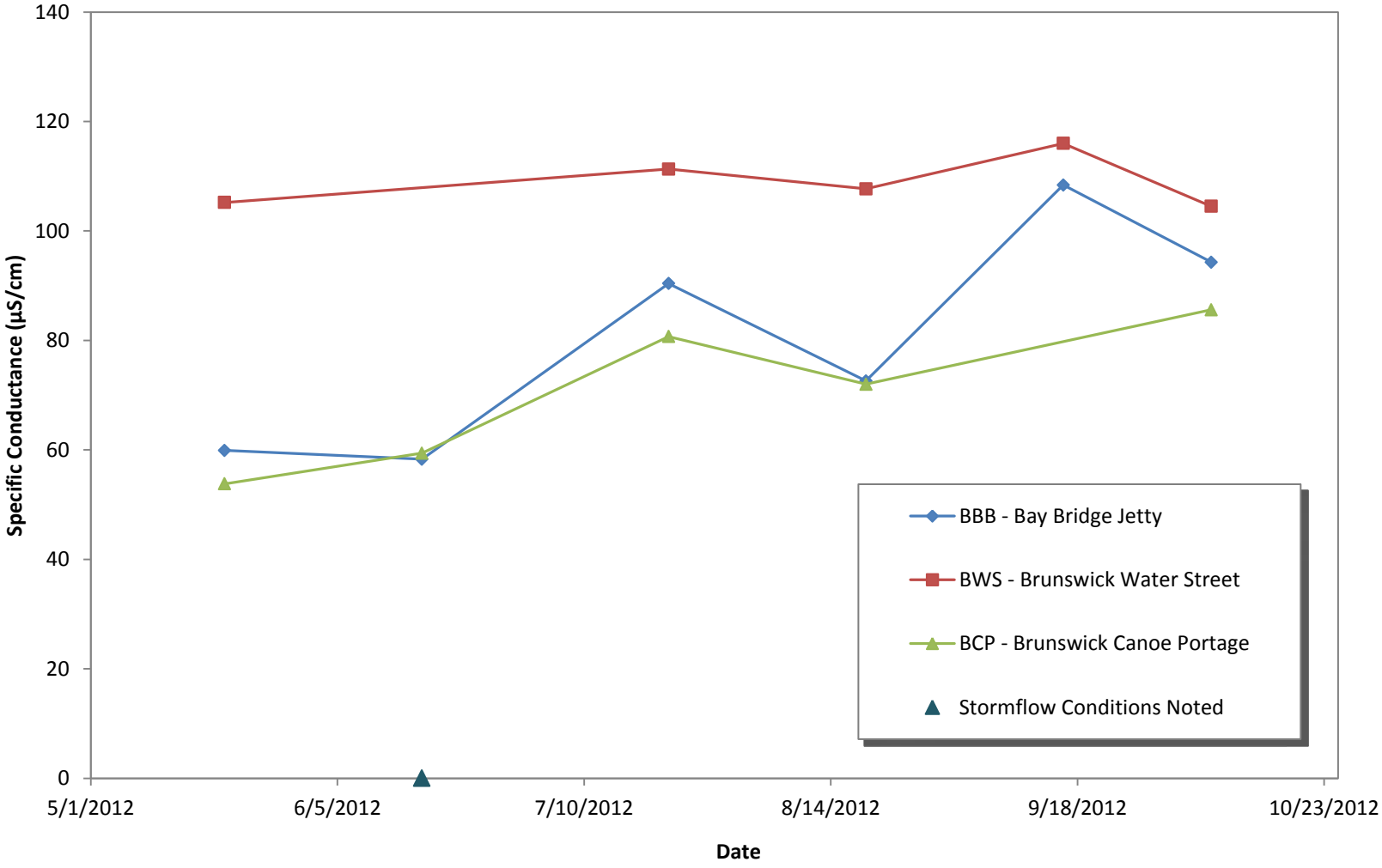


Figure 5-2-9. Specific Conductance at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

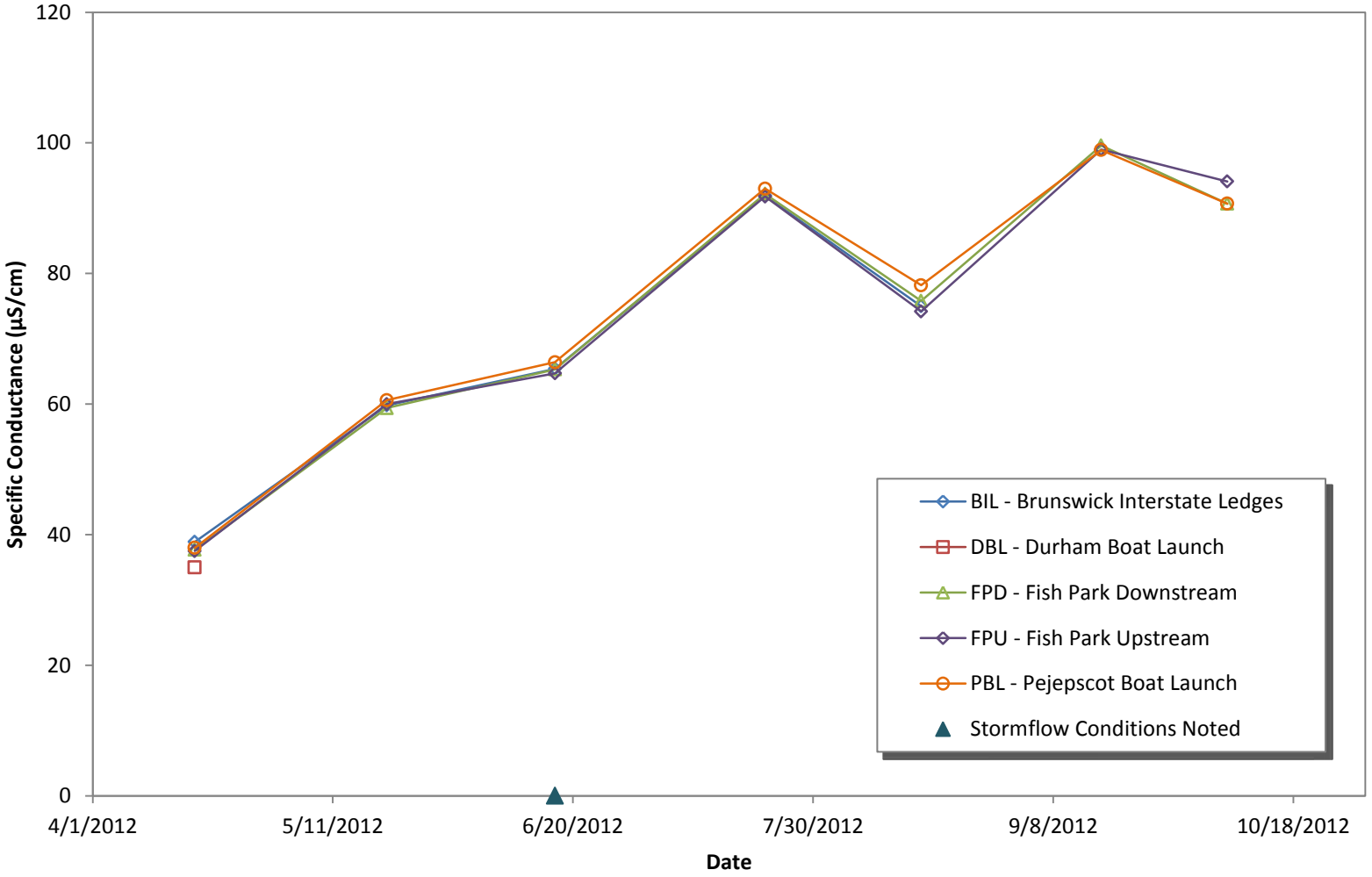


Figure 5-2-10. Specific conductance at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

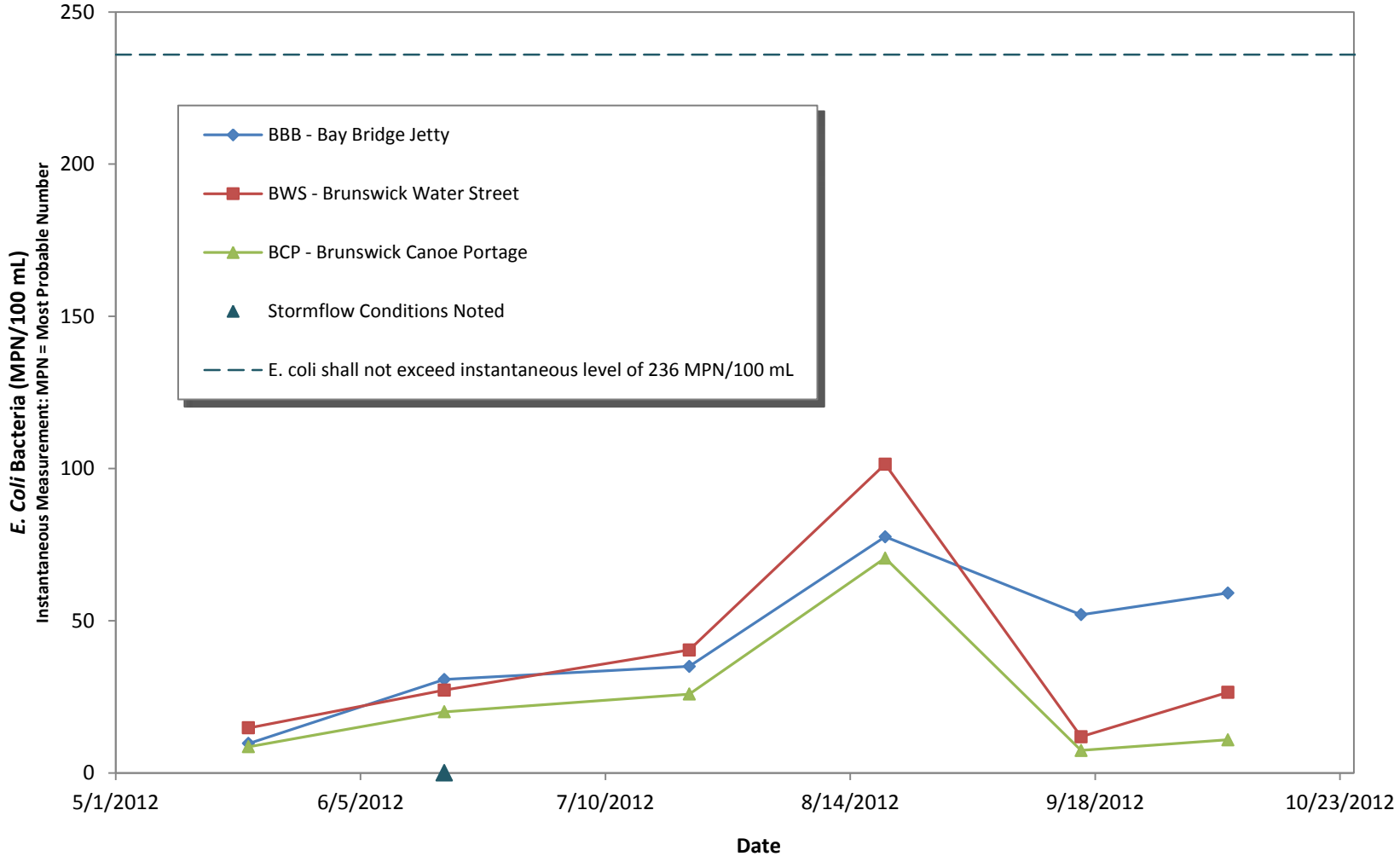


Figure 5-2-11. *E. Coli* bacteria at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

Appendix A-1. 2012 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; "Turb" = turbidity; "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)	Turb-idity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River, Friends of Merrymeeting Bay - Approved Sites:															
BBB - BAY BRIDGE JETTY	ANDROSCOGGIN RIVER - A231 - VRMP	5/20/2012	8:15 AM	N			16.2	99.9	9.8	59.9				9.7	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	6/17/2012	7:30 AM	N				86.1	8.1	58.3				30.7	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	7/22/2012	7:50 AM	N				87.2	7.25	90.4				35	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	8/19/2012	7:35 AM	N			20.7	83.5	7.22	72.6				77.6	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	9/16/2012	7:45 AM	N			19.6	84.8	7.6	108.4				52	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/7/2012	8:40 AM	N				103.5	10.33	94.3				59.1	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/7/2012	8:40 AM	D										59.1	
WSM - WATER STREET MOORING	ANDROSCOGGIN RIVER - A281 - VRMP	5/20/2012	7:45 AM	N			16.4	102.7	9.96	105.2				14.8	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	6/17/2012	7:45 AM	N										27.2	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	7/22/2012	7:20 AM	N			24.5	100.1	8.1	111.3				40.4	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	7/22/2012	7:20 AM	D										52.8	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	8/19/2012	7:12 AM	N			22.7	87.6	7.57	107.7				101.4	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	9/16/2012	7:10 AM	N			19.6	88.1	8.14	116				11.9	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	10/7/2012	8:10 AM	N			14.9	105.4	10.66	104.5				26.5	
BCP - BRUNSWICK CANOE PORTAGE	ANDROSCOGGIN RIVER - A299 - VRMP	5/20/2012	7:45 AM	N			16.1	101.1	9.8	53.8				8.6	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	6/17/2012	8:00 AM	N				90.7	8.7	59.4				20.1	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	6/17/2012	8:00 AM	D										24.1	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	7/22/2012	7:45 AM	N				83.4	7.1	80.7				25.9	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	8/19/2012	8:05 AM	N			23.4	86.8	7.4	72				70.6	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	9/16/2012	7:40 AM	N			20.1	85.1	7.6					7.4	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	10/7/2012	8:45 AM	N			15.1	84.7	8.52	85.6				10.9	

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)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River, Friends of Merrymeeting Bay - Non-approved Sites:															
DBL - DURHAM BOAT LAUNCH	ANDROSCOGGIN RIVER - A158 - FOMB	4/18/2012	7:00 AM	N			4.8	112.8	14.5	35					
DBL	ANDROSCOGGIN RIVER - A158 - FOMB	4/18/2012	7:00 AM	D			4.8	112.8	14.5	35					
BIL - BRUNSWICK INTERSTATE LEDGES	ANDROSCOGGIN RIVER - A24 - FOMB	4/18/2012	8:00 AM	N			4.9	115.2	14.7	38.9					
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	5/20/2012	8:00 AM	N			16.3	97.1	9.5	59.8					
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	6/17/2012	8:00 AM	N			19.7	94.9	8.7	65.4					
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/22/2012	8:00 AM	N			24.9	89.7	7.4	91.9					
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/17/2012	7:55 AM	N			23.4	87.7	7.5	75					
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/17/2012	7:55 AM	D			23.4	87.7	7.5	75					
FPD - FISH PARK DOWNSTREAM	ANDROSCOGGIN RIVER - A45 - FOMB	4/18/2012	7:45 AM	N			4.8	114.5	14.9	37.7					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	5/20/2012	7:45 AM	N			16.2	97	9.5	59.4					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	6/17/2012	7:40 AM	N			19.6	94	8.6	65.3					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/22/2012	7:45 AM	N			25.2	91.2	7.5	92.2					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/22/2012	7:45 AM	D			25.2	91.2	7.5	92.2					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	8/17/2012	7:30 AM	N			23.5	87.7	7.5	75.8					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	9/16/2012	7:30 AM	N			20.4	89.7	8.1	99.6					
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	10/7/2012	7:45 AM	N			15.2	93.2	9.1	90.7					
FPU - FISH PARK UPSTREAM	ANDROSCOGGIN RIVER - A47 - FOMB	4/18/2012	7:30 AM	N			4.7	111.6	14.4	37.5					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	5/20/2012	7:30 AM	N			16.2	97.2	9.5	60					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	6/17/2012	7:25 AM	N			19.6	94.4	8.7	64.7					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	6/17/2012	7:25 AM	D			19.8	94.4	8.7	64.7					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	7/22/2012	7:30 AM	N			25.1	91.2	7.5	91.8					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	8/17/2012	7:20 AM	N			23.3	88.1	7.5	74.2					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	9/16/2012	7:20 AM	N			20.4	89.1	8.1	99					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	10/7/2012	7:25 AM	N			15.2	91.7	9.1	94.1					
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	10/7/2012	7:25 AM	D			15.2	91.7	9.1	94.1					

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)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
PBL - PEJEPSCOT BOAT LAUNCH	ANDROSCOGGIN RIVER - A71 - FOMB	4/18/2012	6:30 AM	N			5.1	111.5	14.2	38					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	5/20/2012	7:00 AM	N			15.9	97	9.6	60.6					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	5/20/2012	7:00 AM	D			15.9	97	9.6	60.6					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	6/17/2012	7:00 AM	N			19	94	8.7	66.4					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	7/22/2012	7:05 AM	N			25.3	93.6	7.7	93					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	8/17/2012	7:00 AM	N			22.9	87.6	7.5	78.2					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/16/2012	6:55 AM	N			20	91	8.3	98.9					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/16/2012	6:55 AM	D			20	91	8.3	98.9					
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	10/7/2012	7:05 AM	N			14.5	97.8	9.1	90.7					

Appendix A-2. 2012 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; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "Turb"= turbidity
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 Appear-ance	Comments
Androscoggin River, Friends of Merrymeeting Bay - Approved Sites:															
BBB - BAY BRIDGE JETTY	ANDROSCOGGIN RIVER - A231 - VRMP	5/20/2012	8:15 AM	N	BASE FLOW	MED	19	BANK	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	6/17/2012	7:30 AM	N	STORM FLOW	HIGH		WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	EXTREMELY HIGH WATER & SIGNIFICANT FRESET NO VERTICAL DEPTH RECORDED. NO VALUE FOR WATER TEMPERATURE. D.O. METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	7/22/2012	7:50 AM	N	BASE FLOW	MED	20.9	BANK	PARTLY CLOUDY	CALM	CLEAR	RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH NO VALUE FOR WATER TEMPERATURE. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	8/19/2012	7:35 AM	N		MED		BANK	CLEAR	BREEZE	HEAVY RAIN, LIGHT RAIN	RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	9/16/2012	7:45 AM	N	BASE FLOW	MED		BANK	CLEAR	BREEZE		RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/7/2012	8:40 AM	N	BASE FLOW	MED	12	BANK	PARTLY CLOUDY			RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH NO VALUE FOR WATER TEMPERATURE. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/7/2012	8:40 AM	D				BANK							NON-WADEABLE/MID-DEPTH NO VALUE FOR WATER TEMPERATURE. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM - WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMP	5/20/2012	7:45 AM	N	BASE FLOW	MED	19	BANK	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH DO TITRATION = 9.3, 9.4 AND 9.2. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	6/17/2012	7:45 AM	N											NON-WADEABLE/MID-DEPTH NO FIELD SHEET SO ONLY ENTERED BACTERIA RESULTS. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	7/22/2012	7:20 AM	N	BASE FLOW	MED	20.7	BANK	PARTLY CLOUDY	CALM	CLEAR	RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH D.O. TITRATION=7.7 AND 7.8 DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	7/22/2012	7:20 AM	D				BANK							NON-WADEABLE/MID-DEPTH D.O. TITRATION=7.7 AND 7.8 DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	8/19/2012	7:12 AM	N		MED		BANK	CLEAR	CALM	HEAVY RAIN, LIGHT RAIN	RUN		DARKLY STAINED	COOL RAIN FOR DAYS BEFORE. NON-WADEABLE/MID-DEPTH DO TITRATION = 7.4 AND 7.6. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	9/16/2012	7:10 AM	N	BASE FLOW	MED		BANK	CLEAR	BREEZE		RUN		DARKLY STAINED	NON-WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	10/7/2012	8:10 AM	N	BASE FLOW	MED	11.5	BANK	PARTLY CLOUDY			RUN		DARKLY STAINED	NO RAIN, COLD NON-WADEABLE/MID-DEPTH D.O. TITRATION = 8.8, 8.6 AND 8.7. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP - BRUNSWICK CANOE PORTAGE	ANDROSCOGGIN RIVER - A299 - VRMP	5/20/2012	7:45 AM	N	BASE FLOW		16.1	WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	WADEABLE/1.5 FT BELOW SURFACE DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	6/17/2012	8:00 AM	N	STORM FLOW	HIGH		WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	D.O. METER- DID NOT ALLOW TO WARM UP AT LEAST 20 MINUTES (15 MIN). NO VERTICAL DEPTH RECORDED. NO VALUE FOR WATER TEMP. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	6/17/2012	8:00 AM	D				WADING							D.O. METER- DID NOT ALLOW TO WARM UP AT LEAST 20 MINUTES (15 MIN). NO VERTICAL DEPTH RECORDED. NO VALUE FOR WATER TEMP. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.

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 Appear-ance	Comments
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	7/22/2012	7:45 AM	N	BASE FLOW	LOW	19.9	WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	WADEABLE/1.5 FT BELOW SURFACE D.O. METER- DID NOT ALLOW TO WARM UP AT LEAST 20 MINUTES (15 MIN). NO VALUE FOR WATER TEMP. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	8/19/2012	8:05 AM	N	BASE FLOW	MED	21	BANK	CLEAR		HEAVY RAIN, LIGHT RAIN	RUN		DARKLY STAINED	COOL RAIN SEVERAL DAYS BEFORE. NON-WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	9/16/2012	7:40 AM	N	BASE FLOW	LOW	13.9	WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	NO VERTICAL DEPTH RECORDED. DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	10/7/2012	8:45 AM	N	BASE FLOW	LOW		WADING	CLEAR	CALM	CLEAR	RUN		DARKLY STAINED	WADEABLE/MID-DEPTH DID NOT COMPLETE LAB PARAMETERS TO BE SAMPLED PORTION OF VRMP FIELD DATA SHEETS.

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

DBL - DURHAM BOAT LAUNCH	ANDROSCOGGIN RIVER - A158 - FOMB	4/18/2012	7:00 AM	N			5	BANK	CLEAR		CLEAR, HEAVY RAIN				NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
DBL	ANDROSCOGGIN RIVER - A158 - FOMB	4/18/2012	7:00 AM	D				BANK							NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL - BRUNSWICK INTERSTATE LEDGES	ANDROSCOGGIN RIVER - A24 - FOMB	4/18/2012	8:00 AM	N			6.5	BANK	CLEAR		CLEAR, HEAVY RAIN				NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	5/20/2012	8:00 AM	N			14.5	BANK	CLEAR	CALM	CLEAR				WADEABLE/1.5 FT BELOW SURFACE D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (TIME NOT RECORDED)? WINKLER D.O. = 9.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	6/17/2012	8:00 AM	N			14.5	WADING	CLEAR	CALM	CLEAR				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	7/22/2012	8:00 AM	N			20	BANK	CLEAR, PARTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/17/2012	7:55 AM	N			17.5	WADING		CALM	CLEAR				WADEABLE/1.5 FT BELOW SURFACE D.O. TITRATION = 7.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
BIL	ANDROSCOGGIN RIVER - A24 - FOMB	8/17/2012	7:55 AM	D				WADING							WADEABLE/1.5 FT BELOW SURFACE D.O. TITRATION = 7.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD - FISH PARK DOWNSTREAM	ANDROSCOGGIN RIVER - A45 - FOMB	4/18/2012	7:45 AM	N			6.5	BANK	CLEAR		CLEAR, HEAVY RAIN				NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	5/20/2012	7:45 AM	N			14.5	BANK	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (TIME NOT RECORDED)? WINKLER D.O. = 9.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	6/17/2012	7:40 AM	N			11.5	BANK	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/22/2012	7:45 AM	N			18.5	BANK	CLEAR, PARTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	7/22/2012	7:45 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	8/17/2012	7:30 AM	N			15	BANK		CALM	CLEAR				WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	9/16/2012	7:30 AM	N			11	BANK	CLEAR		CLEAR, CLOUDY, LIGHT RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE 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 Appear-ance	Comments
FPD	ANDROSCOGGIN RIVER - A45 - FOMB	10/7/2012	7:45 AM	N			4.5	BANK	CLEAR, FOGGY	CALM	CLEAR, LIGHT RAIN, SHOWERS				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU - FISH PARK UPSTREAM	ANDROSCOGGIN RIVER - A47 - FOMB	4/18/2012	7:30 AM	N			6.5	BANK	CLEAR	CALM	CLEAR, HEAVY RAIN				NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	5/20/2012	7:30 AM	N			14.5	BANK	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (TIME NOT RECORDED)? DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	6/17/2012	7:25 AM	N			11	BANK	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	6/17/2012	7:25 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	7/22/2012	7:30 AM	N			18	BANK	CLEAR, PARTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	8/17/2012	7:20 AM	N			15	BANK		CALM	CLEAR				WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	9/16/2012	7:20 AM	N			9	BANK	CLEAR		CLEAR, CLOUDY, LIGHT RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	10/7/2012	7:25 AM	N			4	BANK	CLEAR, FOGGY	CALM	CLEAR, LIGHT RAIN, SHOWERS				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
FPU	ANDROSCOGGIN RIVER - A47 - FOMB	10/7/2012	7:25 AM	D				BANK							WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL - PEJEPSCOT BOAT LAUNCH	ANDROSCOGGIN RIVER - A71 - FOMB	4/18/2012	6:30 AM	N			5	BANK	CLEAR	CALM	CLEAR, HEAVY RAIN				NON-WADEABLE/MID-DEPTH D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (15 MINS). DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	5/20/2012	7:00 AM	N			14.5	BANK	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (TIME NOT RECORDED)? WINKLER D.O. = 9.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	5/20/2012	7:00 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE D.O METER-DID NOT ALLOW TO WARM UP FOR AT LEAST 20 MINUTES (TIME NOT RECORDED)? WINKLER D.O. = 9.4 DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	6/17/2012	7:00 AM	N			10.5	WADING	CLEAR	CALM	CLEAR				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	7/22/2012	7:05 AM	N			18	WADING	CLEAR, PARTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	8/17/2012	7:00 AM	N			15	WADING		CALM	CLEAR				NON-WADEABLE/MID-DEPTH DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/16/2012	6:55 AM	N			8.5	WADING	CLEAR		CLEAR, CLOUDY, LIGHT RAIN, PARTLY CLOUDY				NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	9/16/2012	6:55 AM	D				WADING							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.
PBL	ANDROSCOGGIN RIVER - A71 - FOMB	10/7/2012	7:05 AM	N			6	WADING	CLEAR, FOGGY	CALM	CLEAR, LIGHT RAIN, SHOWERS				WADEABLE/1.5 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL DATA.

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. Androscogging 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, form 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

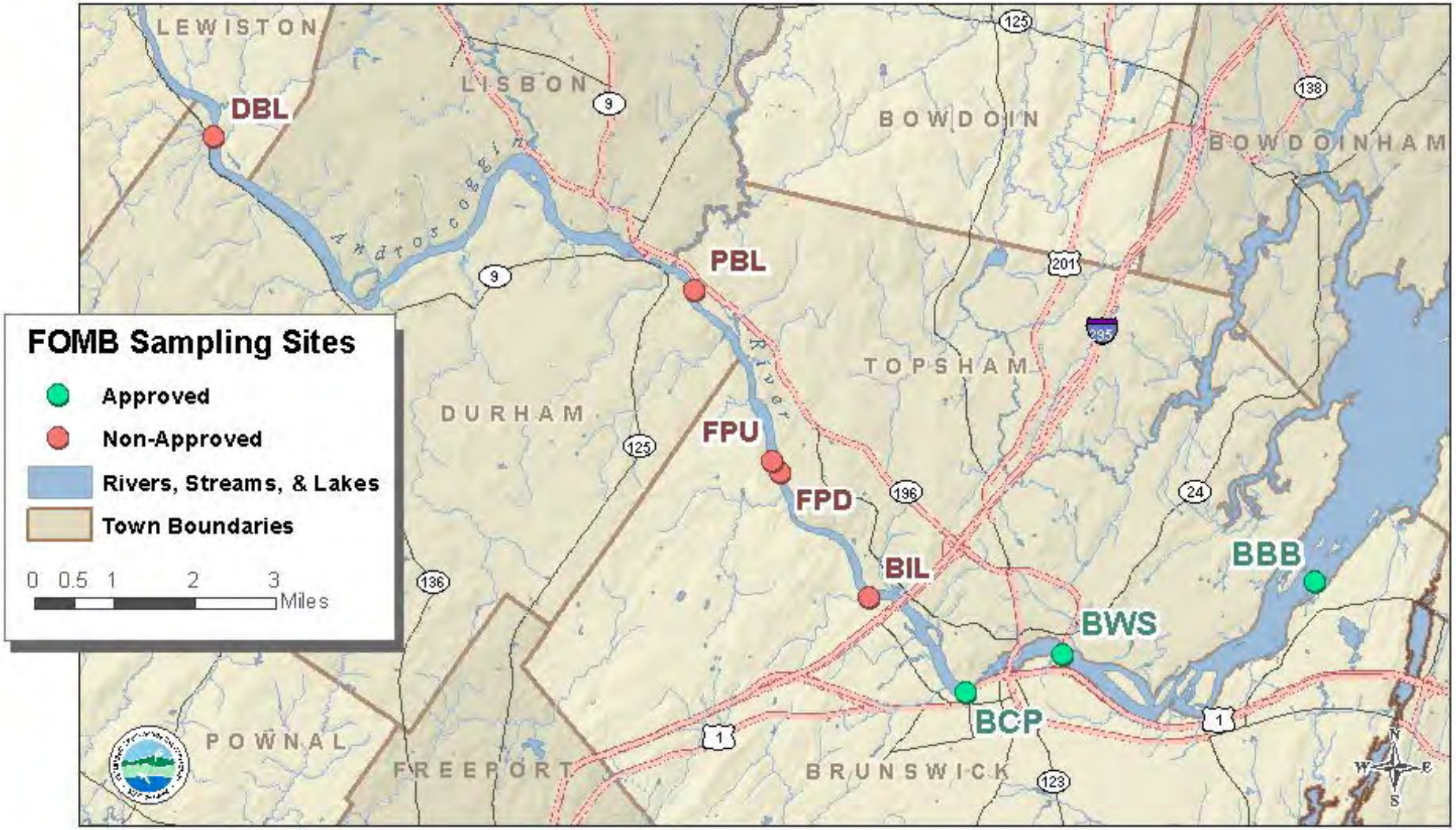


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

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.

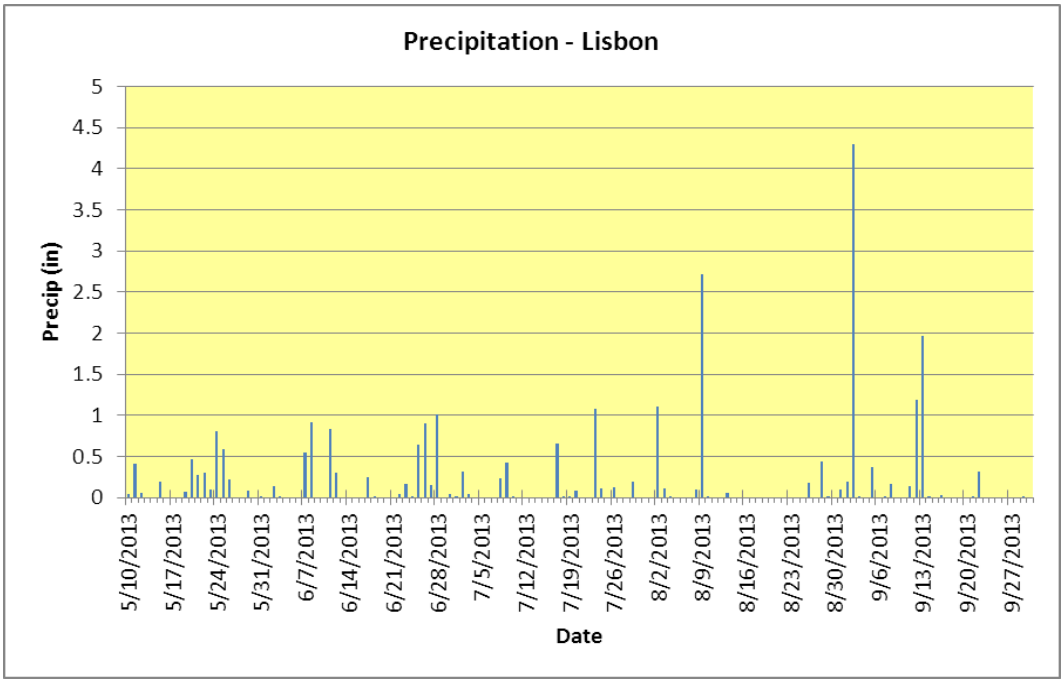
Results

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.

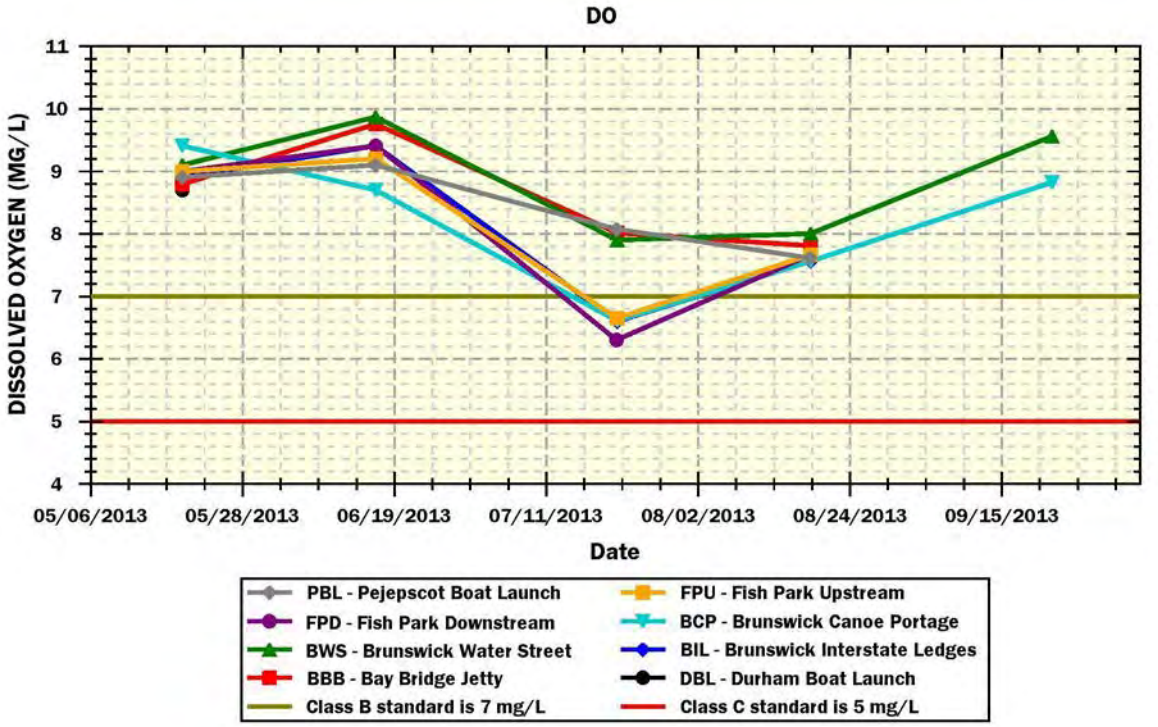


Table 5-2-2: A summary of minimum, maximum, and average dissolved oxygen concentration values (mg/l) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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

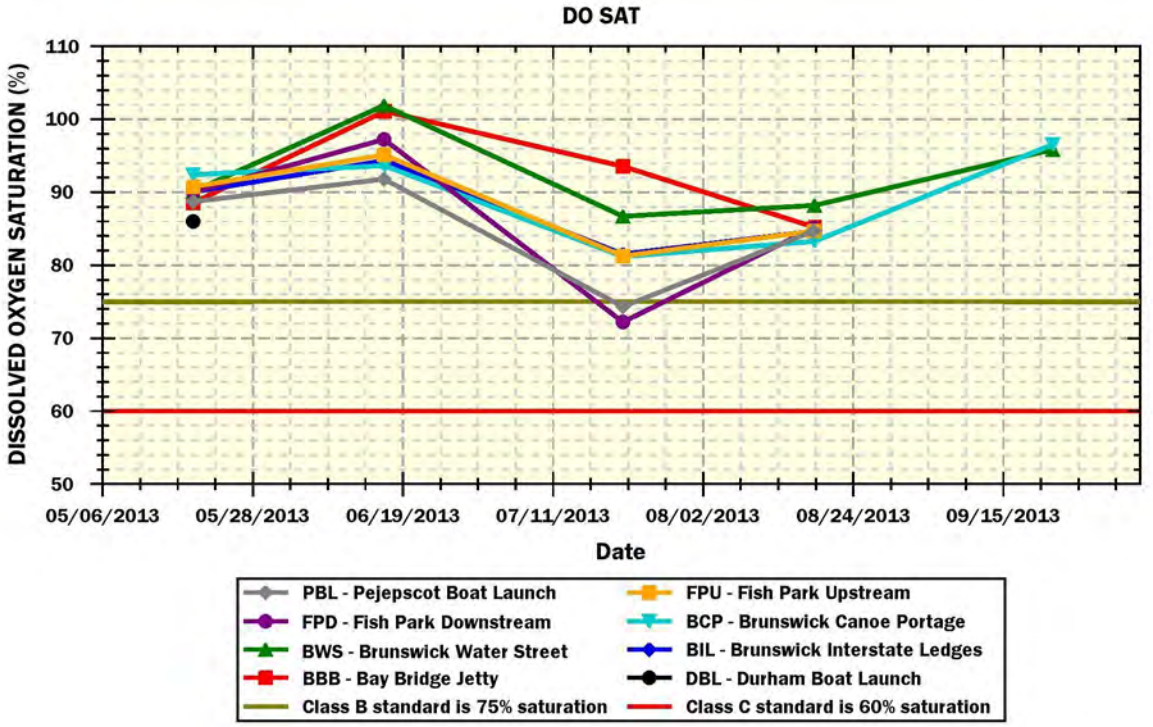


Table 5-2-3: A summary of minimum, maximum, and average dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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

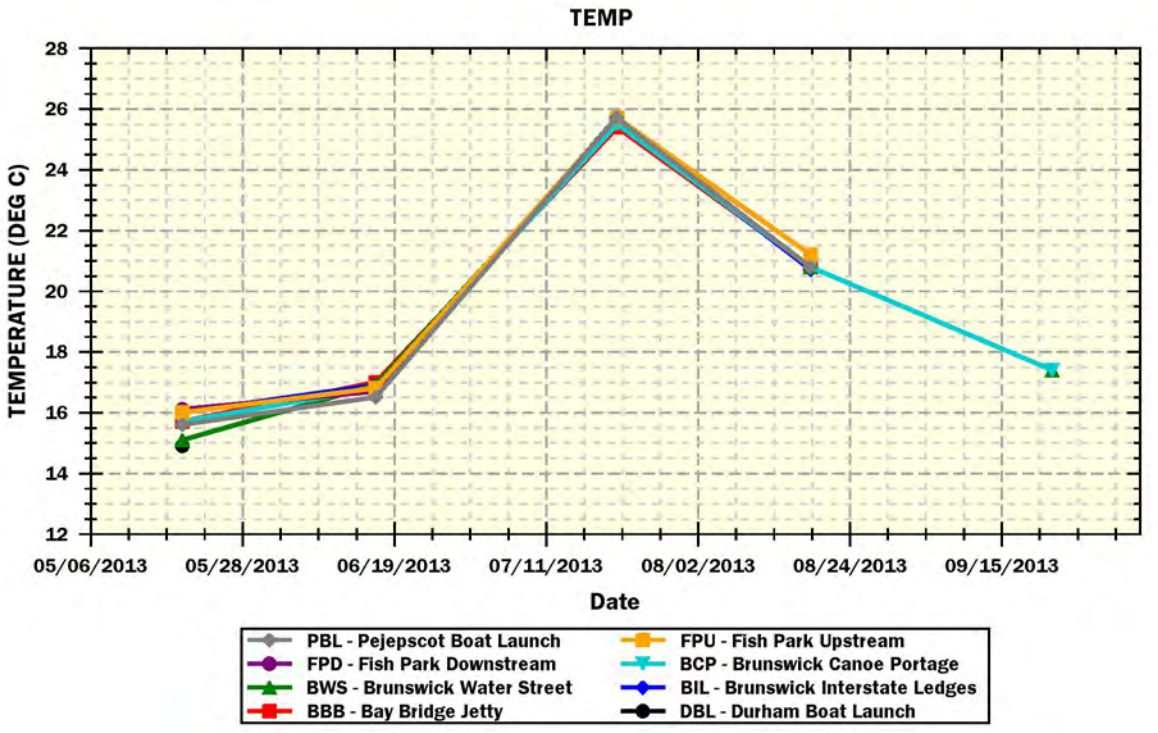


Table 5-2-4: A summary of minimum, maximum, and average water temperature (°C) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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

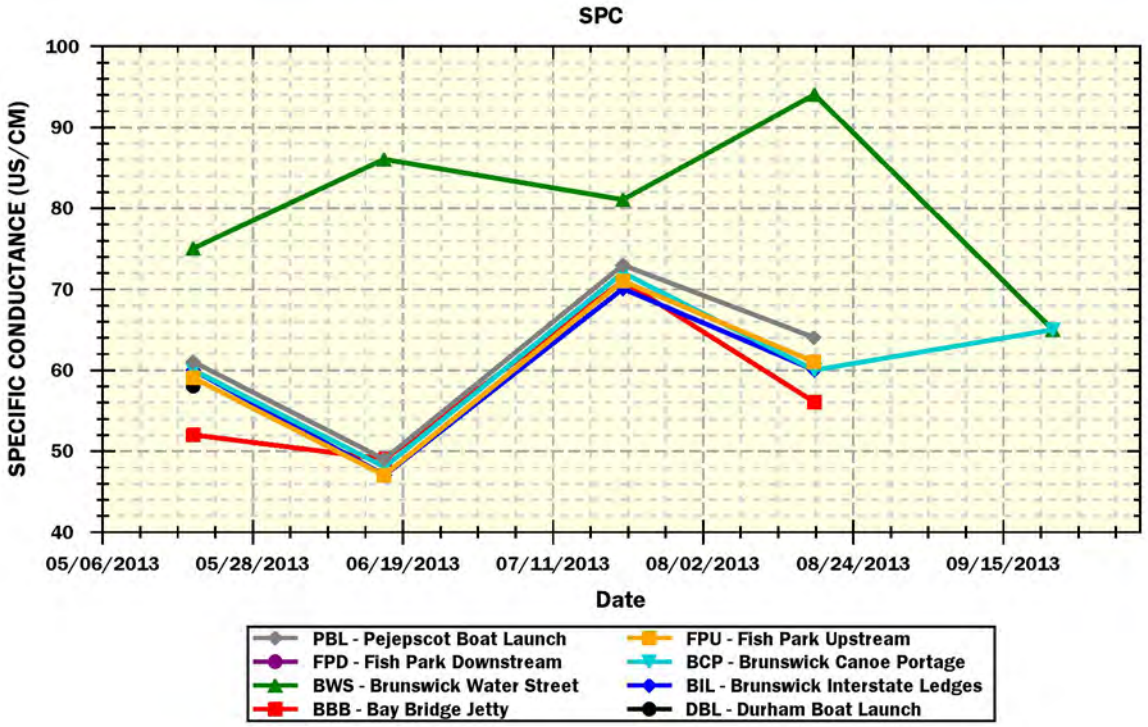


Table 5-2-5: A summary of minimum, maximum, and average specific conductance values (micro-ohms/cm, µS/cm) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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 µS/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 µS/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)

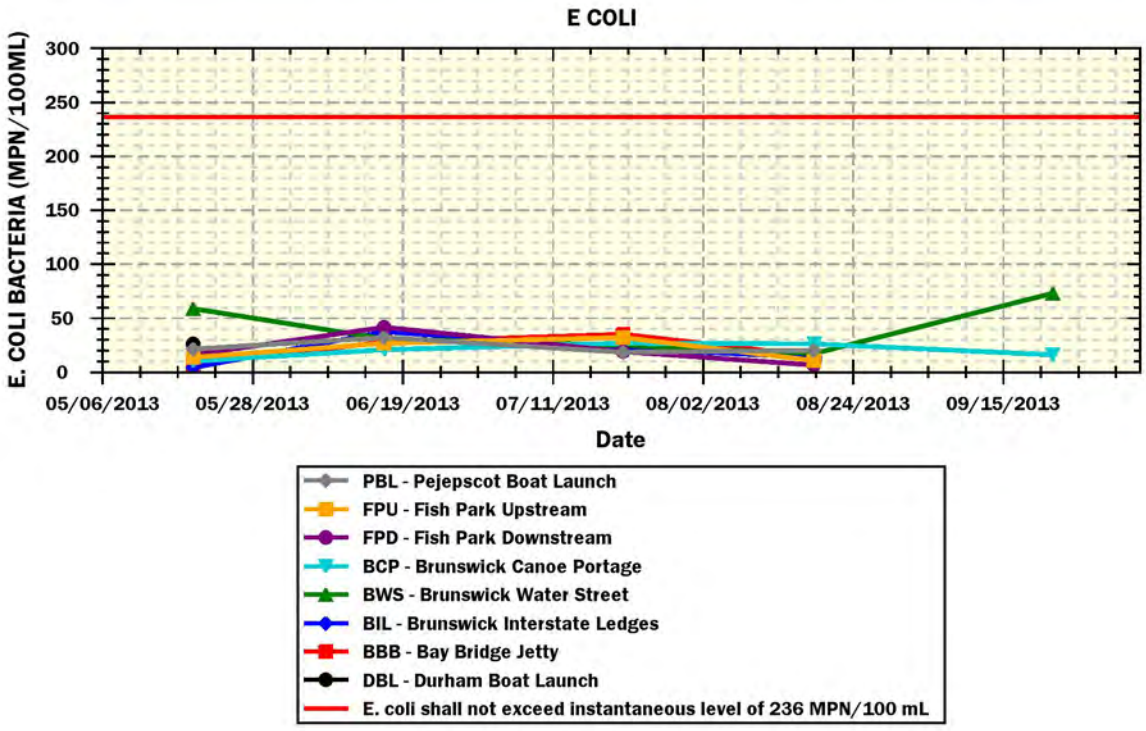


Table 5-2-6: A summary of minimum, maximum, and geometric mean values (MPN/100mL) for bacteria at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

Site	Bacteria Type	# of Samples	Minimum Value	Maximum Value	Geometric Mean
BBB	*E. coli*	4	7	35	18
BCP	*E. coli*	5	10	27	18
BIL	*E. coli*	4	4	37	14
BWS	*E. coli*	5	17	73	36
DBL	*E. coli*	1	26	26	26
FBU	*E. coli*	4	11	32	19
FPD	*E. coli*	4	6	41	17
PBL	*E. coli*	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)	Turb-idity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (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)	Turb-idity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (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.

Section 5-2
Androscoggin River (Friends of Merrymeeting Bay)

Androscoggin River

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 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 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 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.

Monitoring History

• The Maine DEP Biological Monitoring Program has been monitoring the lower Androscoggin River since 1984. This data is available on DEP's website.

• 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.

[1] Maine Rivers Website- Androscoggin River Profile
[2] Androscoggin River Alliance Website-Androscoggin River slideshow

• 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.

• In 2010, a water quality model to predict effect of discharges and river flows on attainment of Maine's Water Quality Standards was developed for the lower Androscoggin River by the Maine DEP. The model report and data are available on DEP's website.

Methods and Sampling Sites

Volunteers monitor the Androscoggin River at eight sites on the main stem. All of the sites are now VRMP approved sites.

Monitoring is conducted once/month from May through August-September. Monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Specific conductance is measured using either a YSI meter or an Oakton EC 11+/11 Testr pen. Samples are collected for *E. coli* bacteria and transported to Bowdoin College for analysis by FOMB volunteers.

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

2014 Androscoggin River Sampling Sites
Friends of Merrymeeting Bay

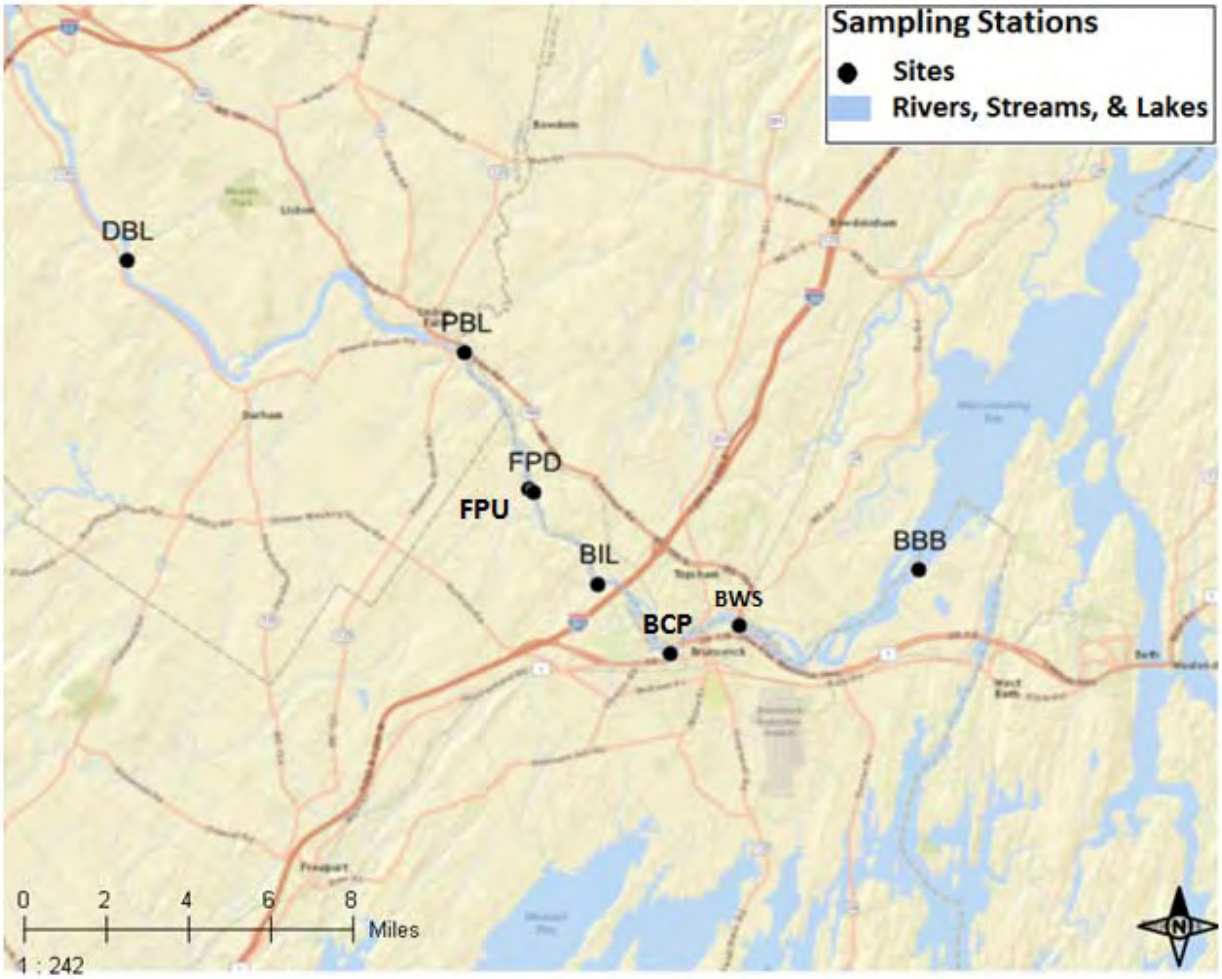


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River

Results

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

Dissolved Oxygen

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, this will affect the dissolved oxygen.

Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60 % saturation. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

2014 Results:

Dissolved oxygen (DO) was measured 6 times from May through October at the 7 sampling sites. Not all the data are reported here because some data was rejected for QA/QC reasons (no calibration value recorded). At all the sites, DO concentration was above the Class C criterion of 5 mg/l. It was also above the Class B criterion of 7 mg/l at all sites except sites BBB and BWS. It was below 7 mg/l 2 times at site BBB and 1 time at site BWS. DO percent saturation was above the Class C criterion of 60% saturation for all dates also above Class B criterion of 75% saturation for all dates. Overall sites BBB, BWS and BCP are very similar. The sites above here (BIL, FPD, FPU, and PBL) are also very similar. Dissolved oxygen was overall good to excellent.

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	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
BBB	C	5	8.4	6.7	10.5	5	0
BWS	C	5	8.6	6.5	10.9	5	0
BCP	C	6	8.9	7.0	11.0	5	0
BIL	C	4	9.5	8.6	10.9	5	0
FPD	C	4	9.6	8.5	11.5	5	0
FPU	C	4	9.2	8.4	10.8	5	0
PBL	C	4	9.4	8.4	10.7	5	0

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	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
BBB	C	5	94.8	80.7	103.0	60	0
BWS	C	5	96.8	84.5	108.4	60	0
BCP	C	6	90.8	83.5	104.1	60	0
BIL	C	4	96.9	91.7	108.2	60	0
FPD	C	4	99.3	92.4	114.3	60	0
FPU	C	4	96.9	91.5	107.0	60	0
PBL	C	4	96.6	91.7	105.6	60	0

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

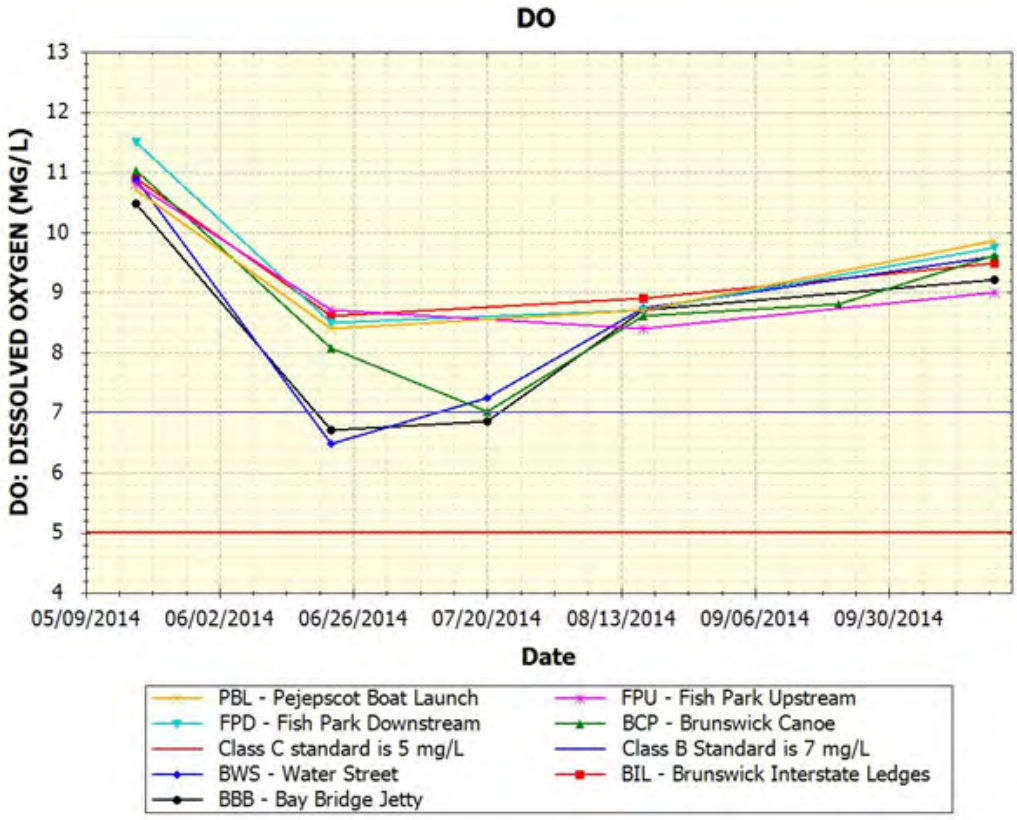
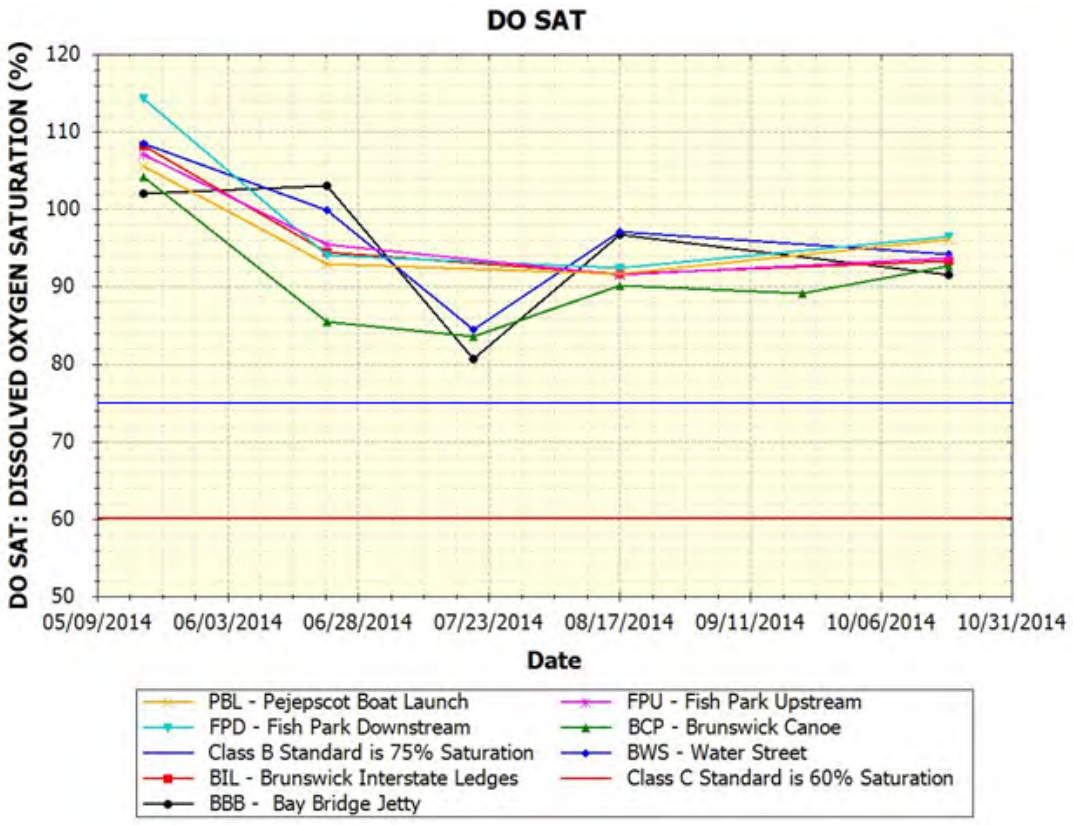


Figure 5-2-3: Graph of dissolved oxygen saturation



Water Temperature

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.

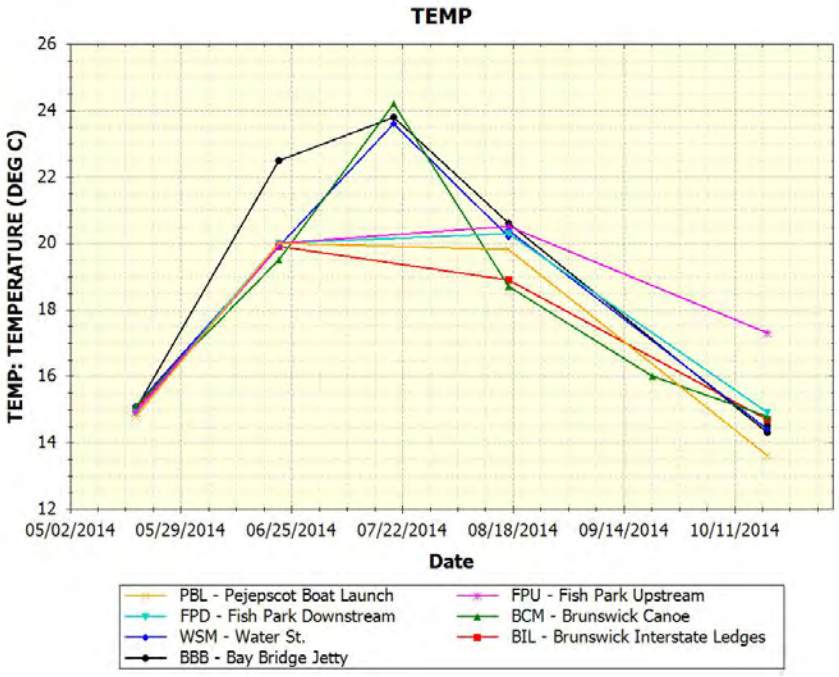
2014 Results:

Temperature at the 3 lowest sampling sites (BBB, BWS and BCP) were similar with highest temperatures occurring in July (23°-24°C). Temperature was very similar at the 4 sampling sites above (BIL, FPD, FPU, PBL) with highest readings being around 20°C). Temperature for July is not reported here because the data was not included due to QA/QC reasons explained in the "Dissolved Oxygen" results. Because sampling only occurs monthly, it is not possible to determine how long temperatures remained high. 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.

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	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
BBB	C	5	19.3	14.5	23.8	n/a	n/a
BWS	C	5	18.7	14.4	23.6	n/a	n/a
BCP	C	6	18.1	14.8	24.2	n/a	n/a
BIL	C	4	17.1	14.7	19.9	n/a	n/a
FPD	C	4	17.5	14.9	20.3	n/a	n/a
FPU	C	4	18.2	14.9	20.5	n/a	n/a
PBL	C	4	17.1	13.6	20.0	n/a	n/a

Figure 5-2-4: Graph of temperature



Specific Conductance

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.

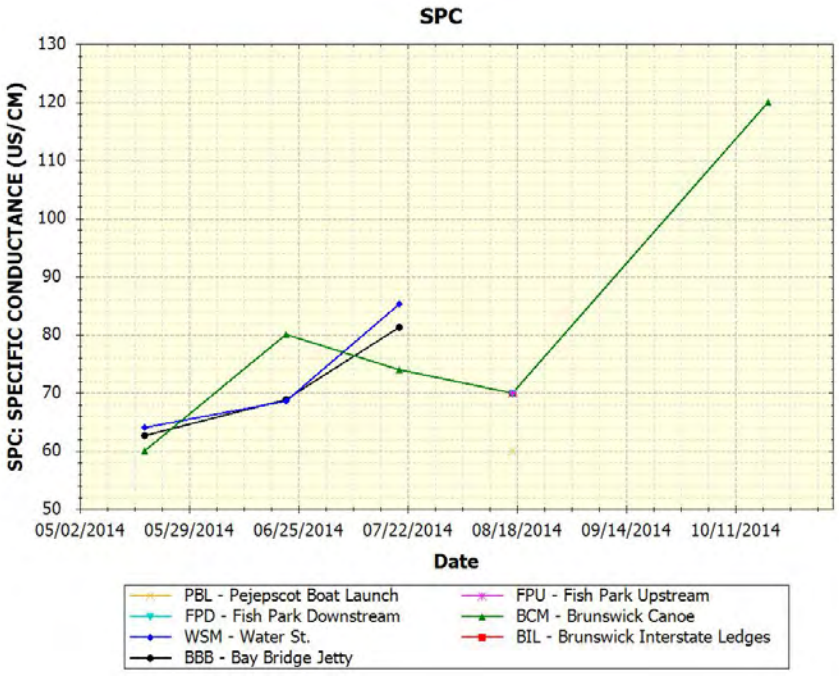
2014 Results:

Specific conductance was measured from 1-5 times at the sampling sites with measurements ranging from 60-120 µS/cm. Overall, the values are low, but somewhat elevated from natural background values reflecting point and non-point source effects.

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

Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
BBB	C	3	71	63	81	n/a	n/a
BWS	C	3	73	64	85	n/a	n/a
BCP	C	5	81	60	120	n/a	n/a
BIL	C	1	70	70	70	n/a	n/a
FPD	C	1	70	70	70	n/a	n/a
FPU	C	1	70	70	70	n/a	n/a
PBL	C	1	60	60	60	n/a	n/a

Figure 5-2-5: Graph of specific conductance



Bacteria

E. coli bacteria are used as the indicator organism for freshwater. 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 it is more appropriate to use geometric mean for something like bacteria where there may be one or more very high or low values that can skew the mean.

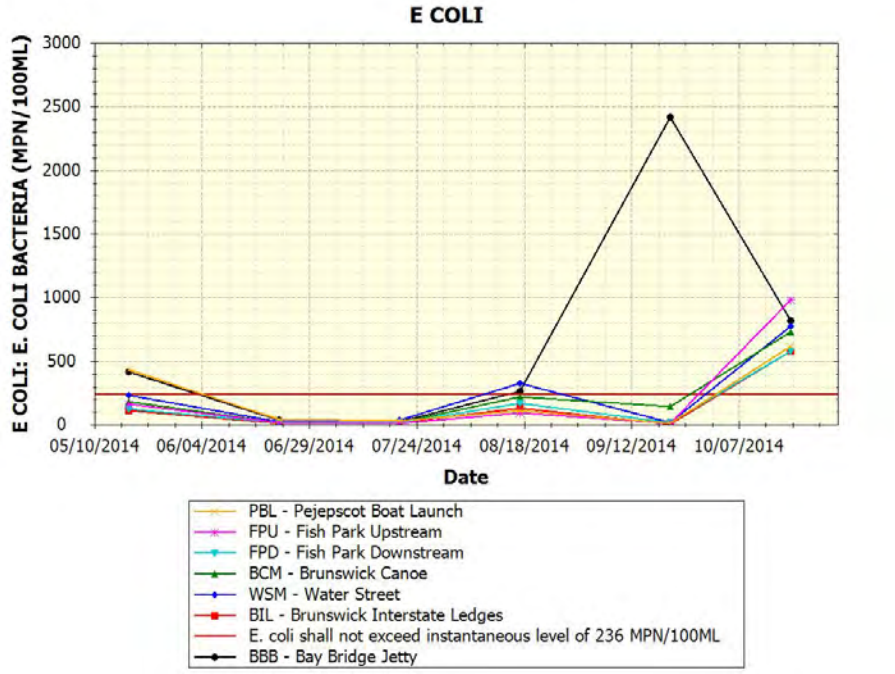
2014 Results:

Escherichia coli bacteria was sampled 6 times at the 7 sampling sites. Weather conditions included a mix of conditions including 2 dates (May & September) when there was heavy rain in the past 24 hours, 1 date when there was light rain (October) and dry conditions for July and August. Site BBB exceeded the Class B and Class C bacteria instantaneous criterion of 236 (MPN/100ml) on 4 out of 6 sampling dates (all dates except June & July). Site BWS exceeded these criterion in August and October. Sites BCP, BIL, FPD and FPU exceeded criterion in October only. Site PBL exceeded these criterion 2 times-May and October. The geometric mean criterion of 126 (MPN/100ml) was not exceeded at any of the sites. The Class B criterion of 64 (MPN/100ml) was exceeded at 4 of 7 sites. Site BBB is the lowest site on the river and exceeded the instantaneous criterion most often-perhaps because of its location below Brunswick. The fact that in 2014, there were exceedances may in part reflect that sampling included wet weather conditions. Typically high bacterial levels are associated with stormwater runoff and/or combined sewer overflows.

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	Class	# of Observations	Geometric Mean	Minimum	Maximum	Criterion Inst/Geo	# Exceeding
BBB	C	6	239	24	2419	236/126	4
BWS	C	6	95	12	770	236/126	2
BCP	C	6	99	14	727	236/126	1
BIL	C	6	41	5	579	236/126	1
FPD	C	6	61	16	579	236/126	1
FPU	C	6	53	8	980	236/126	1
PBL	C	6	87	12	613	236/126	2

Figure 5-2-6: Graph of E. coli (MPN/ml)



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. FOMB might consider sampling 2 X/month in July and August and dropping the October sampling event.**
- **Some data was not accepted because calibration values were not entered on the field sheets. Monitors should review their field sheets on each sampling date to ensure they are completed.**

Appendix A-1. 2014 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)	Turb-idity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River - Friends of Merrymeeting Bay: Approved Sites																
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	5/18/2014	8:05 AM	N			15	102	10.47	62.6					410.6	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	6/22/2014	8:15 AM	N			22.5	103	6.71	68.8					36.9	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	6/22/2014	8:15 AM	D											10.8	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	7/20/2014	7:45 AM	N			23.8	80.7	6.85	81.2					24.1	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	8/17/2014	7:45 AM	N			20.6	96.7	8.7						260.3	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	9/21/2014	8:20 AM	N											2419.6	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/19/2014	9:00 AM	N			14.5	91.5	9.2						816.4	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/19/2014	9:00 AM	D			14.3	93	9.4							
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/18/2014	8:15 AM	N			15	108.2	10.9						108.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/22/2014	8:30 AM	N			19.9	94.4	8.6						7.5	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/22/2014	8:30 AM	D											11.9	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/20/2014	8:12 AM	N											14.5	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	8/17/2014	7:35 AM	N			18.9	91.7	8.9	70					127.4	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/25/2014	7:45 AM	N											5.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/25/2014	7:45 AM	D											5.2	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	10/19/2014		N			14.7	93.3	9.48						579.4	

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)
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	5/18/2014	7:25 AM	N			15.1	108.4	10.88	64					231	
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	6/22/2014	7:45 AM	N			19.9	99.9	6.48	68.5					20.6	
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	7/20/2014	7:15 AM	N			23.6	84.5	7.25	85.3					37.3	
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	8/17/2014	7:15 AM	N			20.4	97.1	8.74						325.5	
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	8/17/2014	7:15 AM	D			20.2	96.9	8.61							
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	9/21/2014	7:50 AM	N											16.9	
BWS	ANDROSCOGGIN RIVER - A281 - VRMP	10/19/2014	8:40 AM	N			14.4	94.2	9.6						770.1	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	5/18/2014	7:45 AM	N			15.1	104.1	11.03	60					178.5	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	6/22/2014	7:45 AM	N			19.5	85.5	8.07	80					17.3	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	7/20/2014	8:00 AM	N			24.2	83.5	7.01	74					13.5	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	8/17/2014	7:45 AM	N			18.7	90.1	8.6	70					218.7	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	9/21/2014	7:45 AM	N			16	89.16	8.8						143.9	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	10/19/2014	7:30 AM	N			14.8	92.7	9.61	120					727	
BCP	ANDROSCOGGIN RIVER - A299 - VRMP	10/19/2014	7:30 AM	D			14.8	92.7	9.61	120					579.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/18/2014	7:50 AM	N			14.9	114.3	11.5						121	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/22/2014	8:00 AM	N			20	94	8.5						16.9	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/22/2014	8:00 AM	D											11.9	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	7/20/2014	7:38 AM	N											16.8	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	8/17/2014	7:25 AM	N			20.3	92.4	8.71	70					167	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	9/25/2014	7:12 AM	N											15.5	

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)
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/19/2014	6:55 AM	N			14.9	96.5	9.75						579.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	5/18/2014	7:35 AM	N			14.9	107	10.8						161.6	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	6/22/2014	7:40 AM	N			20	95.4	8.7						18.7	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	6/22/2014	7:40 AM	D			19.9	95.5	8.7						11.9	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/20/2014	7:15 AM	N											8.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/20/2014	7:15 AM	D											28.2	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	8/17/2014	7:20 AM	N			20.5	91.5	8.4	70					93.3	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	9/21/2014	6:50 AM	N											9.6	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	10/19/2014	6:40 AM	N			17.3	93.7	9						980.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	10/19/2014	6:40 AM	D			17.3	92.4	9.4						727	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/18/2014	6:55 AM	N			14.8	105.6	10.7						435.2	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/18/2014	6:55 AM	D			14.8	105.3	10.7						248.1	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/22/2014	7:10 AM	N			20	92.9	8.4						42	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/20/2014	6:05 AM	N											27.5	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/17/2014	7:00 AM	N			19.8	91.7	8.71	60					112.4	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	9/21/2014	6:12 AM	N											12.1	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/19/2014	5:50 AM	N			13.6	96	9.86						613.1	

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)

Appendix A-2. 2014 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	Water Appearance	Comments
Androscoggin River - Friends of Merrymeeting Bay: Approved Sites														
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	5/18/2014	8:05 AM	N	BASEFLOW	HIGH	17.6	WADING	PARTLY CLOUDY	STRONG WIND	CLEAR	RUN	MEDIUM STAINED	EXTREMELY HIGH TIDE WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	6/22/2014	8:15 AM	N	BASEFLOW	MEDIUM	22.5	WADING	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	6/22/2014	8:15 AM	D				WADING						WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	7/20/2014	7:45 AM	N	BASEFLOW	MEDIUM	19.7	WADING	CLOUDY	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	8/17/2014	7:45 AM	N	BASEFLOW	MEDIUM	17.5	WADING	CLOUDY	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	9/21/2014	8:20 AM	N	BASEFLOW	LOW	16.7	WADING		CALM		RUN	MEDIUM STAINED	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., WATER VERY LOW WADEABLE/MID-DEPTH DISSOLVED OXYEN NOT ENTERED-CALIBRATION NOT ENTERED ON FIELDSHEET
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	10/19/2014	9:00 AM	N	STORMFLOW	MEDIUM	10	WADING	CLOUDY	STRONG WIND	CLOUDY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
BAY BRIDGE JETTY (BBB)	ANDROSCOGGIN RIVER - A231 - VRMP	10/19/2014	9:00 AM	D				WADING						WADEABLE/MID-DEPTH
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	5/18/2014	8:15 AM	N			13.9	WADING	CLEAR	CALM	CLOUDY, FOGGY, HEAVY RAIN, LIGHT RAIN			NON-WADEABLE/MID-DEPTH
Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	6/22/2014	8:30 AM	N	BASEFLOW	LOW	13.5	BANK	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	6/22/2014	8:30 AM	D				BANK						WADEABLE/1.5 FT BELOW SURFACE
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	7/20/2014	8:12 AM	N	BASEFLOW	LOW	18.5	WADING	CLOUDY, FOGGY	CALM	CLEAR, CLOUDY, FOGGY, MOSTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	8/17/2014	7:35 AM	N		HIGH		WADING	CLOUDY		CLOUDY, LIGHT RAIN	RUN	DARKLY STAINED	NON-WADEABLE/MID-DEPTH
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	9/25/2014	7:45 AM	N	BASEFLOW	LOW		WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, LIGHT RAIN, MOSTLY CLOUDY, PARTLY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.

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	Water Appearance	Comments
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	9/25/2014	7:45 AM	D				WADING						WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Brunswick Interstate Ledges (BIL)	ANDROSCOGGIN RIVER - A24 - VRMP	10/19/2014		N	BASEFLOW	LOW	6.8	WADING	CLOUDY		LIGHT RAIN		MEDIUM STAINED	WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	5/18/2014	7:25 AM	N	BASEFLOW	HIGH	17.6	WADING	PARTLY CLOUDY	STRONG WIND	CLEAR	RUN	MEDIUM STAINED	EXTREMELY HIGH TIDE WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	6/22/2014	7:45 AM	N	BASEFLOW	MEDIUM	22.5	WADING	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	7/20/2014	7:15 AM	N	BASEFLOW	MEDIUM	19.7	WADING	CLOUDY	CALM	CLEAR	RUN	MEDIUM STAINED	WATER SCUMMY WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	8/17/2014	7:15 AM	N	BASEFLOW	MEDIUM	17.5	WADING	CLOUDY	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	8/17/2014	7:15 AM	D				WADING						WADEABLE/MID-DEPTH
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	9/21/2014	7:50 AM	N	BASEFLOW	LOW	16.7	WADING		CALM		RUN	MEDIUM STAINED	WATER VERY LOW WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Water Street(BWS)	ANDROSCOGGIN RIVER - A281 - VRMP	10/19/2014	8:40 AM	N	STORMFLOW	MEDIUM	10	WADING	CLOUDY	STRONG WIND	CLOUDY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	5/18/2014	7:45 AM	N	STORMFLOW	HIGH	17.4	WADING	CLEAR	CALM	HEAVY RAIN, MOSTLY CLOUDY, SHOWERS	RUN	DARKLY STAINED	HEAVY RAIN PRIOR TO TESTING, WATER EXTREMELY HIGH; MOVED DOWNSTREAM TO SAMPLE WADEABLE/MID-DEPTH
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	6/22/2014	7:45 AM	N	BASEFLOW	MEDIUM	15.1	WADING	CLEAR	CALM	CLEAR, PARTLY CLOUDY	RUN	DARKLY STAINED	WADEABLE/MID-DEPTH
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	7/20/2014	8:00 AM	N	BASEFLOW	MEDIUM	18	BANK	PARTLY CLOUDY	CALM	CLEAR	RUN	MEDIUM STAINED	NON-WADEABLE/MID-DEPTH
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	8/17/2014	7:45 AM	N		HIGH		WADING	CLOUDY		CLOUDY, LIGHT RAIN	RUN	DARKLY STAINED	NON-WADEABLE/MID-DEPTH COMPLETED ZERO DO CHECK-DID NOT RECORD RESULTS
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	9/21/2014	7:45 AM	N	BASEFLOW	LOW	17	WADING	CLOUDY		CLOUDY, HEAVY RAIN, LIGHT RAIN, SHOWERS	RUN	MEDIUM STAINED	NON-WADEABLE/MID-DEPTH SAMPLE TIME ESTIMATED FROM START AND END TIME
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	10/19/2014	7:30 AM	N	BASEFLOW	LOW	12.6	WADING	CLOUDY		CLOUDY	RUN	MEDIUM STAINED	LOTS OF GULLS AROUND WADEABLE/MID-DEPTH
BRUNSWICK CANOE PORTAGE (BCP)	ANDROSCOGGIN RIVER - A299 - VRMP	10/19/2014	7:30 AM	D				WADING						LOTS OF GULLS AROUND WADEABLE/MID-DEPTH
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	5/18/2014	7:50 AM	N			13.9	BANK	CLEAR	CALM	CLOUDY, FOGGY, HEAVY RAIN, LIGHT RAIN			NON-WADEABLE/MID-DEPTH
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	6/22/2014	8:00 AM	N	BASEFLOW	LOW	13.5	WADING	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE

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	Water Appearance	Comments
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	6/22/2014	8:00 AM	D				WADING						WADEABLE/1.5 FT BELOW SURFACE
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	7/20/2014	7:38 AM	N	BASEFLOW	LOW	18.5	BANK	CLOUDY, FOGGY	CALM	CLEAR, CLOUDY, FOGGY, MOSTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	8/17/2014	7:25 AM	N		HIGH	19.8	BANK	CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	DARKLY STAINED	NON-WADEABLE/MID-DEPTH
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	9/25/2014	7:12 AM	N	BASEFLOW	LOW		WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, LIGHT RAIN, MOSTLY CLOUDY, PARTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Fish Park Downstream (FPD)	ANDROSCOGGIN RIVER - A45 - VRMP	10/19/2014	6:55 AM	N	BASEFLOW	LOW	6.8	WADING	CLOUDY		LIGHT RAIN		MEDIUM STAINED	WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	5/18/2014	7:35 AM	N			13.9	BANK	CLEAR	CALM	CLOUDY, FOGGY, HEAVY RAIN, LIGHT RAIN			NON-WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	6/22/2014	7:40 AM	N	BASEFLOW	LOW	13.5	WADING	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	6/22/2014	7:40 AM	D				WADING						WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	7/20/2014	7:15 AM	N	BASEFLOW	LOW	18.5	WADING	CLOUDY, FOGGY	CALM	CLEAR, CLOUDY, FOGGY, MOSTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	7/20/2014	7:15 AM	D				WADING						WADEABLE/1.5 FT BELOW SURFACE DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	8/17/2014	7:20 AM	N		HIGH	19.8	BANK	CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	DARKLY STAINED	NON-WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	9/21/2014	6:50 AM	N	BASEFLOW	LOW		WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, LIGHT RAIN, MOSTLY CLOUDY, PARTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	10/19/2014	6:40 AM	N	BASEFLOW	LOW	6.8	WADING	CLOUDY		LIGHT RAIN		MEDIUM STAINED	WADEABLE/MID-DEPTH
Fish Park Upstream (FPU)	ANDROSCOGGIN RIVER - A47 - VRMP	10/19/2014	6:40 AM	D				WADING						WADEABLE/MID-DEPTH

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	Water Appearance	Comments
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	5/18/2014	6:55 AM	N			13.9	WADING	CLEAR	CALM	CLOUDY, FOGGY, HEAVY RAIN, LIGHT RAIN			WADEABLE/MID-DEPTH
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	5/18/2014	6:55 AM	D				WADING						WADEABLE/MID-DEPTH
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	6/22/2014	7:10 AM	N	BASEFLOW	LOW	13.5	WADING	CLEAR	CALM	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	7/20/2014	6:05 AM	N	BASEFLOW	LOW	18.5	WADING	CLOUDY, FOGGY	CALM	CLEAR, CLOUDY, FOGGY, MOSTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/1.5 FT BELOW SURFACE DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	8/17/2014	7:00 AM	N		HIGH		WADING	CLOUDY		CLOUDY, LIGHT RAIN	RUN	DARKLY STAINED	NON-WADEABLE/MID-DEPTH
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	9/21/2014	6:12 AM	N	BASEFLOW	LOW		WADING	CLOUDY, LIGHT RAIN	CALM	CLOUDY, LIGHT RAIN, MOSTLY CLOUDY, PARTLY CLOUDY	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH DISSOLVED OXYGEN NOT ENTERED-CALIBRTATION VALUE NOT ENTERED ON FIELDSHEET.
Pejepscot Boat Launch (PBL)	ANDROSCOGGIN RIVER - A71 - VRMP	10/19/2014	5:50 AM	N	BASEFLOW	LOW	6.8	WADING	CLOUDY		LIGHT RAIN		MEDIUM STAINED	WADEABLE/MID-DEPTH

Section 5-2
Androscoggin River (Friends of Merrymeeting Bay)

Androscoggin River

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 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 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 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.

Monitoring History

• The Maine DEP Biological Monitoring Program has been monitoring the lower Androscoggin River since 1984. This data is available on DEP's website.

• 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 where possible.

[1] Maine Rivers Website- Androscoggin River Profile
[2] Androscoggin River Alliance Website-Androscoggin River slideshow

• 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.

• In 2010, a water quality model to predict effect of discharges and river flows on attainment of Maine's Water Quality Standards was developed for the lower Androscoggin River by the Maine DEP. The model report and data are available on DEP's website.

Methods and Sampling Sites

Volunteers monitor the Androscoggin River at eight sites on the main stem. All of the sites are now VRMP approved sites.

Monitoring is conducted once/month from May through September-October. Monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Specific conductance is measured using either a YSI meter or an Oakton EC 11+/11 Testr pen. Samples are collected for *E. coli* bacteria and transported to Bowdoin College for analysis by FOMB volunteers using the IDEXX Colilert system.

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-A281-VRMP	BWS	Brunswick Water Street	C
Androscoggin River-A299-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

Androscoggin River Sampling Sites
Friends of Merrymeeting Bay

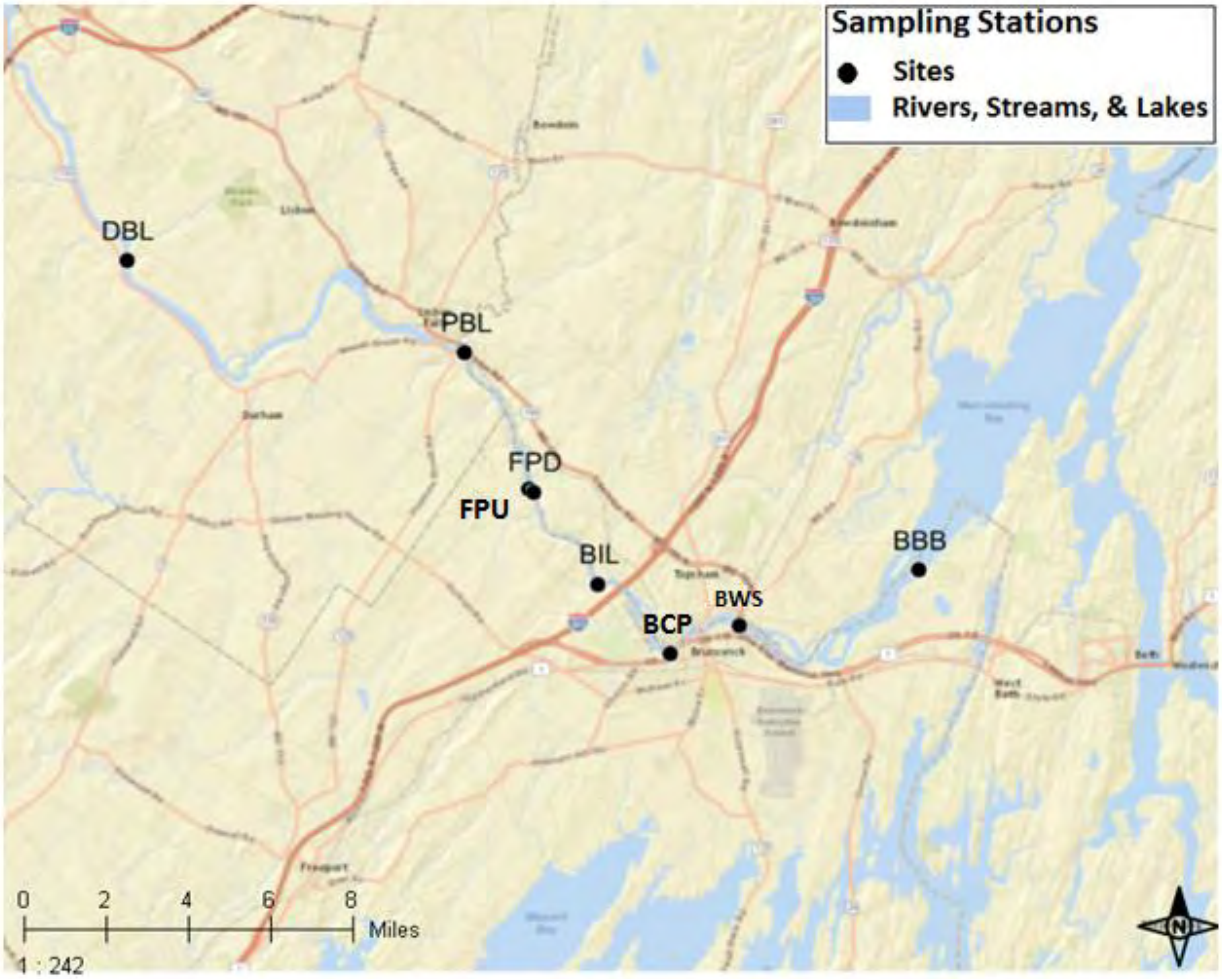


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River

Results

Refer to Appendix A-1 for discussion of individual site data and trends.

Dissolved Oxygen

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, this will affect the dissolved oxygen.

Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60 % saturation. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

2015 Results:

Dissolved oxygen (DO) was measured 6 times from May through October at 7 sampling sites. At all the sites, DO concentration was above the Class C criterion of 5 mg/l. It was also at or above the Class B criterion of 7 mg/l at all sites. Dissolved oxygen percent saturation was above the Class C criterion of 60% saturation for all dates and also above Class B criterion of 75% saturation for all dates. Overall sites BBB, BWS and BCP are very similar. The sites above here (BIL, FPD, FPU, and PBL) are also very similar. Dissolved oxygen was overall excellent.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
BBB	C	6	8.5	7.0	9.8	5	0
BWS	C	6	8.9	7.2	11.0	5	0
BCP	C	7	8.4	7.0	10.2	5	0
BIL	C	6	8.7	7.4	10.2	5	0
FPD	C	6	8.8	7.4	10.4	5	0
FPU	C	6	8.8	7.3	10.2	5	0
PBL	C	6	8.9	7.5	10.3	5	0

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
BBB	C	6	88.7	83.7	96.7	60	0
BWS	C	6	94.0	86.7	98.6	60	0
BCP	C	7	90.7	83.7	97.0	60	0
BIL	C	6	92.4	86.3	97.0	60	0
FPD	C	6	93.8	88.2	98.0	60	0
FPU	C	6	93.4	87.3	97.5	60	0
PBL	C	6	94.0	89.4	96.8	60	0

Figure 5-2-2: Graph of dissolved oxygen concentrations-lower sites

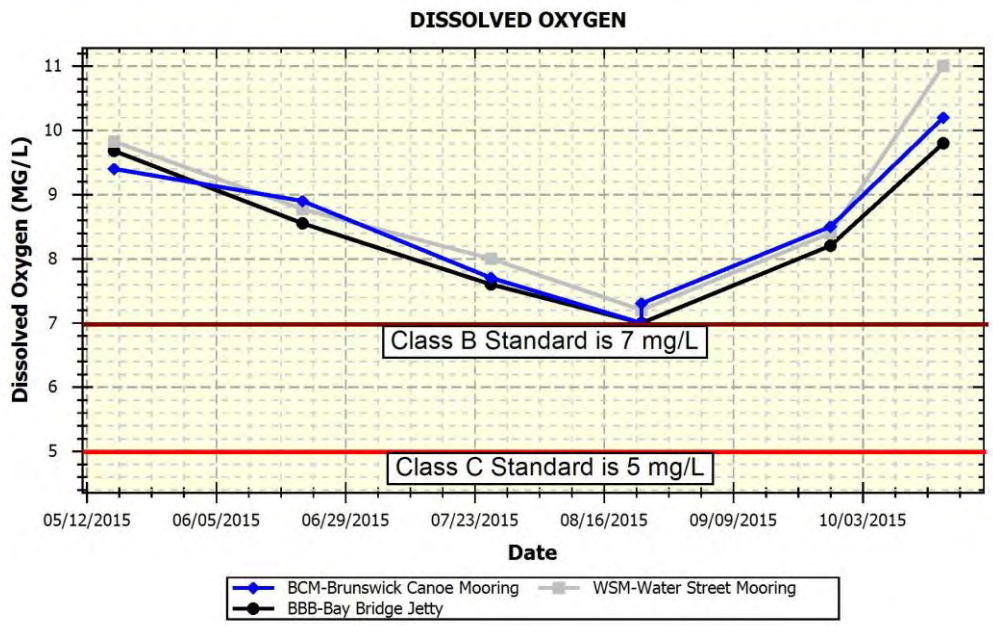


Figure 5-2-3: Graph of dissolved oxygen concentrations-upper sites

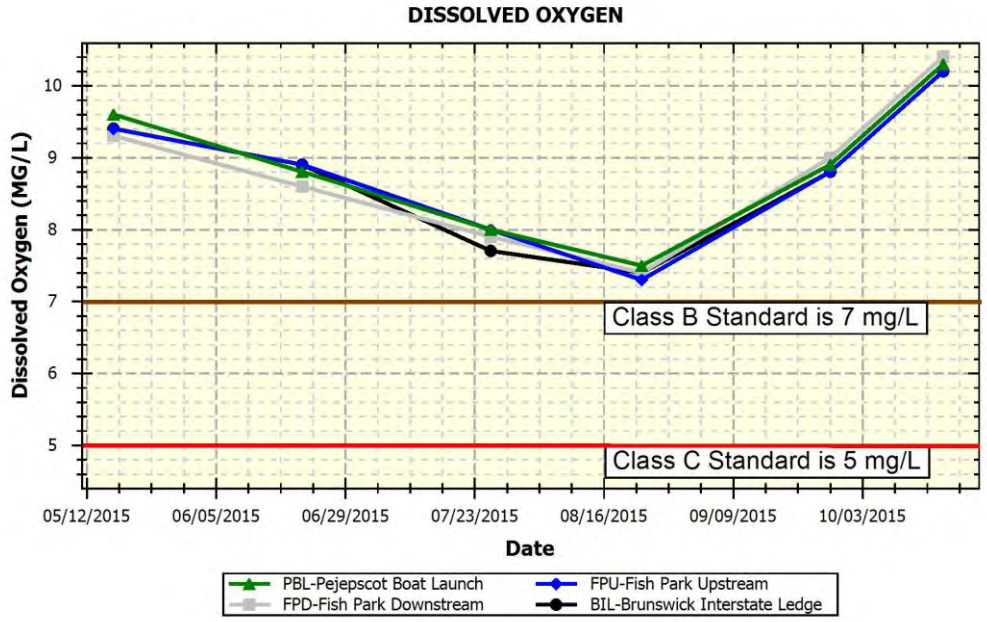


Figure 5-2-4: Graph of dissolved oxygen saturation-lower sites

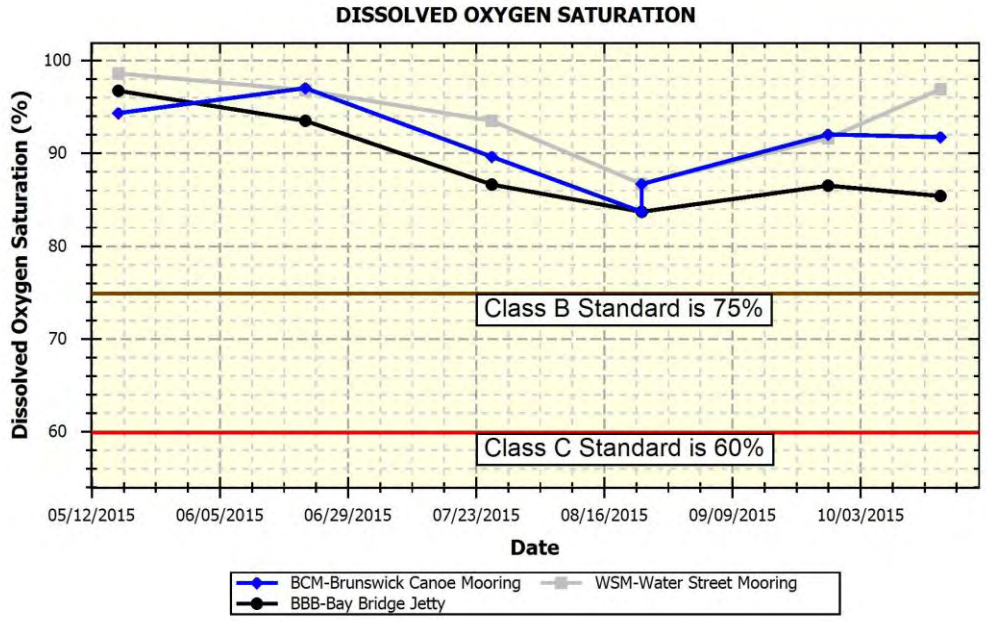
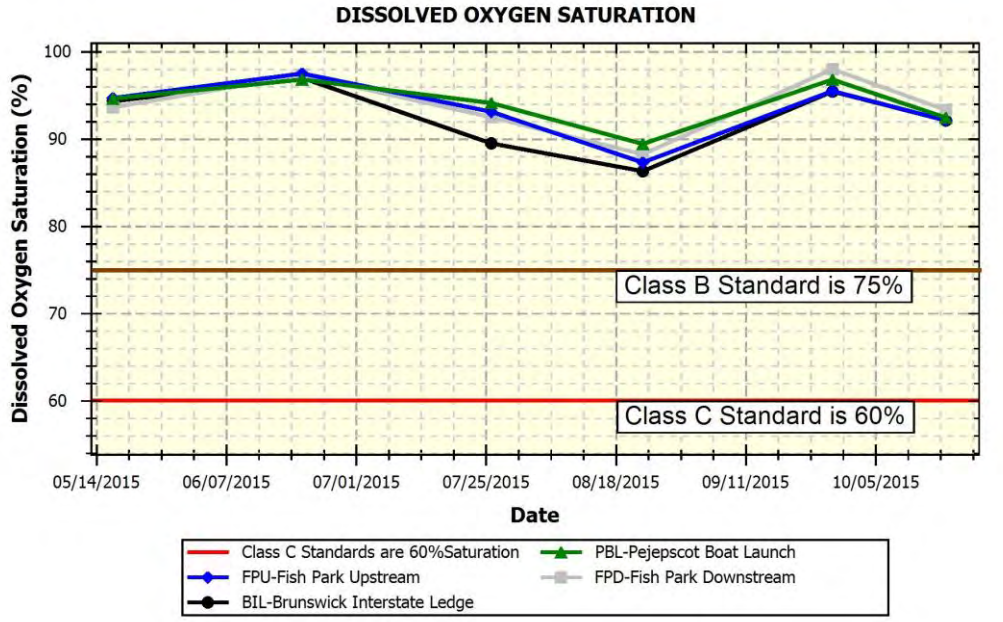


Figure 5-2-5: Graph of dissolved oxygen saturation-upper sites



Water Temperature

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.

2015 Results:

Temperature at the 3 lowest sampling sites (BBB, BWS and BCP) were similar with highest temperatures occurring in July and August (22˚-24˚C). Temperature was very similar at the 4 sampling sites above (BIL, FPD, FPU, PBL) with highest readings occurring in July and August also (20˚-24˚ C). Because sampling only occurs monthly, it is not possible to determine how long temperatures remained high. 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.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
BBB	C	6	18.0	8.9	24.3	n/a	n/a
BWS	C	6	18.3	9.8	24.5	n/a	n/a
BCP	C	7	19.0	10.4	24.1	n/a	n/a
BIL	C	6	18.7	10.1	24.1	n/a	n/a
FPD	C	6	18.9	10.6	24.3	n/a	n/a
FPU	C	6	18.9	10.8	24.2	n/a	n/a
PBL	C	6	18.8	11.1	24.3	n/a	n/a

Figure 5-2-6: Graph of temperature-lower sites

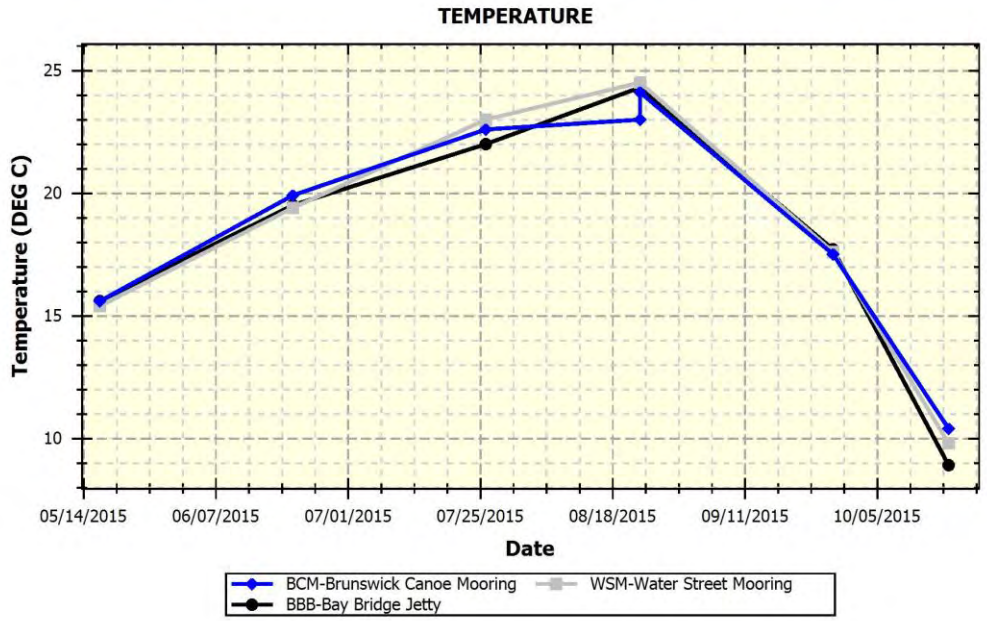
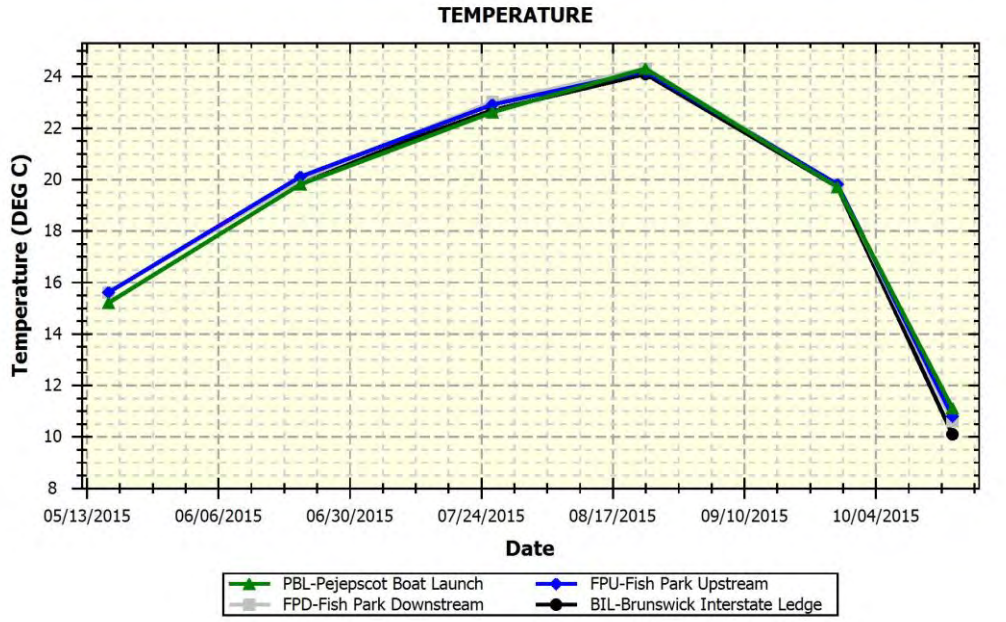


Figure 5-2-7: Graph of temperature-upper sites



Specific Conductance

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.

2015 Results:

Specific conductance was measured from May through October at the sampling sites with measurements ranging from 50-170 µS/cm. Overall, the mean values are low, but values are somewhat elevated later in the season reflecting point and non-point source effects. Specific conductance overall is good.

Table 5-2-5: A summary of minimum, maximum, and mean specific conductance values (micro-ohms/cm, µS/cm) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
BBB	C	6	110	70	160	n/a	n/a
BWS	C	6	112	60	170	n/a	n/a
BCP	C	7	103	60	160	n/a	n/a
BIL	C	6	88	50	140	n/a	n/a
FPD	C	6	90	50	140	n/a	n/a
FPU	C	6	88	50	140	n/a	n/a

PBL	C	6	97	60	140	n/a	n/a

Figure 5-2-8: Graph of specific conductance-lower sites

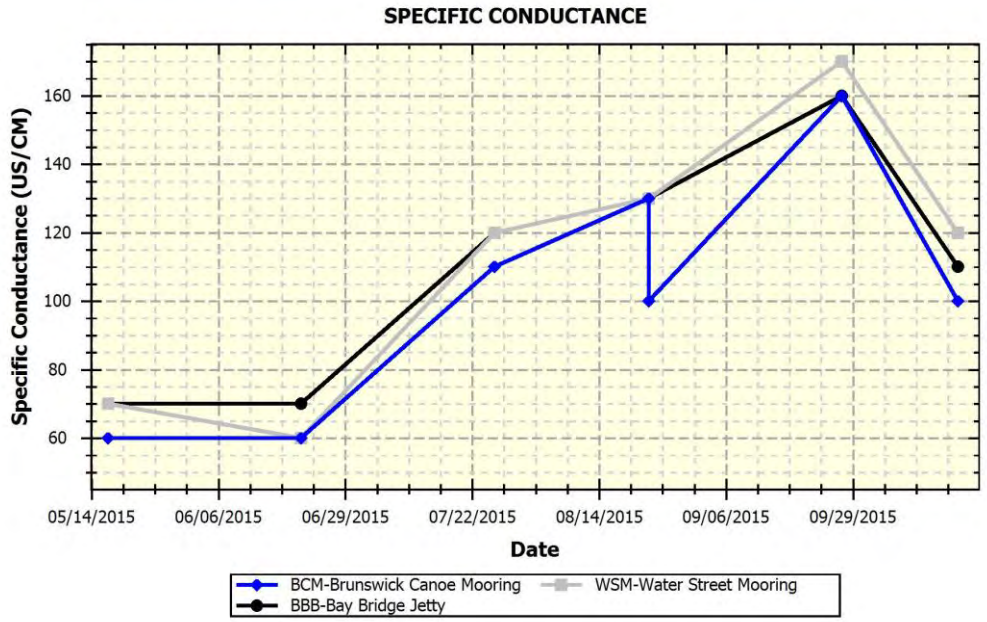
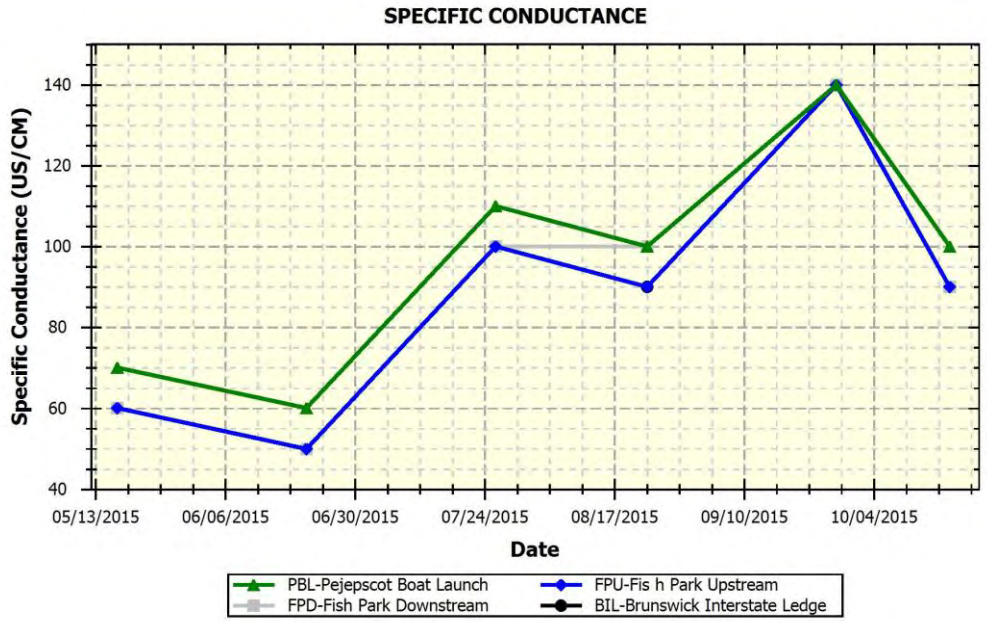


Figure 5-2-9: Graph of specific conductance-upper sites



Bacteria

E. coli bacteria are used as the indicator organism for freshwater. 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 it is more appropriate to use geometric mean for something like bacteria where there may be one or more very high or low values that can skew the mean.

2015 Results:

Escherichia coli bacteria was sampled from May through October at 7 sampling sites. Weather conditions included a mix of conditions with one date where there was heavy rain in the previous 24 hours (June), showers (May and October), and light rain-cloudy-clear for the remaining months (July, August, September). Five of seven sites exceeded the Class B and Class C bacteria instantaneous criterion of 236 (MPN/100ml) one time. The exceedances all occurred in October. The Class C geometric mean criterion of 126 (MPN/100ml) was not exceeded at any of the sites. The Class B geometric mean criterion of 64 (MPN/100ml) was not exceeded at any of the sites. Interestingly the exceedances all occurred in October and not in June when there was a heavy rain event. This could reflect that the system gets flushed out over the winter-spring period and then bacteria levels increase as the season progresses. Typically high bacterial levels are associated with stormwater runoff and/or combined sewer overflows. FOMB suggests that high bacteria levels also may reflect the seasonal September cessation of chlorine inputs by wastewater treatment plants along the river. Because bacteria counts are typically lower in colder water, treatment plants are only required to chlorinate May-Spetember. Overall, bacteria levels are good.

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	Class	# Sample Points	Geometric Mean	Minimum	Maximum	Criterion Inst/Geo	# Exceeding Criterion
BBB	C	6	17	1	291	236/126	1
BWS	C	6	23	3	238	236/126	1
BCP	C	7	25	6	222	236/126	0
BIL	C	6	16	4	192	236/126	0
FPD	C	6	14	4	206	236/126	0
FPU	C	6	15	3	276	236/126	1
PBL	C	6	49	13	291	236/126	1
DBL	C	6	21	6	579	236/126	1

Figure 5-2-10: Graph of E. coli (MPN/ml)-lower sites

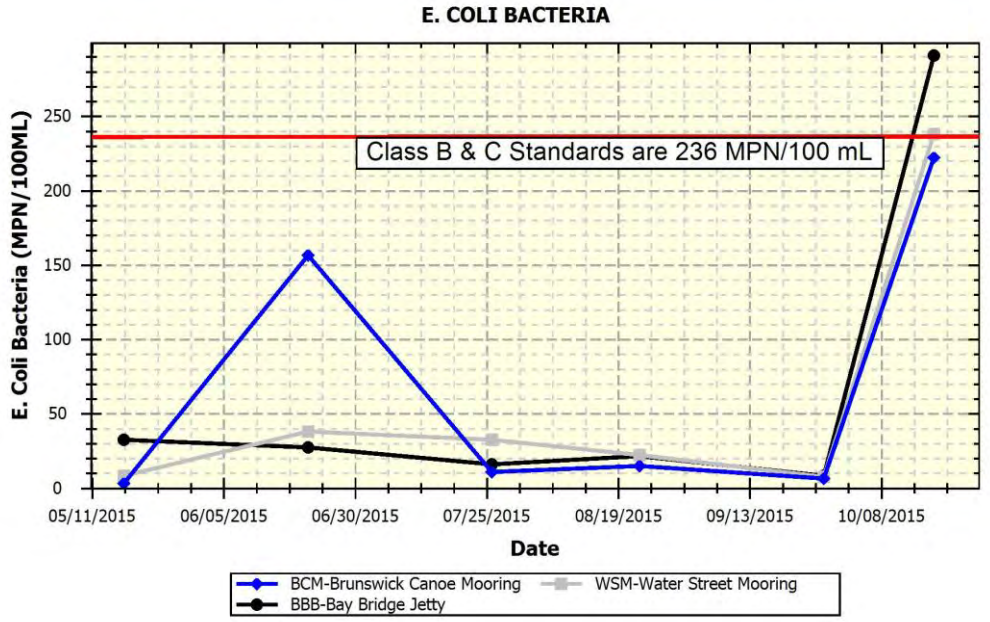
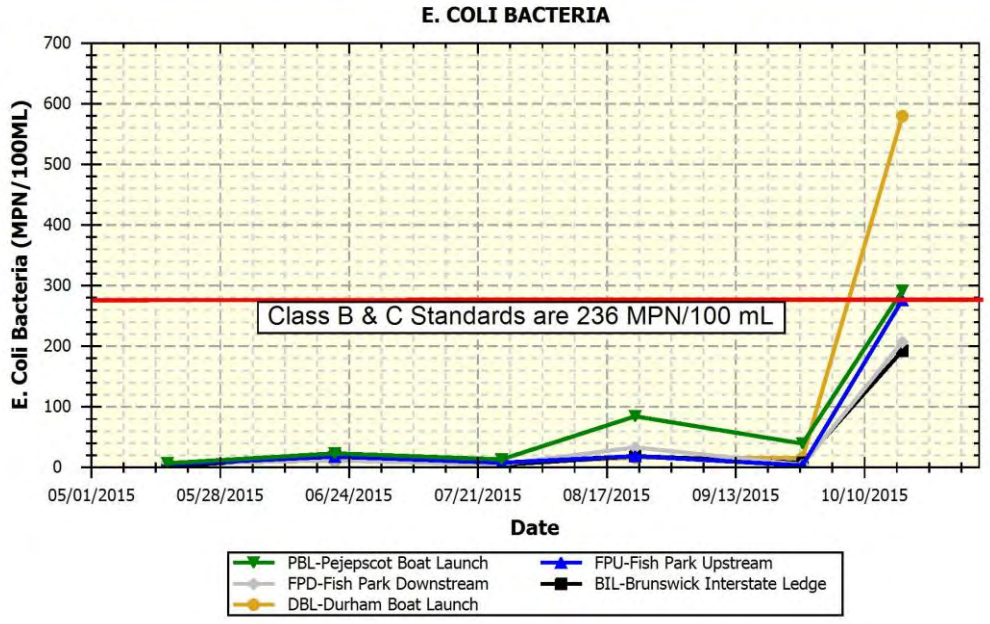


Figure 5-2-10: Graph of E. coli (MPN/ml)-upper sites



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 continue to 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. FOMB might consider sampling 2 X/month in July and August.**

Appendix A-1. 2011 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/A" = normal environmental sample ; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "Turb" = turbidity; "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)	Turb-idity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River-Friends of Merrymeeting Bay: Approved Sites																
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	5/17/2015		NA											6.3	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	6/21/2015		NA											10.8	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	6/21/2015		D											18.5	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	7/26/2015		NA											7.5	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	8/23/2015		NA											16.1	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	9/27/2015		NA											15.8	
DBL	ANDROSCOGGIN RIVER - A158 - VRMP	10/18/2015		NA											579.4	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	5/17/2015	7:30 AM	NA			15.6	96.7	9.7	70					32.7	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	6/21/2015	7:00 AM	NA			19.5	93.5	8.6	70					27.5	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	7/26/2015	7:00 AM	NA			22.0	86.6	7.6	120					16	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	7/26/2015	7:00 AM	D											16	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	8/23/2015	7:00 AM	NA			24.3	83.7	7.0	130					21.6	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	9/27/2015	8:00 AM	NA			17.7	86.5	8.2	160					8.3	
BBB	ANDROSCOGGIN RIVER - A231 - VRMP	10/18/2015	7:50 AM	NA			8.9	85.4	9.8	110					290.9	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/17/2015	7:45 AM	NA			15.6	94.3	9.4	60					1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/17/2015	7:45 AM	D			15.6		9.4						4.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/21/2015	8:00 AM	NA			20.0	97.0	8.9	50					19.7	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/26/2015	7:38 AM	NA			22.7	89.5	7.7	100					4.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	8/23/2015	8:00 AM	NA			24.1	86.3	7.4	90					18.5	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/27/2015	7:40 AM	NA			19.7	95.4	8.8	140					7.4	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	10/18/2015	7:30 AM	NA			10.1	92.1	10.2	90					191.8	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	5/17/2015	8:00 AM	NA			15.4	98.6	9.8	70					8.4	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	6/21/2015	6:15 AM	NA			19.4	96.8	8.8	60					37.9	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	7/26/2015	8:00 AM	NA			23.0	93.5	8.0	120					32.7	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	8/23/2015	6:35 AM	NA			24.5	86.7	7.2	130					22.1	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	8/23/2015	6:35 AM	D											27.5	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	9/27/2015	7:40 AM	NA			17.6	91.6	8.4	170					7.4	
WSM	ANDROSCOGGIN RIVER - A281 - VRMP	10/18/2015	7:25 AM	NA			9.8	96.9	11.0	120					238.2	
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	5/17/2015	8:00 AM	NA			15.6	94.3	9.4	60					3.1	
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	6/21/2015	8:15 AM	NA			19.9	97.0	8.9	60					156.5	
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	7/26/2015	8:00 AM	NA			22.6	89.6	7.7	110					10.9	
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	8/23/2015	6:10 AM	NA			23.0	83.7	7.0	130						
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	8/23/2015	8:15 AM	NA			24.1	86.7	7.3	100					14.8	

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)
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	9/27/2015	7:15 AM	NA			17.5	92.0	8.5	160					6.3	
BCM	ANDROSCOGGIN RIVER - A299 - VRMP	10/18/2015	7:00 AM	NA			10.4	91.7	10.2	100					222.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/17/2015	7:30 AM	NA			15.6	93.6	9.3	60					7.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/21/2015	7:45 AM	NA			20.0	97.3	8.6	50					10.9	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	7/26/2015	7:05 AM	NA			23.0	92.5	7.9	100					5.2	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	8/23/2015	7:45 AM	NA			24.3	88.2	7.4	100					33.1	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	9/27/2015	7:10 AM	NA			19.8	98.0	9.0	140					4.1	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/18/2015	6:55 AM	NA			10.6	93.3	10.4	90					206.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/18/2015	6:55 AM	D											191.8	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	5/17/2015	7:15 AM	NA			15.6	94.7	9.4	60					5.2	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	6/21/2015	7:30 AM	NA			20.1	97.5	8.9	50					17.3	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	7/26/2015	6:40 AM	NA			22.9	93.1	8.0	100					7.4	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	8/23/2015	7:15 AM	NA			24.2	87.3	7.3	90					18.1	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	8/23/2015	7:15 AM	D											25.9	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	9/27/2015	6:48 AM	NA			19.8	95.5	8.8	140					3	
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	9/27/2015	6:48 AM	D			19.8	95.5	8.8	140						
FBU	ANDROSCOGGIN RIVER - A47 - VRMP	10/18/2015	6:40 AM	NA			10.8	92.1	10.2	90					275.5	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/17/2015	6:45 AM	NA			15.2	94.6	9.6	70					6.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/21/2015	6:45 AM	NA			19.8	96.8	8.8	60					22.5	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/21/2015	6:45 AM	D			19.8	96.8	8.8	60					18.7	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/26/2015	6:00 AM	NA			22.6	94.1	8.0	110					13.2	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/26/2015	6:00 AM	D			22.6	94.1	8.0	110					18.9	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/23/2015	6:45 AM	NA			24.3	89.4	7.5	100					83.9	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	9/27/2015	6:15 AM	NA			19.7	96.8	8.9	140					39.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/18/2015	6:10 AM	NA			11.1	92.4	10.3	100					290.9	

Section 5-2
Androscoggin River (Friends of Merrymeeting Bay)

Androscoggin River

The Androscoggin River is the third largest river in the state of Maine. It has a length of 177 miles and drainage area of 3,450 square miles (2,730 sq. mi. in Maine).[1] The Androscoggin River's 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 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 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 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.

Friends of Merrymeeting Bay (FOMB) is a nonprofit organization that focuses on the lower part of the Androscoggin River and other waterbodies draining into Merrymeeting Bay. FOMB has been in existence since 1975 and focuses on protecting the Merrymeeting Bay watershed through research, education, advocacy, and land conservation.

[1] Maine Rivers Website- Androscoggin River Profile
[2] Androscoggin River Alliance Website- Androscoggin River slideshow

Monitoring History

• The Maine Department of Environmental Protection's (DEP) Biological Monitoring Program has been monitoring the lower Androscoggin River since 1984. This data is available on DEP's website.

• The lower Androscoggin River is monitored by Friends of Merrymeeting Bay (FOMB). 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 where possible.

• 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.

• In 2010, a water quality model to predict the effect of discharges and river flows on attainment of Maine's Water Quality Standards was developed for the lower Androscoggin River by the Maine DEP. The model report and data are available on DEP's website.

Methods and Sampling Sites

Volunteers monitor the Androscoggin River at eight sites on the main stem. All of the sites are now VRMP approved sites. In 2016, FOMB added site Island View Lane (IVL) to replace site Bay Bridge Jetty (BBB).

Monitoring is conducted once a month from May through September-October. Monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Specific conductance is measured using either a YSI meter or an Oakton EC 11+/11 Testr pen. Samples are collected for *E. coli* bacteria and transported to Bowdoin College for analysis by FOMB volunteers using the IDEXX Colilert system.

Table 5-2-1: Friends of Merrymeeting Bay sampling sites at Androscoggin River, listed from upstream to downstream.

VRMP Site ID	Organization Site Code	Sample Location	Class
Androscoggin River-A149-VRMP	DBN	Durham Boat New	C
Androscoggin River-A71-VRMP	PBL	Pejepscot Boat Launch	C
Androscoggin River-A47-VRMP	FPU	Fish Park Upstream	C
Androscoggin River-A45-VRMP	FPD	Fish Park Downstream	C
Androscoggin River-A24-VRMP	BIL	Brunswick Interstate Ledges	C
Androscoggin River-A06-VRMP	BCP	Brunswick Canoe Portage	C
Androscoggin River-A-09-VRMP	BWS	Brunswick Water Street	C
Androscoggin River-A-45-VRMP	IVL	Island View Lane	C

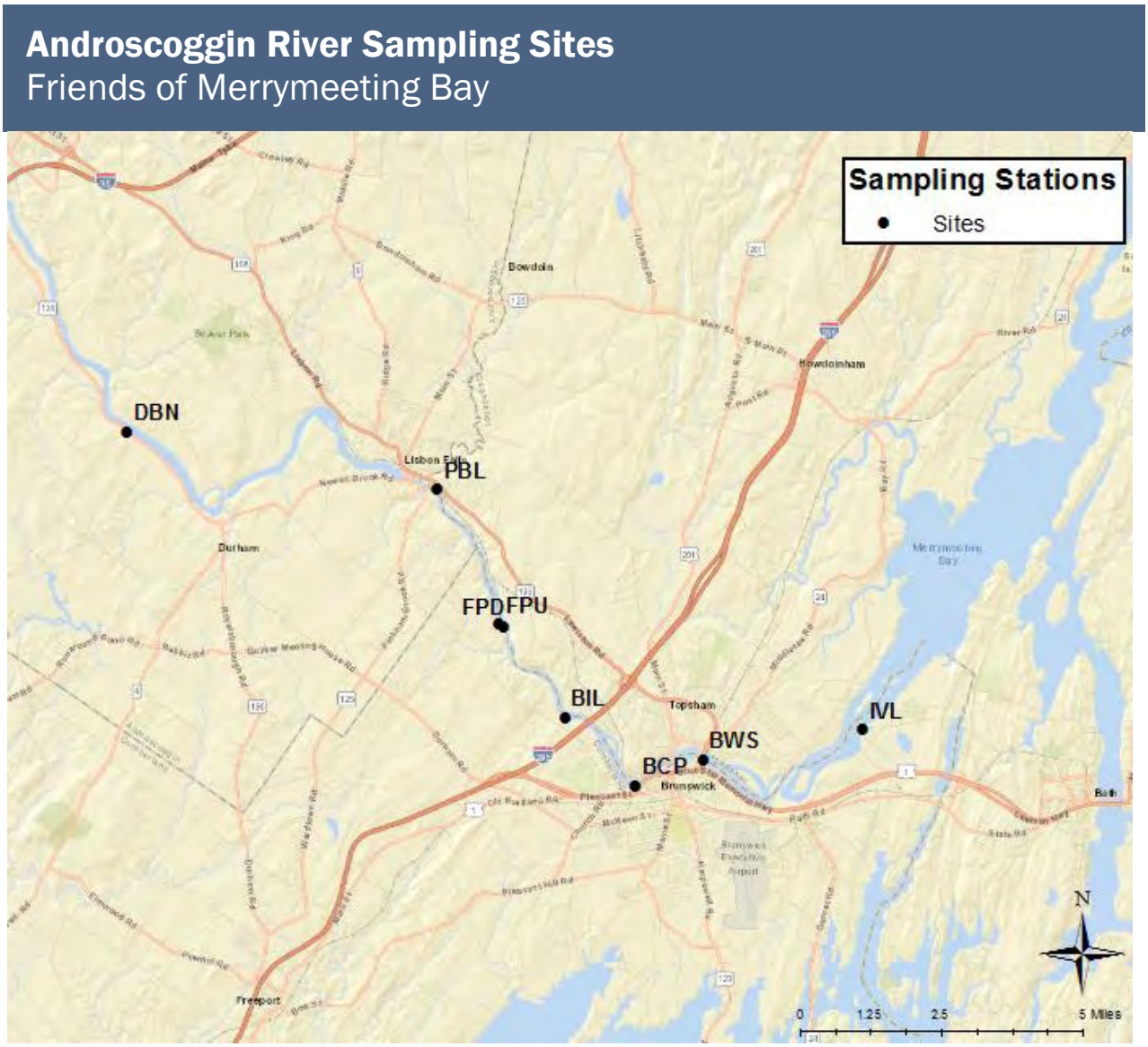


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

Results

Refer to Appendix A-1 for discussion of individual site data and trends.

Dissolved Oxygen

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, this will affect the dissolved oxygen.

Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60% saturation. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

2016 Results

Dissolved oxygen (DO) was measured two to six times from May through October at eight sampling sites. At all the sites, DO concentration was above the Class C criterion of 5 mg/l. It was also above the Class B criterion of 7 mg/l at all sites. Dissolved oxygen percent saturation was above the Class C criterion of 60% saturation for all dates and also above Class B criterion of 75% saturation for all dates. Overall sites BCP, BWS and IVL are very similar to each other. The sites upstream (BIL, DBN, FPD, FPU, and PBL) are also very similar. Dissolved oxygen was excellent overall.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
DBN	C	2	8.1	7.5	8.6	5	0
PBL	C	6	8.7	7.6	10.1	5	0
FPU	C	6	8.6	7.7	10.1	5	0
FPD	C	6	8.6	7.7	9.9	5	0
BIL	C	6	8.6	7.8	9.9	5	0
BCP	C	6	8.7	7.1	10.5	5	0
BWS	C	6	9.0	7.5	10.6	5	0
IVL	C	6	8.8	7.5	10.3	5	0

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
DBN	C	2	91.8	90.5	93.0	60	0
PBL	C	6	93.5	86.7	98.3	60	0
FPU	C	6	93.8	88.4	101.0	60	0
FPD	C	6	93.7	90.4	99.4	60	0
BIL	C	6	93.6	89.5	99.5	60	0
BCP	C	6	94.3	86.2	104.9	60	0
BWS	C	6	97.6	90.9	105.3	60	0
IVL	C	6	94.3	88.9	102.8	60	0

Figure 5-2-2: Graph of dissolved oxygen concentrations - Lower sites.

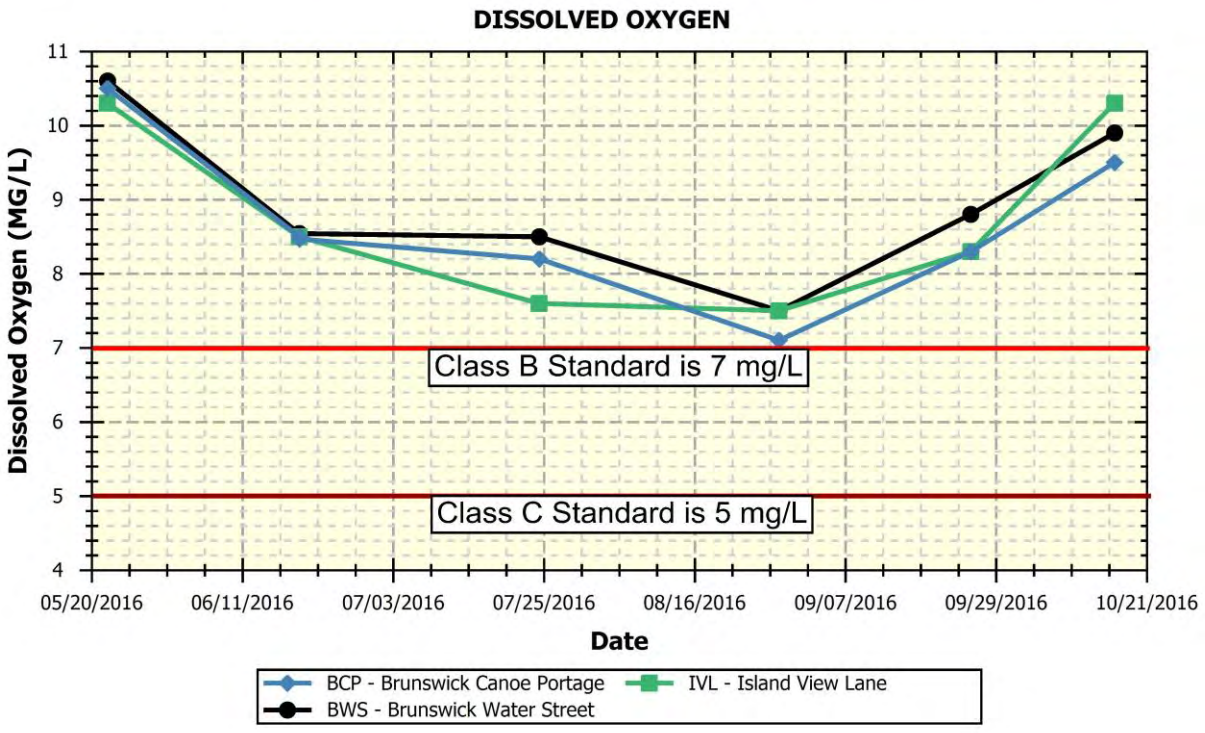


Figure 5-2-3: Graph of dissolved oxygen concentrations - Upper sites.

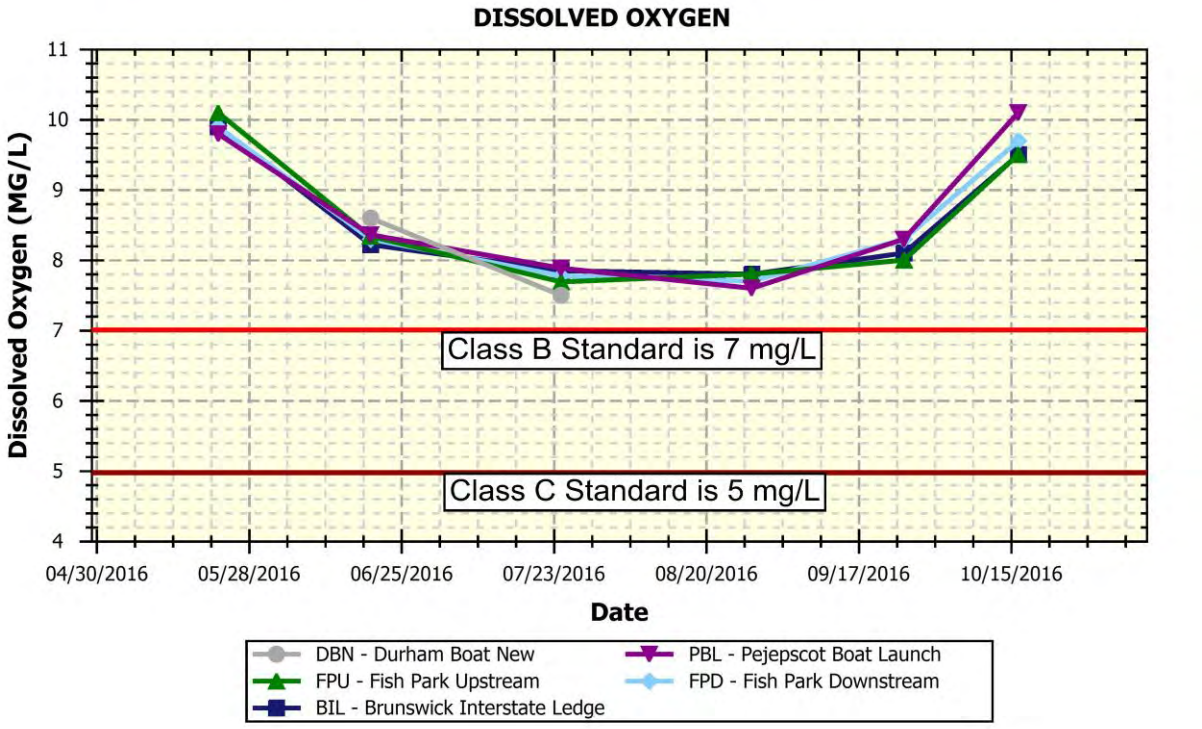


Figure 5-2-4: Graph of dissolved oxygen saturation - Lower sites.

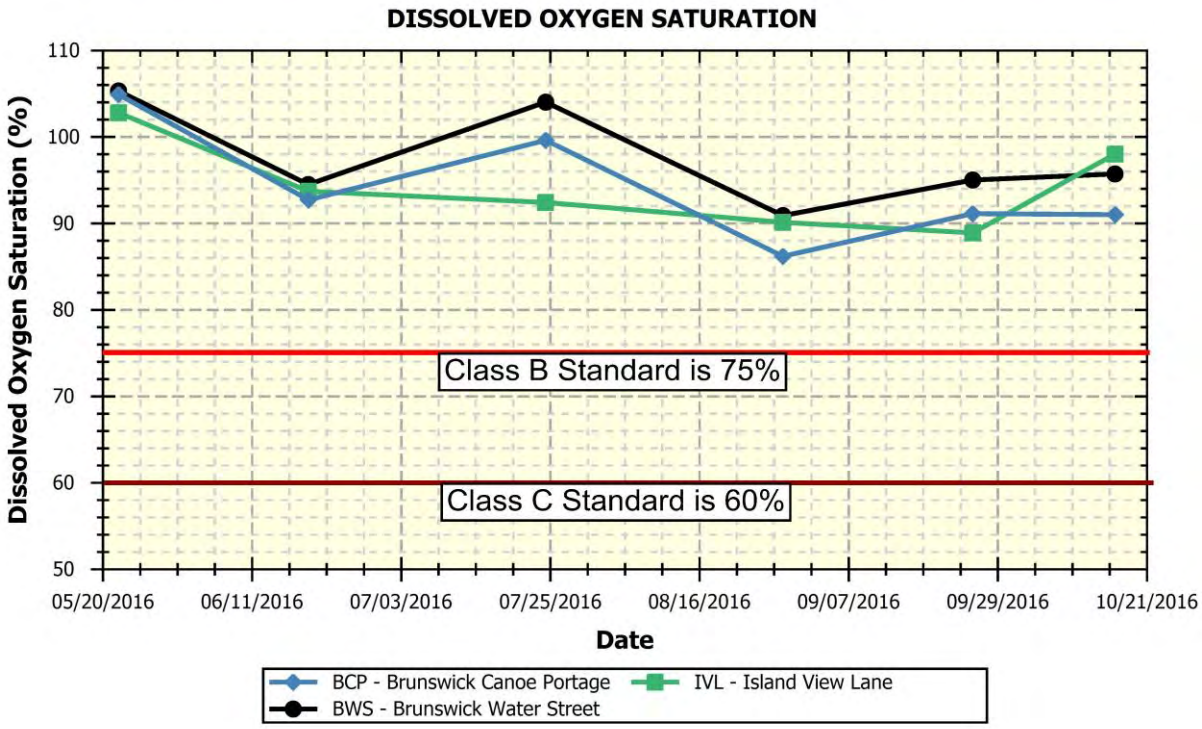
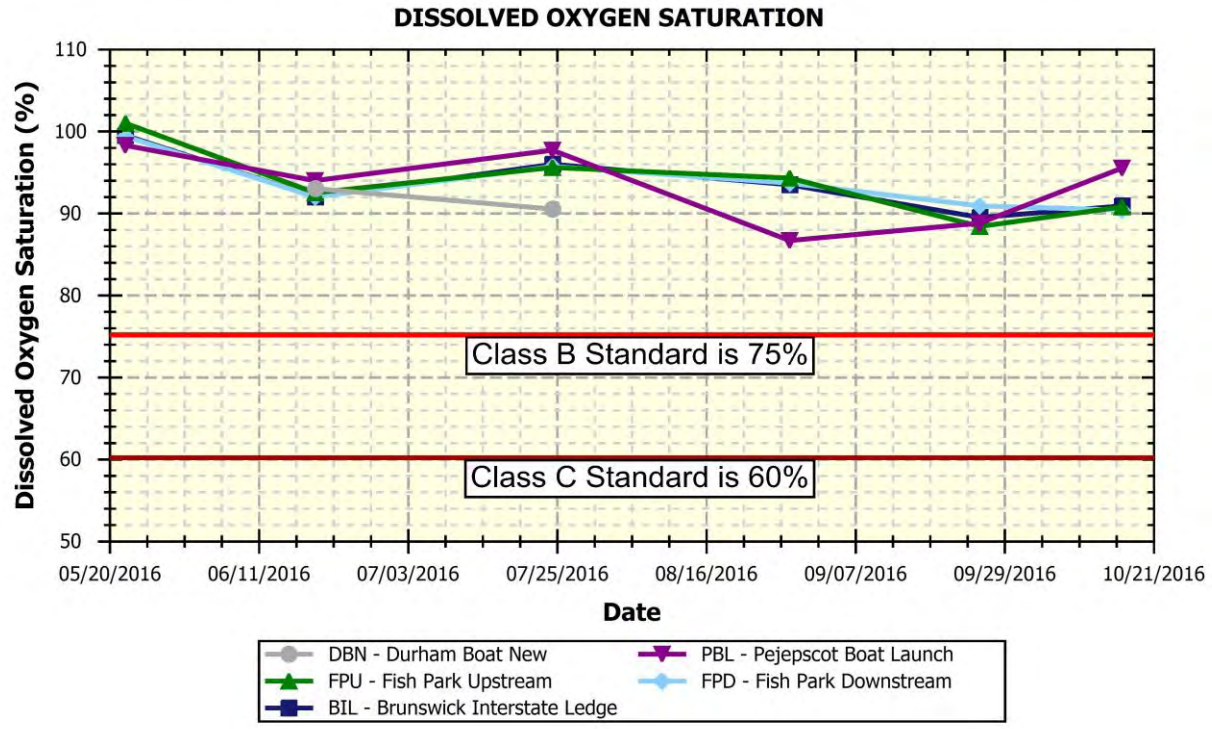


Figure 5-2-5: Graph of dissolved oxygen saturation - Upper sites.



Water Temperature

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.

2016 Results

Temperatures at the three lowest sampling sites (BCP, BWS and IVL) were similar with highest temperatures occurring in July and August (24˚ - 25˚ C). Temperature was similar at the five sampling sites above (BIL, FPD, FPU, IVL, and PBL) with highest readings occurring in July and August also (23˚ - 26˚ C). Since measurements are taken close to the surface [mid-depth (1 - 1.5 ft.)], it is not surprising that temperatures can get quite warm in July and August in the large open river.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
DBN	C	2	22.2	19.2	25.1	n/a	n/a
PBL	C	6	19.0	13.3	24.5	n/a	n/a
FPU	C	6	19.0	9.9	25.1	n/a	n/a
FPD	C	6	18.5	9.6	25.0	n/a	n/a
BIL	C	6	19.6	10.1	25.6	n/a	n/a
BCP	C	6	19.4	13.0	24.5	n/a	n/a
BWS	C	6	19.4	13.0	24.9	n/a	n/a
IVL	C	6	19.2	13.0	24.0	n/a	n/a

Figure 5-2-6: Graph of temperature - Lower sites.

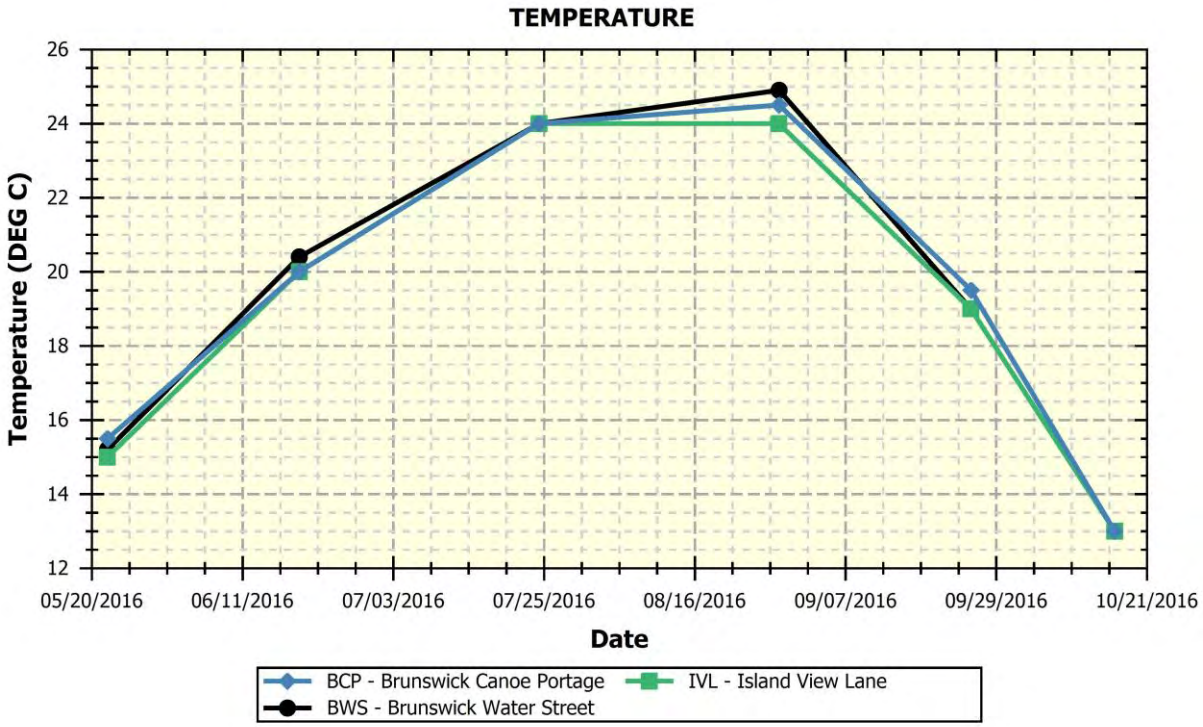
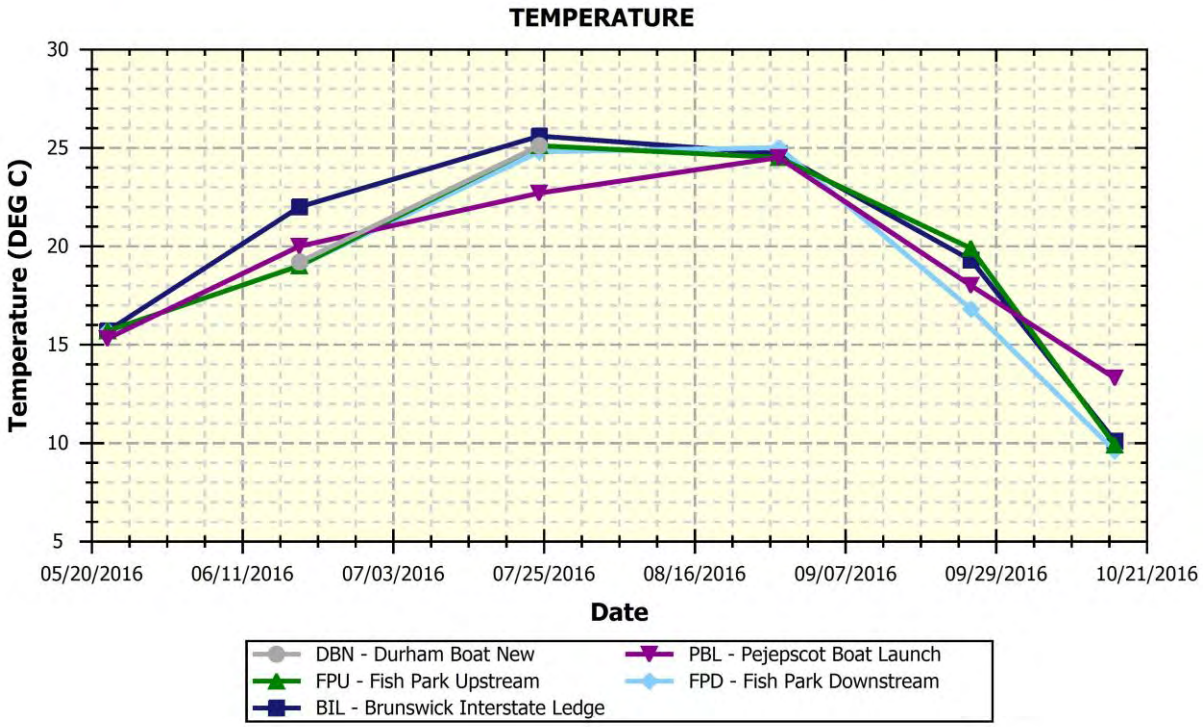


Figure 5-2-7: Graph of temperature - Upper sites.



Specific Conductance

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.

2016 Results

Specific conductance was measured two to six times at the sampling sites with measurements ranging from 67-165 µS/cm. Specific conductance increased as the season progressed with maximum values occurring in August when values were slightly elevated. Specific conductance overall is good.

Table 5-2-5: A summary of minimum, maximum, and mean specific conductance values (micro-ohms/cm, µS/cm) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
DBN	C	2	101	84	117	n/a	n/a
PBL	C	6	114	70	152	n/a	n/a
FPU	C	6	116	67	145	n/a	n/a
FPD	C	6	119	68	154	n/a	n/a
BIL	C	6	117	68	148	n/a	n/a
BCP	C	6	123	74	163	n/a	n/a
BWS	C	6	134	97	165	n/a	n/a
IVL	C	6	127	82	160	n/a	n/a

Figure 5-2-8: Graph of specific conductance - Lower sites.

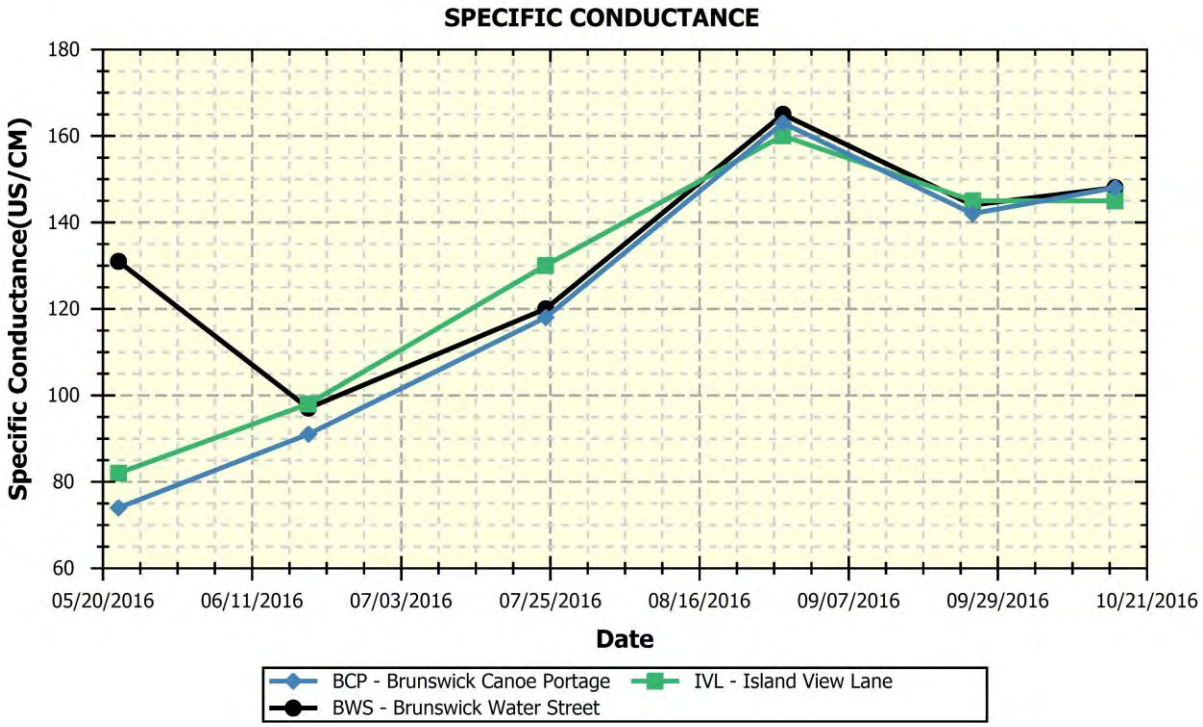
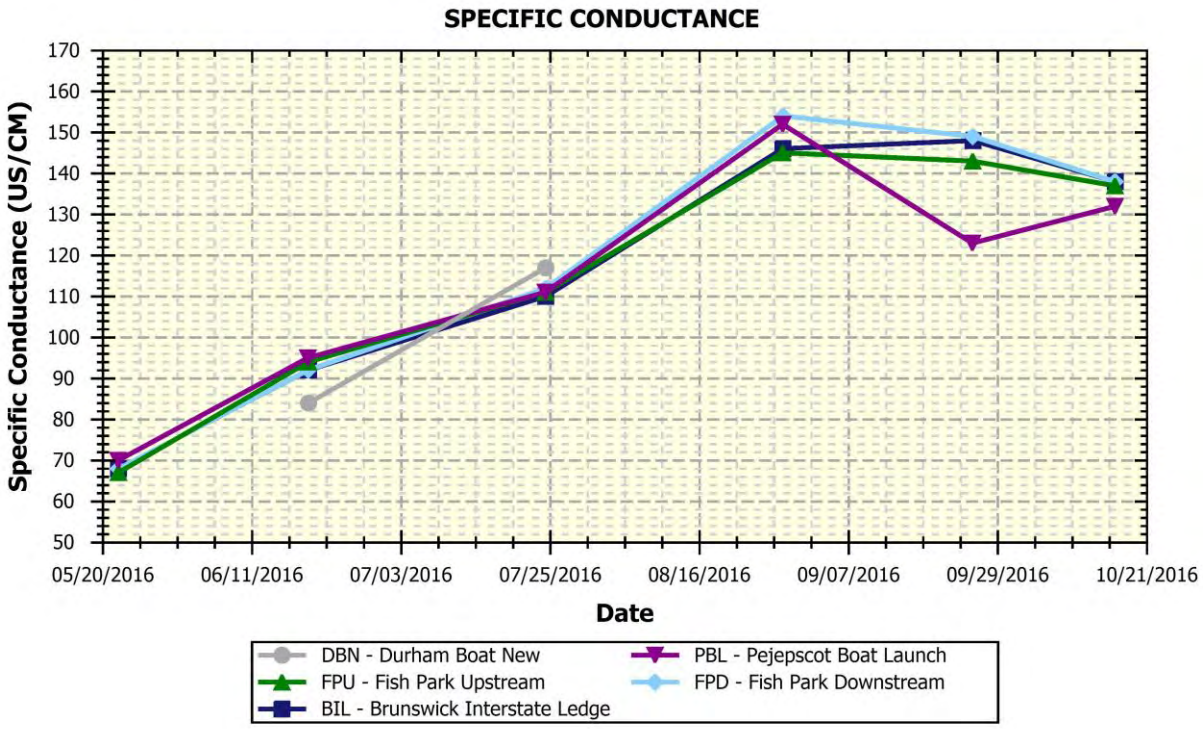


Figure 5-2-9: Graph of specific conductance - Upper sites.



Bacteria

Escherichia coli (E. coli) bacteria are used as the indicator organism for freshwater. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms, including bacteria and viruses, which 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 it is more appropriate to use geometric mean for something like bacteria where there may be one or more very high or low values that can skew the mean.

2016 Results

***Escherichia coli* bacteria were sampled two to six times at eight sampling sites. Weather conditions were clear to overcast on all sample dates and previous 24 hours with the exception of the July date when there was rain the previous day. According to local Weather Underground stations, approximately 0.25-0.5" fell the day before the July sample date. None of the sample sites exceeded the Class B and Class C bacteria instantaneous criterion of 236 (MPN/100ml). The Class C geometric mean criterion of 126 (MPN/100ml) was not exceeded at any of the sites. The Class B geometric mean criterion of 64 (MPN/100ml) was not exceeded at any of the sites. Typically high bacteria levels are associated with stormwater runoff and/or combined sewer overflows. None of the sample dates coincided with any significant rainfall, which may explain why bacteria concentrations were low. FOMB suggests that high bacteria levels also may reflect the seasonal September cessation of chlorine inputs by wastewater treatment plants along the river. Because bacteria counts are typically lower in colder water, treatment plants are only required to chlorinate May - September. However in 2017, bacteria levels were only slightly elevated at two sites in October. Overall, bacteria levels are excellent for the dates that were sampled.**

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	Class	# Sample Points	Geometric Mean*	Minimum	Maximum	Criterion Inst/Geo	# Exceeding Criterion
DBN	C	2	17	17	20	236/126	0
PBL	C	6	19	9	72	236/126	0
FPU	C	6	8	1	16	236/126	0
FPD	C	6	7	4	17	236/126	0
BIL	C	6	9	6	23	236/126	0
BCP	C	6	8	2	17	236/126	0
BWS	C	6	16	9	31	236/126	0
IVL	C	6	24	8	82	236/126	0

***Geometric mean includes October results (beyond the criteria inclusion date range of September 30).**

Figure 5-2-10: Graph of *E. coli* (MPN/100 ml) - Lower sites.

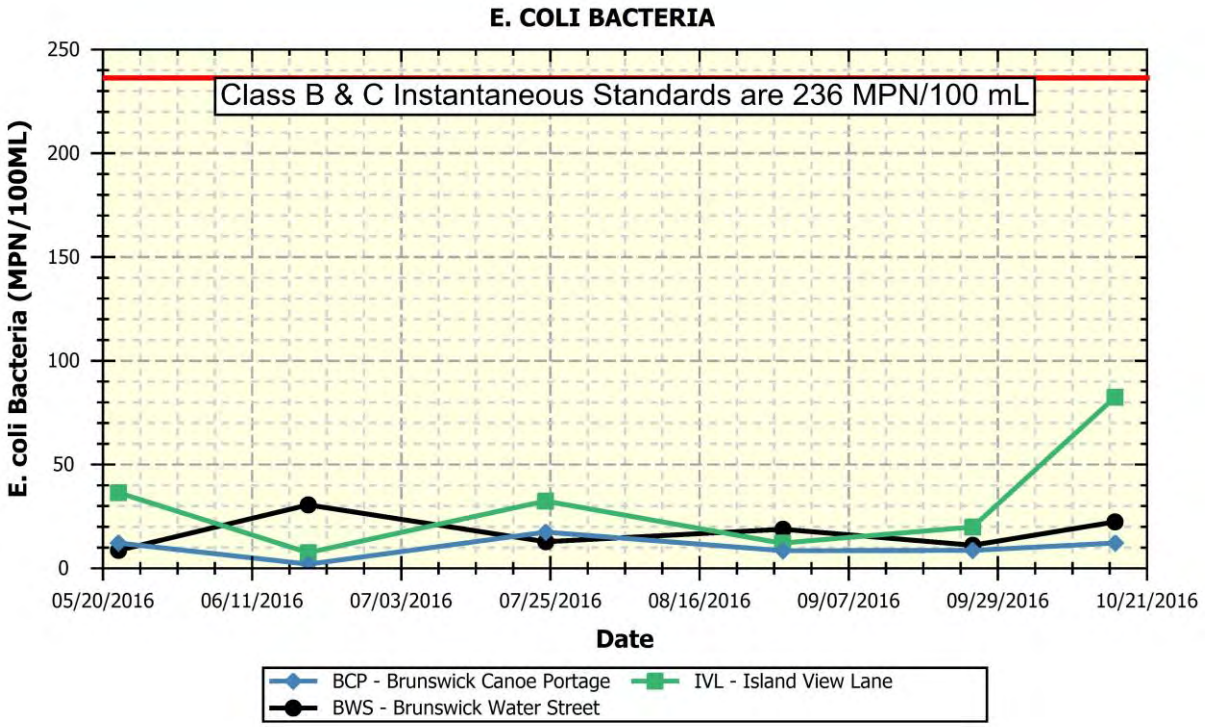
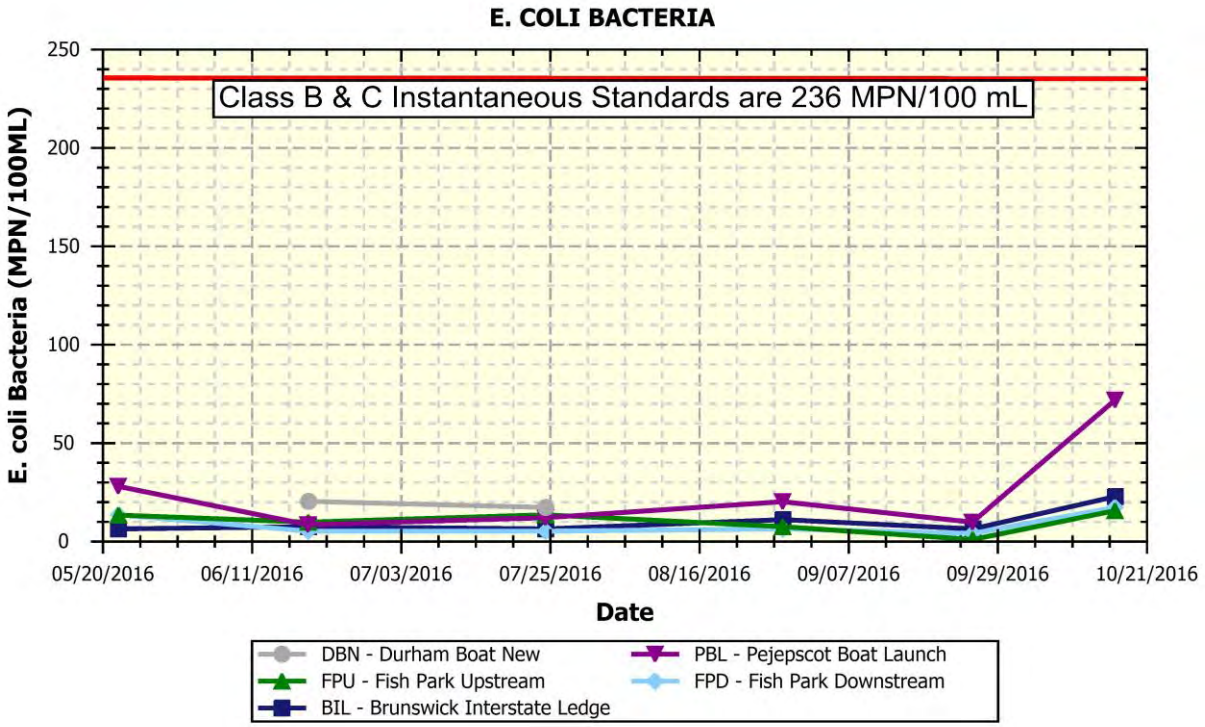


Figure 5-2-11: Graph of *E. coli* (MPN/100 ml) - Upper sites.



Discussion and Recommendations

There are numerous sources of pollution and other stresses to the Androscoggin River sites monitored by 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 to include streams draining to the Androscoggin River.**
- **Bacteria monitoring should continue to include a mix of sampling events to include both dry and runoff events. If possible, volunteer leaders could try to collect one to two 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. FOMB might consider sampling two times per month in July and August.**

Appendix A-1

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

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

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)
Androscoggin River (lower)- Friends of Merrymeeting Bay: Approved Sites																
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	6/19/2016	8:00 AM	NA			19.2	93.0	8.6	84					20.4	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	7/24/2016	7:55 AM	NA			25.1	90.5	7.5	117					17.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/22/2016	6:45 AM	NA			15.3	98.3	9.8	70					27.9	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/22/2016	6:45 AM	D			15.3	98.3	9.8	70					12.2	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/19/2016	6:30 AM	NA			20.0	94.0	8.4	95					8.5	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/24/2016	6:40 AM	NA			22.7	97.7	7.9	111					12	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/28/2016	6:15 AM	NA			24.5	86.7	7.6	152					20.1	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	9/25/2016	6:30 AM	NA			18.0	88.8	8.3	123					9.7	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/16/2016	6:45 AM	NA			13.3	95.5	10.1	132					71.7	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	5/22/2016	7:25 AM	NA			15.7	101.0	10.1	67					13.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	6/19/2016	7:10 AM	NA			19.0	92.5	8.3	94					9.8	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/24/2016	7:16 AM	NA			25.1	95.6	7.7	111					13.5	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	8/28/2016	6:45 AM	NA			24.5	94.3	7.8	145					7.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	8/28/2016	6:45 AM	D			24.5	94.7	7.7	153					7.5	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	9/25/2016	7:05 AM	NA			19.9	88.4	8.0	143					1	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	9/25/2016	7:05 AM	D			19.8	88.3	8.0	135					4.1	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	10/16/2016	7:10 AM	NA			9.9	90.8	9.5	137					15.6	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/22/2016	7:35 AM	NA			15.7	99.4	9.9	68					13.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/19/2016	7:38 AM	NA			19.0	92.0	8.3	92					5.2	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	7/24/2016	7:24 AM	NA			24.8	95.7	7.8	112					5.2	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	8/28/2016	7:05 AM	NA			25.0	93.7	7.7	154					6.3	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	9/25/2016	7:30 AM	NA			16.8	90.9	8.3	149					4.1	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/16/2016	7:25 AM	NA			9.6	90.4	9.7	138					17.3	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/16/2016	7:25 AM	D			10.1	95.0	9.8	139					22.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/22/2016	8:00 AM	NA			15.7	99.5	9.9	68					6.3	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/19/2016	8:00 AM	NA			22.0	92.0	8.2	92					7.5	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/24/2016	7:47 AM	NA			25.6	96.0	7.9	110					6.3	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/24/2016	7:47 AM	D			25.8	95.4	7.8	112					10.9	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	8/28/2016	7:40 AM	NA			24.7	93.5	7.8	146					11	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/25/2016	7:55 AM	NA			19.3	89.5	8.1	148					6.3	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	10/16/2016	7:50 AM	NA			10.1	90.9	9.5	138					22.8	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	5/22/2016	7:50 AM	NA			15.5	104.9	10.5	74					12.1	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	6/19/2016	7:52 AM	NA			20.0	92.7	8.5	91					2	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	6/19/2016	7:52 AM	D			20.0	92.7	8.5	91					12.1	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	7/24/2016	7:45 AM	NA			24.0	99.6	8.2	118					17.3	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	8/28/2016	7:30 AM	NA			24.5	86.2	7.1	163					8.4	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	9/25/2016	7:31 AM	NA			19.5	91.1	8.3	142					8.5	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	10/16/2016	7:32 AM	NA			13.0	91.0	9.5	148					12.1	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	5/22/2016	7:30 AM	NA			15.2	105.3	10.6	131					8.5	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	6/19/2016	7:23 AM	NA			20.4	94.5	8.5	97					30.5	

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)
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	7/24/2016	7:20 AM	NA			24.0	104.0	8.5	120					12.8	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	8/28/2016	7:10 AM	NA			24.9	90.9	7.5	165					18.7	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	9/25/2016	7:18 AM	NA			19.0	95.0	8.8	144					11	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	10/16/2016	7:12 AM	NA			13.0	95.7	9.9	148					22.3	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	5/22/2016	6:58 AM	NA			15.0	102.8	10.3	82					36.4	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	6/19/2016	6:50 AM	NA			20.0	93.7	8.5	98					7.5	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	7/24/2016	6:50 AM	NA			24.0	92.4	7.6	130					32.3	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	8/28/2016	6:45 AM	NA			24.0	90.1	7.5	160					12.1	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	8/28/2016	6:45 AM	D											12	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	9/25/2016	6:55 AM	NA			19.0	88.9	8.3	145					19.9	
IVL	ANDROSCOGGIN RIVER - A-45 - VRMP	10/16/2016	6:47 AM	NA			13.0	98.0	10.3	145					82.3	

Section 5-2
Androscoggin River (Friends of Merrymeeting Bay)

Androscoggin River

The Androscoggin River is the third largest river in the state of Maine. It has a length of 177 miles and drainage area of 3,450 square miles (2,730 sq. mi. in Maine).[1] The Androscoggin River's 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 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 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 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.

Friends of Merrymeeting Bay (FOMB) is a nonprofit organization that focuses on the lower part of the Androscoggin River and other waterbodies draining into Merrymeeting Bay. FOMB has been in existence since 1975 and its mission is "to preserve, protect and improve the unique ecosystem of Merrymeeting Bay"[3].

[1] Maine Rivers Website- Androscoggin River Profile
[2] Androscoggin River Alliance Website- Androscoggin River slideshow
[3] Friends of Merrymeeting Bay website

Monitoring History

• The Maine Department of Environmental Protection's (DEP) Biological Monitoring Program has been monitoring the lower Androscoggin River since 1984. This data is available on DEP's website.

• The lower Androscoggin River is monitored by Friends of Merrymeeting Bay (FOMB). 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 where possible.

• 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.

• In 2010, a water quality model to predict the effect of discharges and river flows on attainment of Maine's Water Quality Standards was developed for the lower Androscoggin River by the Maine DEP. The model report and data are available on DEP's website.

Methods and Sampling Sites

Volunteers monitor the Androscoggin River at eight sites on the main stem. All of the sites are now VRMP approved sites. In 2015, FOMB added site Durham Boat New (DBN) to replace Durham Boat Launch (DBL) and in 2016 added site Island View Lane (IVL) to replace site Bay Bridge Jetty (BBB).

Monitoring is conducted once a month from May through October. Monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Specific conductance is measured using either a YSI meter or an Oakton EC 11+/11 Testr pen. Samples are collected for *E. coli* bacteria and transported to Bowdoin College for analysis by FOMB volunteers using the IDEXX Colilert system.

Table 5-2-1: Friends of Merrymeeting Bay sampling sites at Androscoggin River, listed from upstream to downstream.

VRMP Site ID	Organization Site Code	Sample Location	Class
Androscoggin River-A149-VRMP	DBN	Durham Boat New	C
Androscoggin River-A71-VRMP	PBL	Pejepscot Boat Launch	C
Androscoggin River-A47-VRMP	FPU	Fish Park Upstream	C
Androscoggin River-A45-VRMP	FPD	Fish Park Downstream	C
Androscoggin River-A24-VRMP	BIL	Brunswick Interstate Ledges	C
Androscoggin River-A06-VRMP	BCP	Brunswick Canoe Portage	C
Androscoggin River-A281-VRMP	BWS	Brunswick Water Street	C
Androscoggin River-A-45-VRMP	IVL	Island View Lane	C

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.

Results

Refer to Appendix A for discussion of individual site data and trends.

Dissolved Oxygen

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, this will affect the dissolved oxygen.

Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60% saturation. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

2017 Results

Dissolved oxygen (DO) was measured six times from May through October at seven sampling sites. At all the sites, DO concentration was above the Class C criterion of 5 mg/l. It was also above the Class B criterion of 7 mg/l at all sites, except for site FPD which had 1 value slightly below 7 mg/l in late July. Dissolved oxygen percent saturation was above the Class C criterion of 60% saturation for all dates and above Class B criterion of 75% saturation for all dates. Overall, sites BCP, BWS and IVL are very similar to each other. The sites upstream (BIL, FPD, FPU, and PBL) are also very similar. Dissolved oxygen was good to excellent overall.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
DBN	C	-	-	-	-	-	-
PBL	C	6	8.5	7.4	10.0	5ppm	0
FPU	C	6	8.4	7.0	10.1	5ppm	0
FPD	C	6	8.5	6.9	10.3	5ppm	0
BIL	C	6	8.4	7.1	10.2	5ppm	0
BCP	C	6	8.5	7.3	10.4	5ppm	0
BWS	C	6	8.6	7.4	10.7	5ppm	0
IVL	C	6	8.5	7.0	10.6	5ppm	0

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
DBN	C	-	-	-	-	n/a	n/a
PBL	C	6	92.9	88.8	99.8	60%	0
FPU	C	6	92.9	88.8	99.8	60%	0
FPD	C	6	91.8	83.9	101.3	60%	0
BIL	C	6	90.7	83.7	100.7	60%	0
BCP	C	6	91.4	86.8	102.6	60%	0
BWS	C	6	93.5	87.6	104.9	60%	0
IVL	C	6	91.3	83.3	102.8	60%	0

Figure 5-2-2: Graph of dissolved oxygen concentrations - Lower sites.

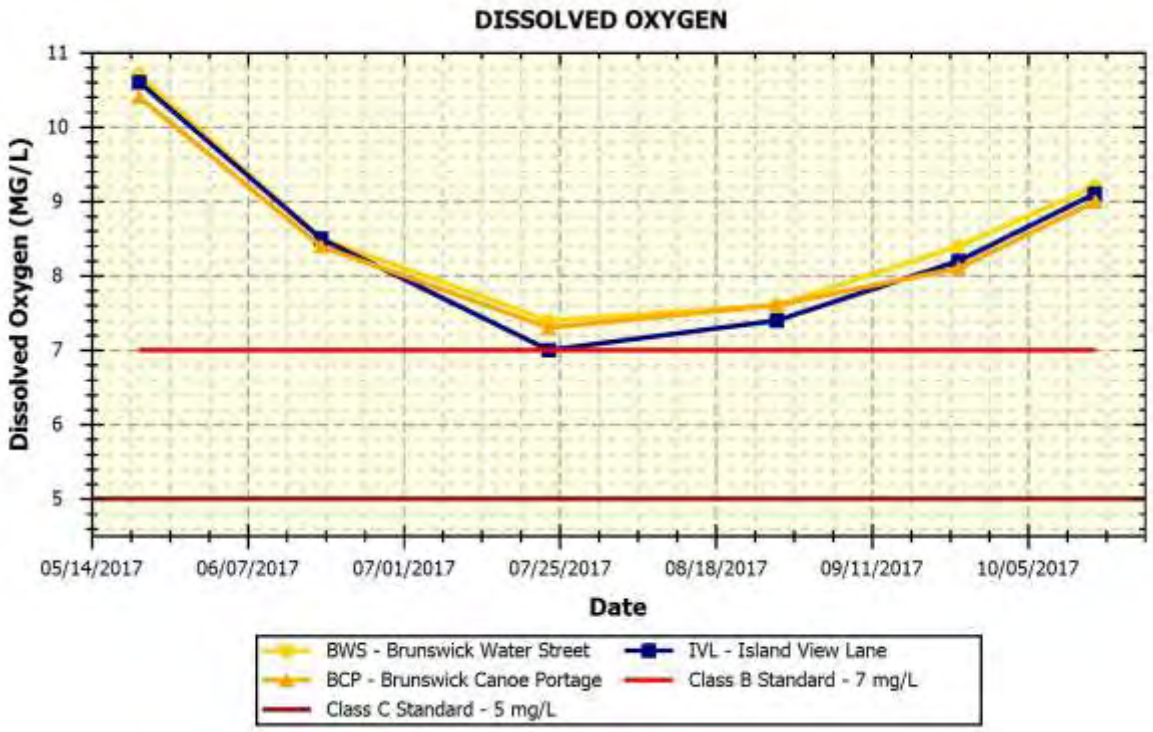


Figure 5-2-3: Graph of dissolved oxygen concentrations - Upper sites.

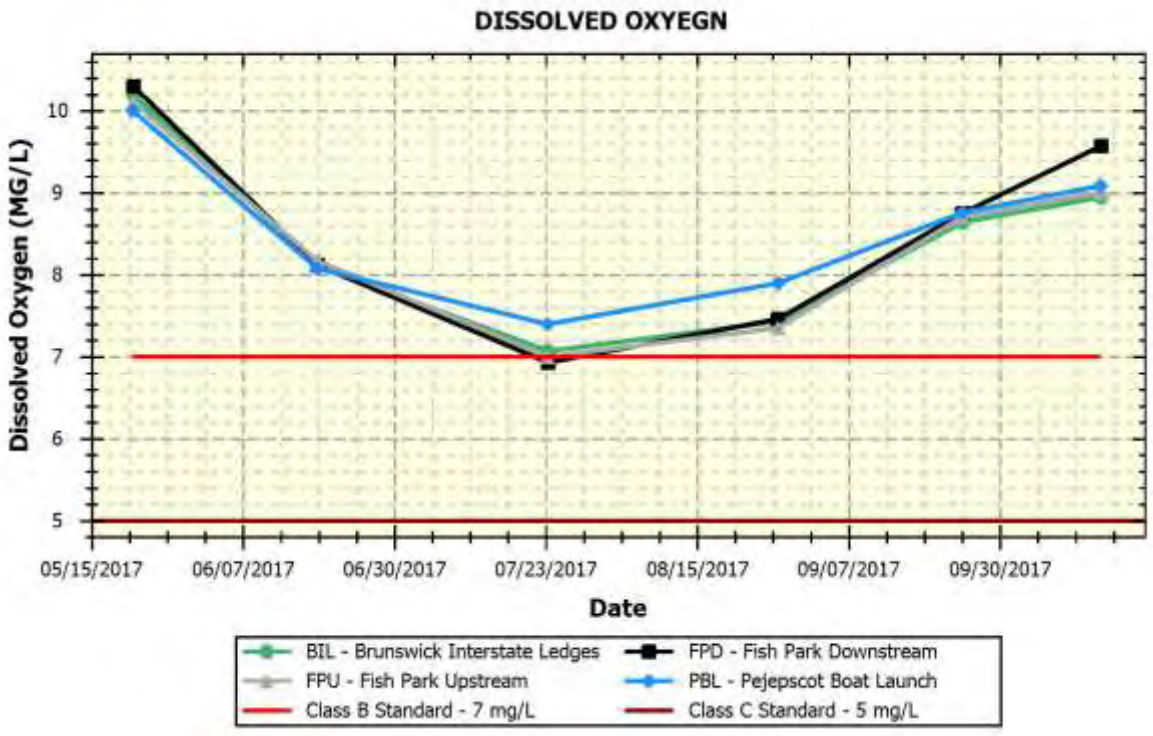


Figure 5-2-4: Graph of dissolved oxygen saturation - Lower sites.

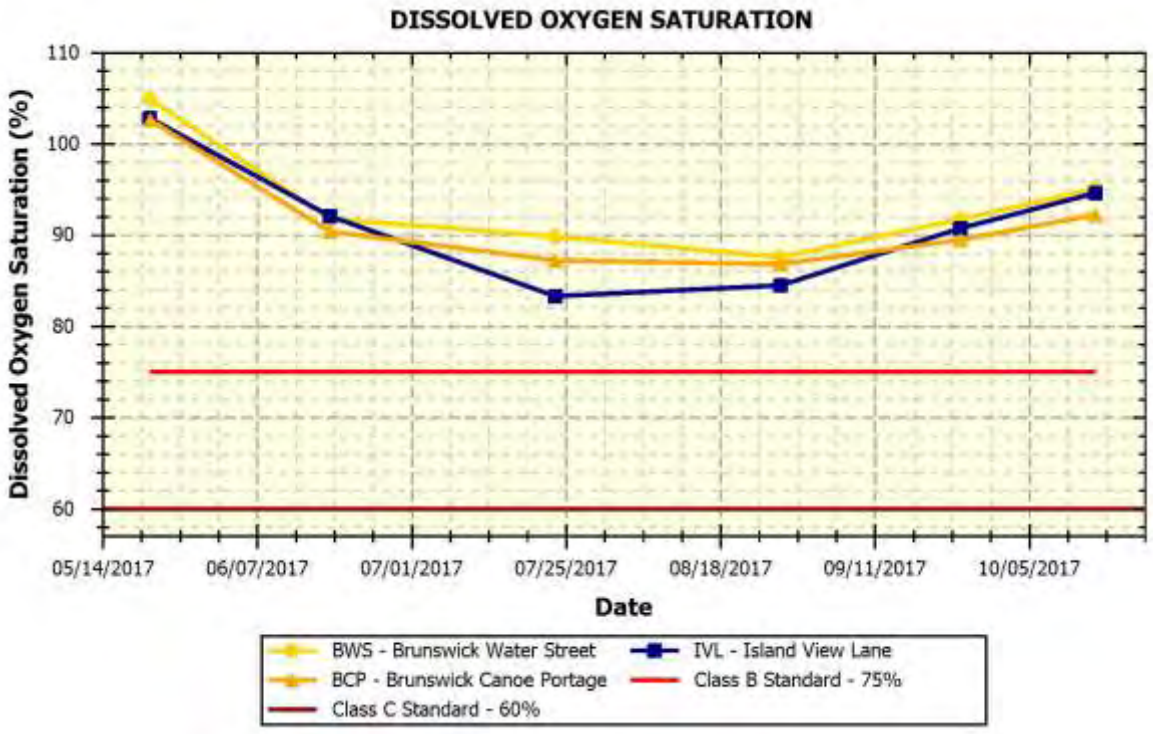
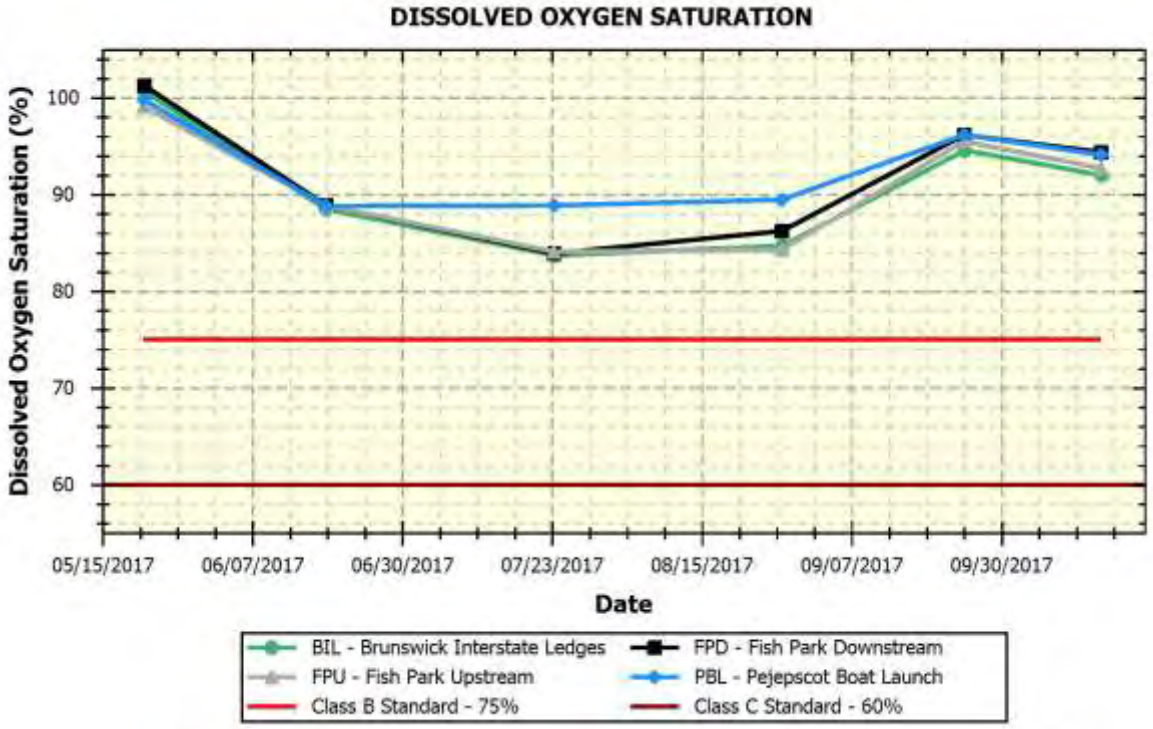


Figure 5-2-5: Graph of dissolved oxygen saturation - Upper sites.



Water Temperature

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.

2017 Results

Temperatures at the three lowest sampling sites (BCP, BWS and IVL) were quite similar with highest temperatures occurring in July and August (20˚ - 25˚ C). Temperature was similar at the five sampling sites above (BIL, FPD, FPU, PBL and DBN) with highest readings occurring in July and August also (22˚ - 25˚ C). Since measurements are taken close to the surface (1.5 - 3 ft.), it is not surprising that temperatures can get quite warm in July and August in the large open river.

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

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
DBN	C	4	19.7	15.5	23.4	n/a	n/a
PBL	C	6	19.4	14.3	24.8	n/a	n/a
FPU	C	6	19.5	14.7	24.7	n/a	n/a
FPD	C	6	19.6	14.7	24.8	n/a	n/a
BIL	C	6	19.4	14.7	24.6	n/a	n/a
BCP	C	6	19.5	14.6	24.6	n/a	n/a
BWS	C	6	19.0	14.3	25.0	n/a	n/a
IVL	C	6	19.5	14.2	24.4	n/a	n/a

Figure 5-2-6: Graph of temperature - Lower sites.

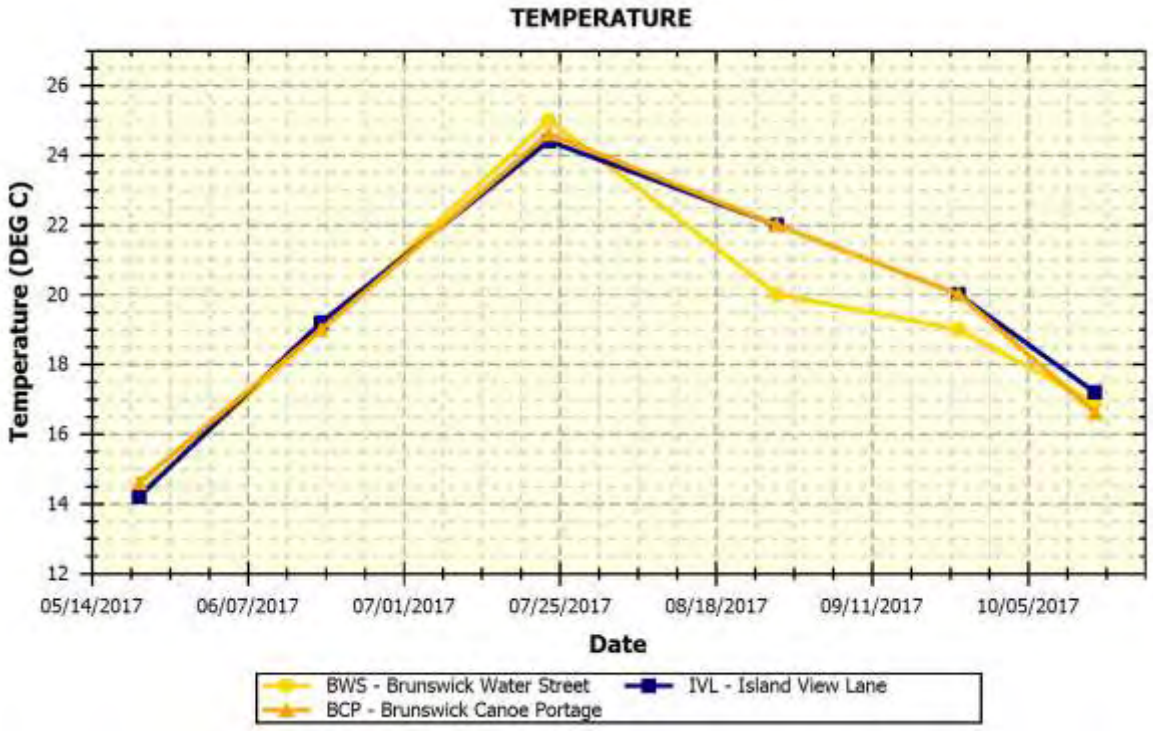
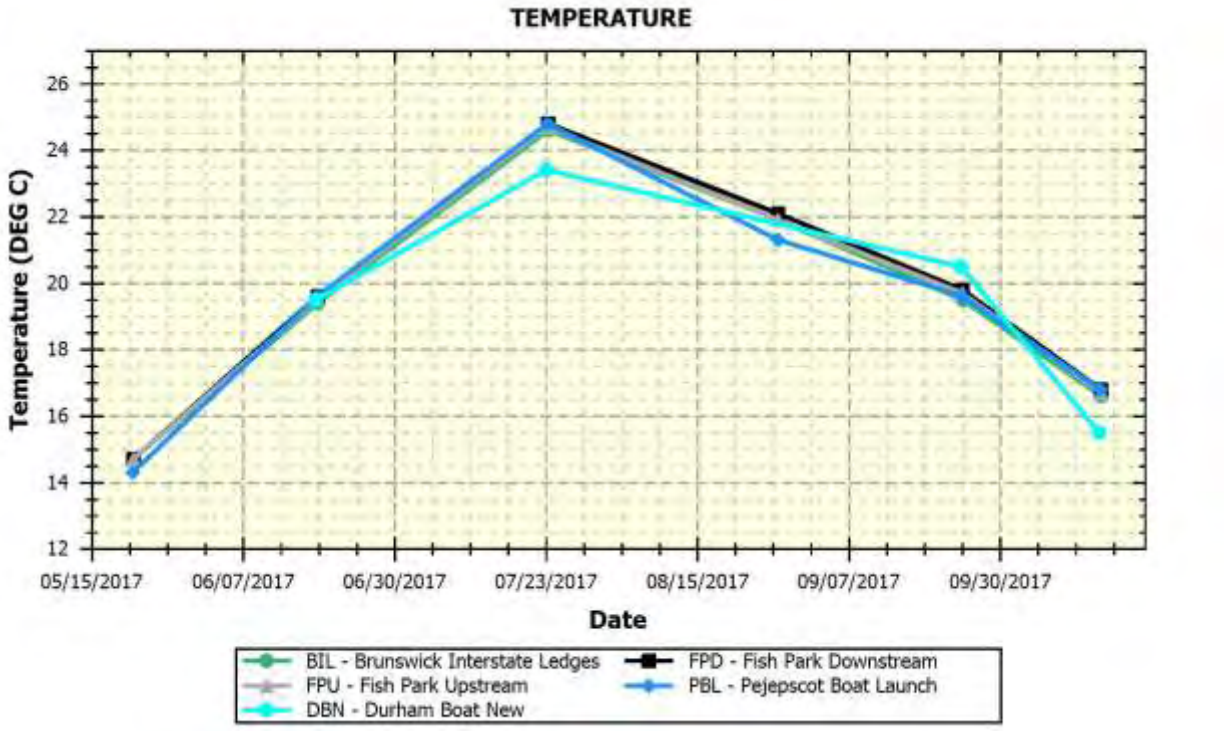


Figure 5-2-7: Graph of temperature - Upper sites.



Specific Conductance

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.

2017 Results

Specific conductance was measured six times at the sampling sites with measurements ranging from 40-120 µS/cm. Specific conductance increased as the season progressed with maximum values occurring in August-October when values were slightly elevated. Specific conductance overall is low.

Table 5-2-5: A summary of minimum, maximum, and mean specific conductance values (micro-ohms/cm, µS/cm) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

Site	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
DBN	C	-	-	-	-	n/a	n/a
PBL	C	6	93	50	120	n/a	n/a
FPU	C	6	87	40	120	n/a	n/a
FPD	C	6	87	40	120	n/a	n/a
BIL	C	6	87	40	120	n/a	n/a
BCP	C	6	92	50	120	n/a	n/a
BWS	C	6	98	70	120	n/a	n/a
IVL	C	6	88	40	120	n/a	n/a

Figure 5-2-8: Graph of specific conductance - Lower sites.

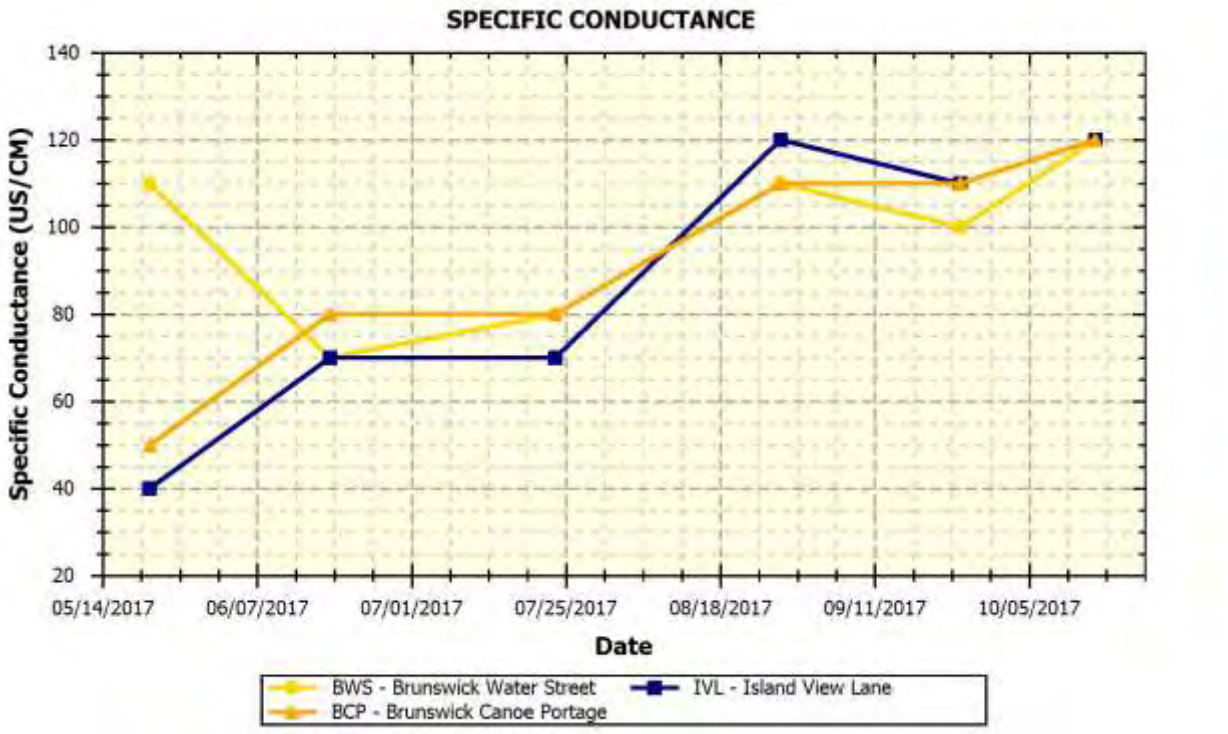
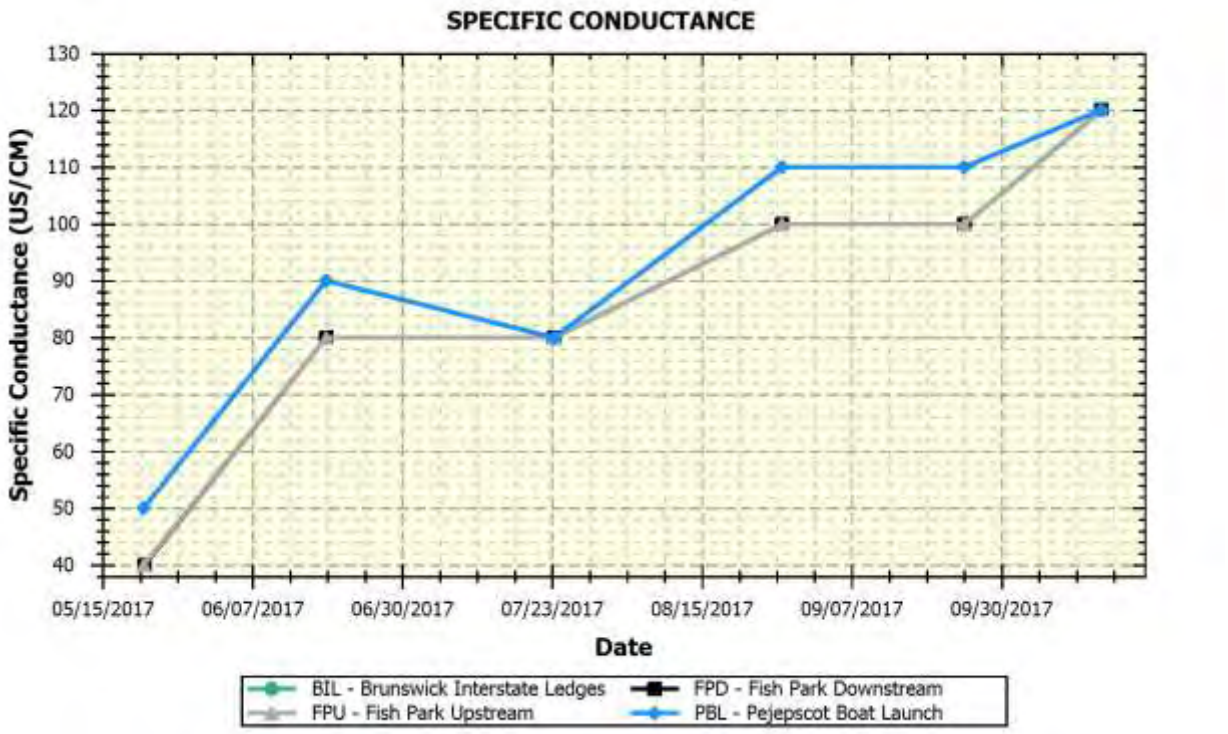


Figure 5-2-9: Graph of specific conductance - Upper sites.



Bacteria

Escherichia coli (E. coli) bacteria are used as the indicator organism for freshwater. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms, including bacteria and viruses, which 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 it is more appropriate to use geometric mean for something like bacteria where there may be one or more very high or low values that can skew the mean.

2017 Results

***Escherichia coli* bacteria were sampled four to six times at eight sampling sites. Weather conditions were clear to light rain on all sample dates and previous 24 hours. All of the sample sites exceeded the Class B and Class C bacteria instantaneous criterion of 236 (MPN/100ml) on 1 date (October), except for site IVL which was elevated. The Class C geometric mean criterion of 126 (MPN/100ml) was not exceeded at any of the sites. The Class B geometric mean criterion of 64 (MPN/100ml) was not exceeded at any of the sites. Typically, high bacteria levels are associated with stormwater runoff and/or combined sewer overflows. None of the sample dates coincided with any significant rainfall, which may explain why bacteria concentrations were low with the exception of the October date. FOMB suggests that high bacteria levels also may reflect the seasonal September cessation of chlorine inputs by wastewater treatment plants along the river. Because bacteria counts are**

typically lower in colder water, treatment plants are only required to chlorinate May - September. Overall, bacteria levels are excellent for the dates except in October.

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	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo)	# Exceeding Criterion
DBN	C	E. Coli	4	11	10	345	236/126	1
PBL	C	E. Coli	6	15	7	1300	236/126	1
FPU	C	E. Coli	6	15	5	1986	236/126	1
FPD	C	E. Coli	6	14	7	1986	236/126	1
BIL	C	E. Coli	6	15	7	1986	236/126	1
BCP	C	E. Coli	6	21	9	1046	236/126	1
BWS	C	E. Coli	6	22	10	727	236/126	1
IVL	C	E. Coli	6	27	13	214	236/126	0

***Geometric mean excludes October results (beyond the criteria inclusion date range of May 15-September 30). Maximum values beyond the range were included in the table and graphs.**

Figure 5-2-10: Graph of *E. coli* (MPN/100 ml) - Lower sites.

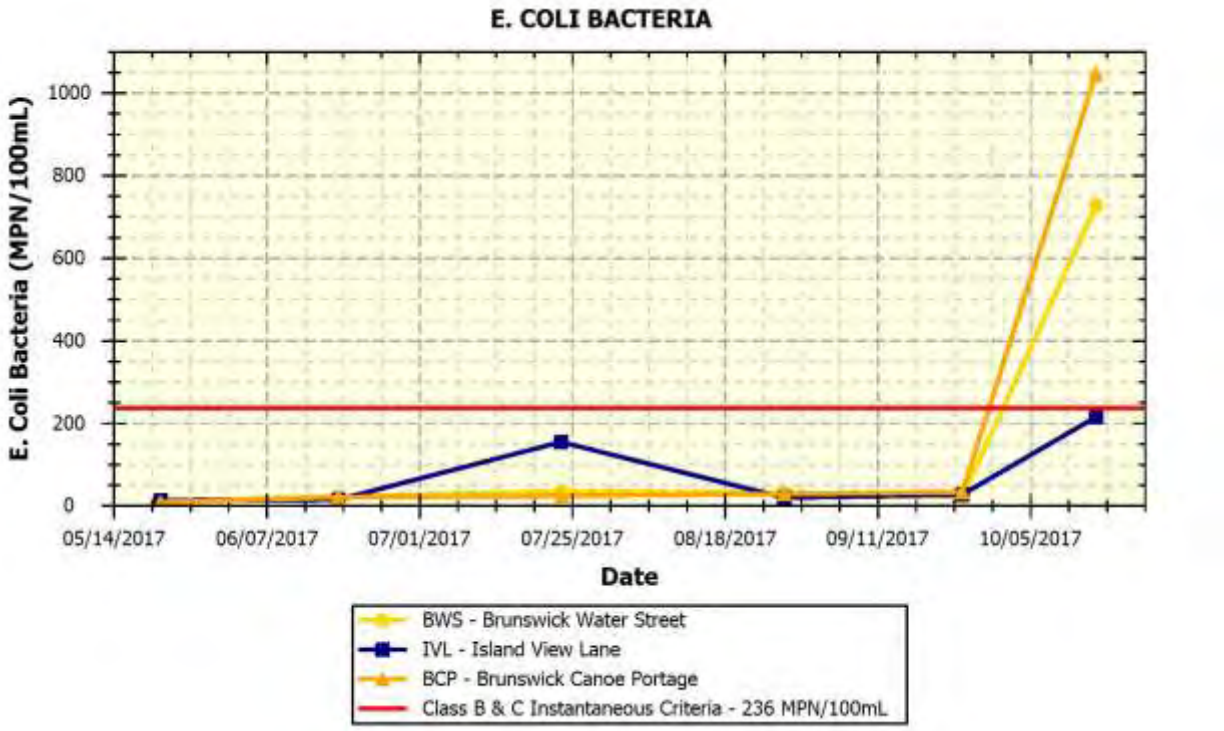
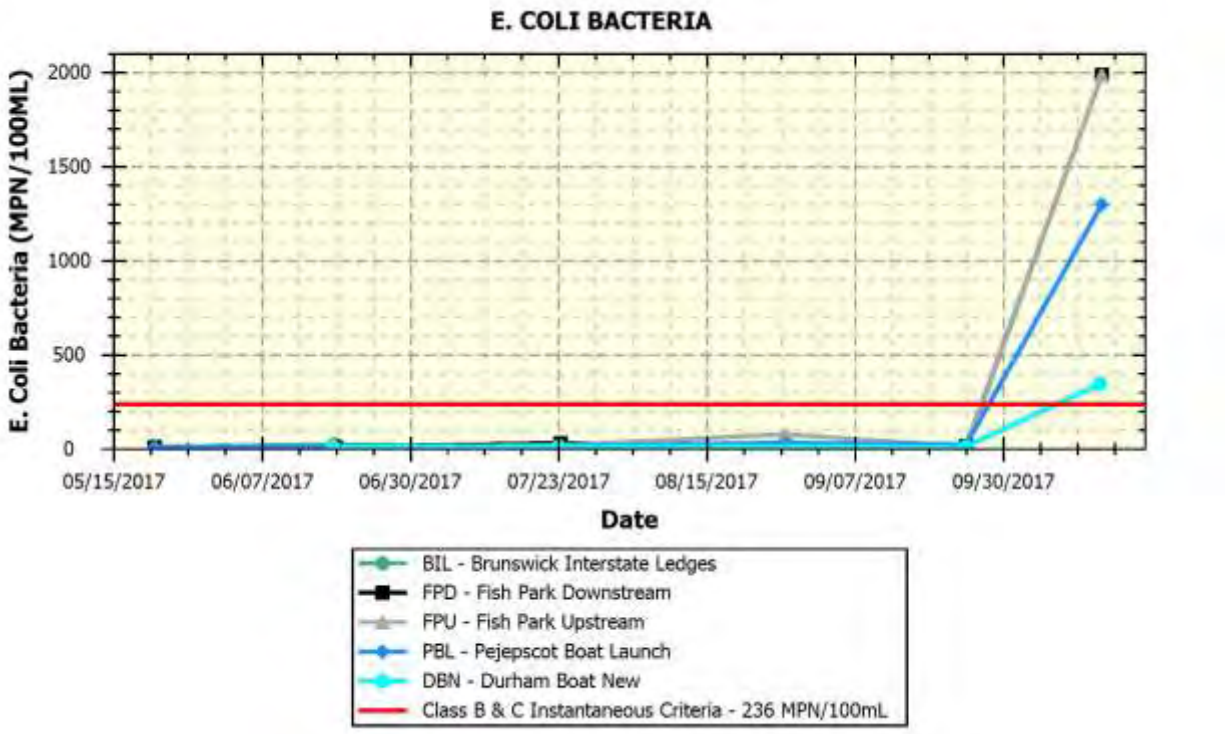


Figure 5-2-11: Graph of *E. coli* (MPN/100 ml) - Upper sites.



Discussion and Recommendations

There are numerous sources of pollution and other stresses to the Androscoggin River sites monitored by 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 to include streams draining to the Androscoggin River.**
- **Bacteria monitoring should continue to include a mix of sampling events to include both dry and runoff events. If possible, volunteer leaders could try to collect one to two 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. FOMB might consider sampling two times per month in July and August.**

Appendix A

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

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

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	** D.O. (MG/L)	** D.O. Sat. (%)	** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	** TDS (MG/L)	** TSS (MG/L)	E. coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River (lower) - Friends of Merrymeeting Bay: Approved Sites																
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	5/21/2017	7:23 AM	NA			14.6	10.4	102.6	50					8.6	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	6/18/2017	7:05 AM	NA			19.0	8.4	90.4	80					20.1	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	7/23/2017	7:50 AM	NA			24.6	7.3	87.2	80					24.6	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	8/27/2017	8:00 AM	NA			22.0	7.6	86.8	110					29.2	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	8/27/2017	8:00 AM	D			22.0	7.6	86.8	110					16	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	9/24/2017	7:35 AM	NA			20.0	8.1	89.5	110					32.7	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	10/15/2017	7:45 AM	NA			16.6	9.0	92.2	120					1046.2	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	6/18/2017		NA			19.5								9.8	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	6/18/2017		D											11	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	7/23/2017		NA			23.4								13.4	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	9/24/2017		NA			20.5								9.8	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	10/15/2017		NA			15.5								344.8	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/21/2017	8:00 AM	NA			14.7	10.2	100.7	40					7.4	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/18/2017	7:30 AM	NA			19.4	8.1	88.5	80					21.6	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/23/2017	7:35 AM	NA			24.6	7.1	83.7	80					12.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	8/27/2017	7:07 AM	NA			21.9	7.4	84.7	100					31.3	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/24/2017	7:16 AM	NA			19.5	8.6	94.6	100					13.4	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	10/15/2017	7:40 AM	NA			16.6	9.0	92.0	120					1986.3	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	5/21/2017	7:08 AM	NA			14.3	10.7	104.9	110					9.7	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	6/18/2017	6:40 AM	NA			19.0	8.5	91.8	70					23.1	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	7/23/2017	7:17 AM	NA			25.0	7.4	89.8	80					35.5	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	8/27/2017	7:40 AM	NA			20.0	7.6	87.6	110					31.3	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	9/24/2017	7:15 AM	NA			19.0	8.4	91.7	100					22.6	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	10/15/2017	7:25 AM	NA			16.9	9.2	95.0	120					727	
BWS	ANDROSCOGGIN RIVER - A-09 - VRMP	10/15/2017	7:25 AM	D			16.9	9.2	95.0	120					866.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/21/2017	7:55 AM	NA			14.7	10.3	101.3	40					7.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/21/2017	7:55 AM	D			14.7	10.3	101.3	40					8.6	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/18/2017	7:07 AM	NA			19.6	8.1	88.9	80					8.6	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	7/23/2017	7:15 AM	NA			24.8	6.9	83.9	80					28.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	8/27/2017	6:40 AM	NA			22.1	7.5	86.2	100					18.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	9/24/2017	6:49 AM	NA			19.8	8.8	96.2	100					16	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/15/2017	7:13 AM	NA			16.8	9.6	94.4	120					1986.3	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	5/21/2017	7:19 AM	NA			14.7	10.1	99.1	40					5.2	

Androscoggin River (lower) - Friends of Merrymeeting Bay: Approved Sites																
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	6/18/2017	6:50 AM	NA			19.5	8.2	88.9	80					8.4	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/23/2017	6:37 AM	NA			24.7	7.0	84.1	80					19.9	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/23/2017	6:37 AM	D			24.7	6.9	83.9	80					23.3	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	8/27/2017	6:24 AM	NA			21.9	7.4	84.3	100					78	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	9/24/2017	6:33 AM	NA			19.7	8.7	95.5	100					12.1	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	10/15/2017	7:00 AM	NA			16.7	9.0	92.7	120					1986.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/21/2017	6:45 AM	NA			14.3	10.0	99.8	50					7.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/21/2017	6:45 AM	D											9.7	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/18/2017	6:25 AM	NA			19.6	8.1	88.8	90					13.4	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/23/2017	6:15 AM	NA			24.8	7.4	88.9	80					14.8	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/27/2017	5:55 AM	NA			21.3	7.9	89.5	110					27.5	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	9/24/2017	6:07 AM	NA			19.6	8.8	96.2	110					22.1	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/15/2017	6:11 AM	NA			16.8	9.1	94.1	120					1299.7	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/15/2017	6:11 AM	D			16.8	9.1	94.3	120					1119.9	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	5/21/2017	6:43 AM	NA			14.2	10.6	102.8	40					13.4	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	6/18/2017	6:10 AM	NA			19.2	8.5	92.1	70					14.8	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	7/23/2017	6:51 AM	NA			24.4	7.0	83.3	70					154.1	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	8/27/2017	7:25 AM	NA			22.0	7.4	84.5	120					18.5	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	9/24/2017	6:55 AM	NA			20.0	8.2	90.7	110					27.5	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	9/24/2017	6:55 AM	D			20	8.2	90.7	110					28.5	
IVL	ANDROSCOGGIN RIVER-A-45-VRMP	10/15/2017	7:00 AM	NA			17.2	9.1	94.6	120					214.2	

Section 5-2
Androscoggin River (Friends of Merrymeeting Bay)

Androscoggin River

The Androscoggin River is the third largest river in the state of Maine. It has a length of 177 miles and drainage area of 3,450 square miles (2,730 sq. mi. in Maine).[1] The Androscoggin River's 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 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 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 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.

Friends of Merrymeeting Bay (FOMB) is a nonprofit organization that focuses on the lower part of the Androscoggin River and other waterbodies draining into Merrymeeting Bay. FOMB has been in existence since 1975 and its mission is "to preserve, protect and improve the unique ecosystem of Merrymeeting Bay"[3].

[1] Maine Rivers Website- Androscoggin River Profile
[2] Androscoggin River Alliance Website- Androscoggin River slideshow
[3] Friends of Merrymeeting Bay website

Monitoring History

• The Maine Department of Environmental Protection's (DEP) Biological Monitoring Program has been monitoring the lower Androscoggin River since 1984. This data is available on DEP's website.

• The lower Androscoggin River is monitored by Friends of Merrymeeting Bay (FOMB). 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 where possible.

• 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.

• In 2010, a water quality model to predict the effect of discharges and river flows on attainment of Maine's Water Quality Standards was developed for the lower Androscoggin River by the Maine DEP. The model report and data are available on DEP's website.

• In 2018, FOMB added three sites on the Kennebec River (Hallowell Boat Launch (HLK), Gardiner Waterfront Park (GRK) and Abbagadassett Point (ABK).

Methods and Sampling Sites

Volunteers monitor at ten sites on the main stem of the Androscoggin River and at three sites of the mainstem of the Kennebec River. All of the sites are now VRMP approved sites. In 2015, FOMB added site Durham Boat New (DBN) to replace Durham Boat Launch (DBL) and in 2016 added site Island View Lane (IVL) to replace site Bay Bridge Jetty (BBB) due to access issues. Site DBN is downstream of DBL and access is from the riverbank and site IVL is slightly upstream from BBB and access is from the float/ramp.

Monitoring is conducted once a month from May through October. Winkler titration was used for dissolved oxygen measurements at most sites until the end of 2017. Since 2018, monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Specific conductance is measured using either a YSI meter or an Oakton EC 11+/11 Testr pen. Samples are collected for *E. coli* bacteria and transported to Bowdoin College for analysis by FOMB volunteers using the IDEXX Colilert system.

Table 5-2-1: Friends of Merrymeeting Bay sampling sites on the Androscoggin River and Kennebec River-listed from upstream to downstream. **Sites monitored in 2018 are in bold.**

VRMP Site ID	Organization Site Code	Sample Location	Class
Androscoggin River-A158-VRMP	DBL	Durham Boat Launch	C
Androscoggin River-A149-VRMP	**DBN**	**Durham Boat New**	**C**

Androscoggin River-A71-VRMP	PBL	Pejepscot Boat Launch	C
Androscoggin River-A47-VRMP	FPU	Fish Park Upstream	C
Androscoggin River-A45-VRMP	FPD	Fish Park Downstream	C
Androscoggin River-A24-VRMP	BIL	Brunswick Interstate Ledges	C
Androscoggin River-A06-VRMP	BCP	Brunswick Canoe Portage	C
Androscoggin River-A-09-VRMP	WSM/BWS	Brunswick Water Street	C
Androscoggin River-A-45-VRMP	IVL	Island View Lane	C
Androscoggin River-A-50-VRMP	BBB	Bay Bridge Jetty	C
Kennebec River-K-58-VRMP	HLK	Hallowell Boat Launch	B
Kennebec River-K-100-VRMP	GRK	Gardiner Waterfront Park	B
Kennebec River-K-269-VRMP	ABK	Abbagadassett Point	B

Androscoggin and Kennebec River Sampling Sites
Friends of Merrymeeting Bay

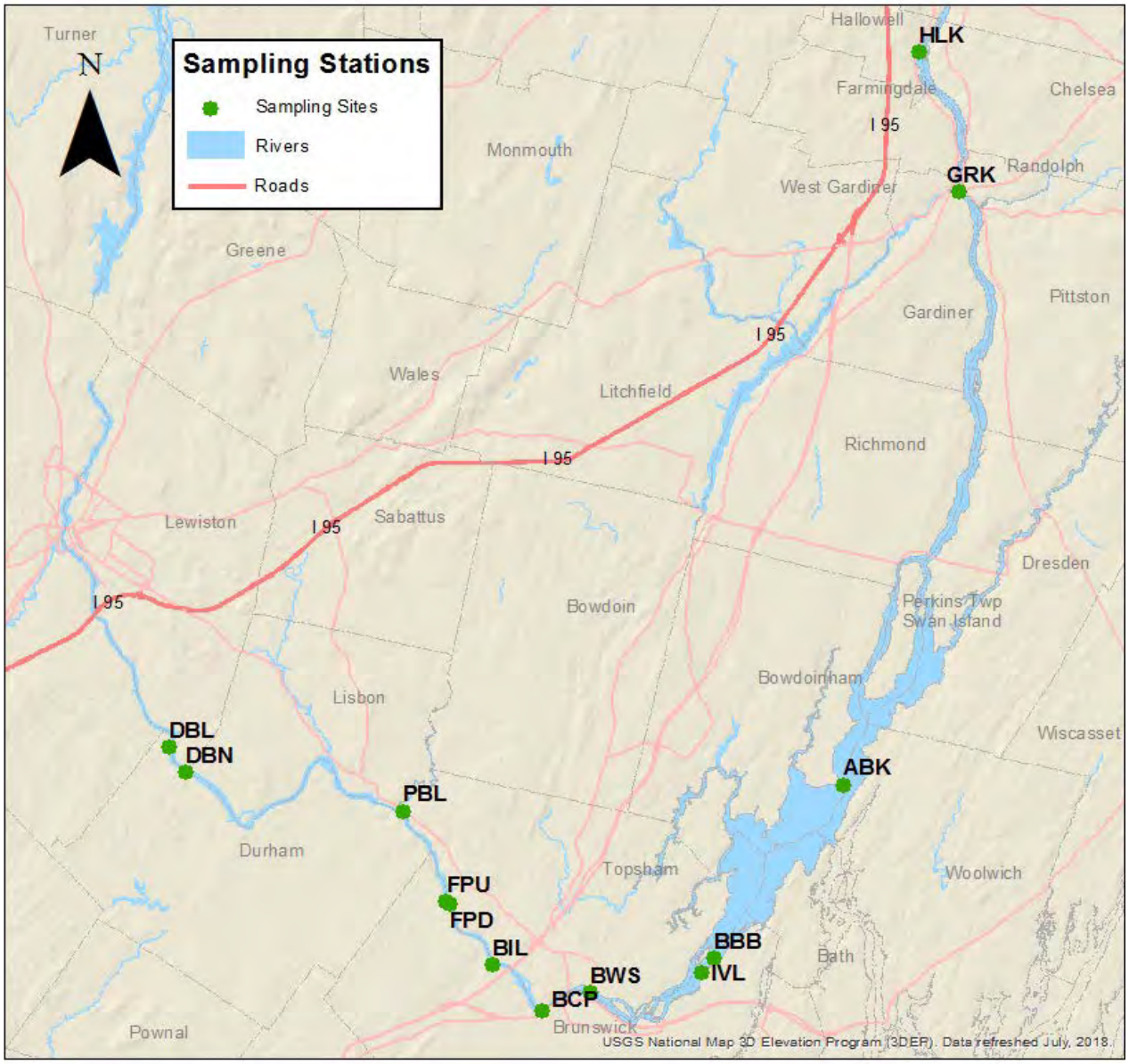


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

Parameters

Dissolved Oxygen

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, this will affect the dissolved oxygen.

Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60% saturation. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

Water Temperature

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.

Specific Conductance

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.

Bacteria

Escherichia coli (E. coli) bacteria are used as the indicator organism for freshwater. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms, including bacteria and viruses, which can cause gastrointestinal illnesses.

Class C criteria for bacteria (effective August 1, 2018) are as follows: "Between April 15th and October 31st, the number of Escherichia coli bacteria in Class C waters may not exceed a geometric mean of 100 CFU per 100 milliliters over a 90-day interval or 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval." Class B criteria (effective August 1, 2018) are as follows: "Between April 15th and October 31st, the number of Escherichia coli bacteria in these waters may not exceed a

geometric mean of 64 CFU per 100 milliliters over a 90-day interval or 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval." Geometric means are calculated instead of averages because it is more appropriate to use geometric mean for something like bacteria where there may be one or more very high or low values that can skew the mean.

Summary of Data by Site and Parameter (2010-2018)

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **DBL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	1	7.0	7.0	7.0	5	0
2011	C	2	11.2	7.8	14.5	5	0
2012	C	1	14.5	14.5	14.5	5	0
2013	C	1	8.7	8.7	8.7	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **DBL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	1	82	82	82	60	0
2011	C	2	98.4	84.0	112.8	60	0
2012	C	1	112.8	112.8	112.8	60	0
2013	C	1	86.0	86.0	86.0	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **DBL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	1	22.6	22.6	22.6	n/a	n/a
2011	C	2	11.9	4.8	18.9	n/a	n/a
2012	C	1	4.8	4.8	4.8	n/a	n/a
2013	C	1	14.9	14.9	14.9	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **DBL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	1	95	95	95	n/a	n/a
2011	C	2	52	35	69	n/a	n/a
2012	C	1	35	35	35	n/a	n/a
2013	C	1	58	58	58	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **DBL**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo*) *revised August 1, 2018**	**# Exceeding Criterion**
2010	C	E. Coli	1	22	22	22	236/126	0
2013	C	E. Coli	1	26	26	26	236/126	0
2015	C	E. Coli	6	21	6	579	236/126	0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **DBN**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2016	C	2	8.1	7.5	8.6	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **DBN**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2016	C	2	91.8	90.5	93.0	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **DBN**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2016	C	2	22.2	19.2	25.1	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **DBN**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2016	C	2	101	84	117	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **DBN**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo*) *revised August 1, 2018**	**# Exceeding Criterion**
2016	C	E. Coli	2	17	17	20	236/126	0/0
2017	C	E. Coli	4	11	10	345	236/126	0/0
2018	C	E. Coli	5	30	4	1733	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **PBL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	8.4	7.3	10.5	5	0
2011	C	7	9.5	7.2	14.2	5	0
2012	C	7	9.3	7.5	14.2	5	0
2013	C	4	8.4	7.6	9.1	5	0
2014	C	4	9.4	8.4	10.7	5	0
2015	C	6	8.9	7.5	10.3	5	0
2016	C	6	8.7	7.6	10.1	5	0
2017	C	6	8.5	7.4	10.0	5	0
2018	C	6	8.4	7.5	9.8	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **PBL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	90	86	97	60	0
2011	C	7	94.8	85.2	111.5	60	0
2012	C	7	96.1	87.6	111.5	60	0
2013	C	4	84.9	74.3	91.8	60	0
2014	C	4	96.6	91.7	105.6	60	0
2015	C	6	94.0	89.4	96.8	60	0
2016	C	6	93.5	86.7	98.3	60	0
2017	C	6	92.9	88.8	99.8	60	0
2018	C	6	93	88.1	97	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **PBL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	19.4	11.9	24.4	n/a	n/a
2011	C	7	16.8	5.1	25.5	n/a	n/a
2012	C	7	17.5	5.1	25.3	n/a	n/a
2013	C	4	19.7	15.6	25.7	n/a	n/a
2014	C	4	17.1	13.6	20.0	n/a	n/a
2015	C	6	18.8	11.1	24.3	n/a	n/a
2016	C	6	19.0	13.3	24.5	n/a	n/a
2017	C	6	19.4	14.3	24.8	n/a	n/a
2018	C	6	20.6	12.8	24.7	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **PBL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	87	58	116	n/a	n/a
2011	C	7	75	38	140	n/a	n/a
2012	C	7	75	38	99	n/a	n/a
2013	C	4	62	49	73	n/a	n/a
2014	C	1	60	60	60	n/a	n/a
2015	C	6	97	60	140	n/a	n/a
2016	C	6	114	70	152	n/a	n/a
2017	C	6	93	50	120	n/a	n/a
2018	C	6	100.4	72	120	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **PBL**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo*) *revised August 1, 2018**	**# Exceeding Criterion**
2010	C	E. Coli	5	35	6	225	236/126	0/0
2013	C	E. Coli	4	22	18	32	236/126	0/0
2014	C	E. Coli	6	87	12	613	236/126	0/0
2015	C	E. Coli	6	49	13	291	236/126	0/0
2016	C	E. Coli	6	19	9	72	236/126	0/0
2017	C	E. Coli	6	15	7	1300	236/126	0/0
2018	C	E. Coli	6	41	10	1986	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **FPU**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	8.3	7.2	10.6	5	0
2011	C	7	9.4	7.1	14.4	5	0
2012	C	7	9.3	7.5	14.4	5	0
2013	C	4	8.1	6.7	9.2	5	0
2014	C	4	9.2	8.4	10.8	5	0
2015	C	6	8.8	7.3	10.2	5	0
2016	C	6	8.6	7.7	10.1	5	0
2017	C	6	8.4	7.0	10.1	5	0
2018	C	6	8.3	7.3	9.7	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **FPU**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	89	85	99	60	0
2011	C	7	94.6	85.3	111.6	60	0
2012	C	7	94.8	88.1	111.6	60	0
2013	C	4	87.9	81.2	95.1	60	0
2014	C	4	96.9	91.5	107.0	60	0
2015	C	6	93.4	87.3	97.5	60	0
2016	C	6	93.8	88.4	101.0	60	0
2017	C	6	92.9	88.8	99.8	60	0
2018	C	6	90.9	84.1	96.7	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **FPU**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	19.6	12.3	25.2	n/a	n/a
2011	C	7	16.8	4.7	25.3	n/a	n/a
2012	C	7	17.8	4.7	25.1	n/a	n/a
2013	C	4	19.9	16.0	25.7	n/a	n/a
2014	C	4	18.2	14.9	20.5	n/a	n/a
2015	C	6	18.9	10.8	24.2	n/a	n/a

2016	C	6	19.0	9.9	25.1	n/a	n/a
2017	C	6	19.5	14.7	24.7	n/a	n/a
2018	C	6	20	13	24.5	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **FPU**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	89	55	118	n/a	n/a
2011	C	7	74	38	137	n/a	n/a
2012	C	7	74	38	94	n/a	n/a
2013	C	4	60	47	71	n/a	n/a
2014	C	1	70	70	70	n/a	n/a
2015	C	6	88	50	140	n/a	n/a
2016	C	6	116	67	145	n/a	n/a
2017	C	6	87	40	120	n/a	n/a
2018	C	6	101	64	120	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **FPU**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo*) *revised August 1, 2018	# Exceeding Criterion
2010	C	E. Coli	5	27	5	152	236/126	0/0
2013	C	E. Coli	4	19	11	32	236/126	0/0
2014	C	E. Coli	6	53	8	980	236/126	0/0
2015	C	E. Coli	6	15	3	276	236/126	0/0
2016	C	E. Coli	6	8	1	16	236/126	0/0
2017	C	E. Coli	6	15	5	1986	236/126	0/0
2018	C	E. Coli	6	21	5.2	1120	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **FPD**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	8.3	7.2	10.6	5	0
2011	C	7	9.6	7.0	14.9	5	0
2012	C	7	9.3	7.5	14.9	5	0
2013	C	4	8.1	6.3	9.4	5	0
2014	C	4	9.6	8.5	11.5	5	0
2015	C	6	8.8	7.4	10.4	5	0
2016	C	6	8.6	7.7	9.9	5	0
2017	C	6	8.5	6.9	10.3	5	0
2018	C	6	8.9	7.7	10.2	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **FPD**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	89	85	99	60	0
2011	C	7	95.7	85.5	114.5	60	0
2012	C	7	95.3	87.7	114.5	60	0
2013	C	4	86.1	72.2	97.2	60	0
2014	C	4	99.3	92.4	114.3	60	0
2015	C	6	93.8	88.2	98.0	60	0
2016	C	6	93.7	90.4	99.4	60	0
2017	C	6	91.8	83.9	101.3	60	0
2018	C	6	95.3	90.8	100.1	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **FPD**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	19.8	12.2	25.1	n/a	n/a
2011	C	7	16.8	4.8	25.5	n/a	n/a
2012	C	7	17.8	4.8	25.2	n/a	n/a
2013	C	4	19.9	16.1	25.7	n/a	n/a
2014	C	4	17.5	14.9	20.3	n/a	n/a

2015	C	6	18.9	10.6	24.3	n/a	n/a
2016	C	6	18.5	9.6	25.0	n/a	n/a
2017	C	6	19.6	14.7	24.8	n/a	n/a
2018	C	6	19.2	13.1	24.9	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **FPD**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	4	97	78	118	n/a	n/a
2011	C	7	74	38	138	n/a	n/a
2012	C	7	74	38	100	n/a	n/a
2013	C	4	60	47	71	n/a	n/a
2014	C	1	70	70	70	n/a	n/a
2015	C	6	90	50	140	n/a	n/a
2016	C	6	119	68	154	n/a	n/a
2017	C	6	87	40	120	n/a	n/a
2018	C	6	102	66	120	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **FPD**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo*) *revised August 1, 2018	# Exceeding Criterion
2010	C	E. Coli	4	38	5	160	236/126	0/0
2013	C	E. Coli	4	17	6	41	236/126	0/0
2014	C	E. Coli	6	61	16	579	236/126	0/0
2015	C	E. Coli	6	14	4	206	236/126	0/0
2016	C	E. Coli	6	7	4	17	236/126	0/0
2017	C	E. Coli	6	14	7	1986	236/126	0/0
2018	C	E. Coli	6	42	5	727	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **BIL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	8.3	7.3	10.6	5	0
2011	C	7	9.6	7.0	14.7	5	0
2012	C	5	9.6	7.4	14.7	5	0
2013	C	4	8.1	6.6	9.4	5	0
2014	C	4	9.5	8.6	10.9	5	0
2015	C	6	8.7	7.4	10.2	5	0
2016	C	6	8.6	7.8	9.9	5	0
2017	C	6	8.4	7.1	10.2	5	0
2018	C	6	8.5	7.6	9.8	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **BIL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	89	85	99	60	0
2011	C	7	95.0	84.5	115.2	60	0
2012	C	5	96.9	87.7	115.2	60	0
2013	C	4	87.6	81.5	94.3	60	0
2014	C	4	96.9	91.7	108.2	60	0
2015	C	6	92.4	86.3	97.0	60	0
2016	C	6	93.6	89.5	99.5	60	0
2017	C	6	90.7	83.7	100.7	60	0
2018	C	6	93.2	88.2	97.9	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **BIL**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2010	C	5	19.8	12.4	25.1	n/a	n/a
2011	C	7	16.7	4.9	25.1	n/a	n/a
2012	C	5	17.8	4.9	24.9	n/a	n/a
2013	C	4	19.8	16.0	25.6	n/a	n/a
2014	C	4	17.1	14.7	19.9	n/a	n/a
2015	C	6	18.7	10.1	24.1	n/a	n/a

2016	C	6	19.6	10.1	25.6	n/a	n/a
2017	C	6	19.4	14.7	24.6	n/a	n/a
2018	C	6	20.3	13.2	24.8	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **BIL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	89	55	119	n/a	n/a
2011	C	7	75	39	137	n/a	n/a
2012	C	5	66	39	92	n/a	n/a
2013	C	4	59	47	70	n/a	n/a
2014	C	1	70	70	70	n/a	n/a
2015	C	6	88	50	140	n/a	n/a
2016	C	6	117	68	148	n/a	n/a
2017	C	6	87	40	120	n/a	n/a
2018	C	6	101	67	120	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **BIL**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo*) *revised August 1, 2018	# Exceeding Criterion
2010	C	E. Coli	5	28	7	148	236/126	0/0
2013	C	E. Coli	4	14	4	37	236/126	0/0
2014	C	E. Coli	6	41	5	579	236/126	1/0
2015	C	E. Coli	6	16	4	192	236/126	0/0
2016	C	E. Coli	6	9	6	23	236/126	0/0
2017	C	E. Coli	6	15	7	1986	236/126	1/0
2018	C	E. Coli	6	31	6	866	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **BCP (note this site changed from BCM to BCP in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	8.1	6.6	9.8	5	0
2010	C	5	8.3	7.0	11.3	5	0
2011	C	6	8.8	7.2	15.3	5	0
2012	C	6	8.2	7.1	9.8	5	0
2013	C	5	8.2	6.6	9.4	5	0
2014	C	6	8.9	7.0	11.0	5	0
2015	C	7	8.4	7.0	10.2	5	0
2016	C	6	8.7	7.1	10.5	5	0
2017	C	6	8.5	7.3	10.4	5	0
2018	C	6	9.0	7.5	10.4	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **BCP (note this site changed from BCM to BCP in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	3	83	75	88	60	0
2011	C	5	94.6	82.8	115.0	60	0
2012	C	6	88.6	83.4	101.1	60	0
2013	C	5	89.4	81.1	96.5	60	0
2014	C	6	90.8	83.5	104.1	60	0
2015	C	7	90.7	83.7	97.0	60	0
2016	C	6	94.3	86.2	104.9	60	0
2017	C	6	91.4	86.8	102.6	60	0
2018	C	6	96.4	91.4	100.7	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **BCP (note this site changed from BCM to BCP in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	20.5	17.1	25.0	n/a	n/a
2010	C	5	19.8	12.4	25.3	n/a	n/a
2011	C	4	11.8	4.9	19.2	n/a	n/a
2012	C	4	18.7	15.1	23.4	n/a	n/a
2013	C	5	19.2	15.7	25.5	n/a	n/a
2014	C	6	18.1	14.8	24.2	n/a	n/a

2015	C	7	19.0	10.4	24.1	n/a	n/a
2016	C	6	19.4	13.0	24.5	n/a	n/a
2017	C	6	19.5	14.6	24.6	n/a	n/a
2018	C	6	19.3	12.8	25.0	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **BCP (note this site changed from BCM to BCP in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	67	39	93	n/a	n/a
2010	C	3	75	41	115	n/a	n/a
2011	C	5	80	53	131	n/a	n/a
2012	C	5	70	54	86	n/a	n/a
2013	C	5	61	48	72	n/a	n/a
2014	C	5	81	60	120	n/a	n/a
2015	C	7	103	60	160	n/a	n/a
2016	C	6	123	74	163	n/a	n/a
2017	C	6	92	50	120	n/a	n/a
2018	C	6	92	70	110	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **BCP (note this site changed from BCM to BCP in 2011).**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo*) *revised August 1, 2018	# Exceeding Criterion
2009	C	E. Coli	6	41	10	345	236/126	1/0
2010	C	E. Coli	4	38	20	123	236/126	0/0
2011	C	E. Coli	7	58	10	687	236/126	00
2012	C	E. Coli	6	19	7	71	236/126	0/0
2013	C	E. Coli	5	18	10	27	236/126	0/0
2014	C	E. Coli	6	99	14	727	236/126	0/0
2015	C	E. Coli	7	25	6	222	236/126	0/0
2016	C	E. Coli	6	8	2	17	236/126	0/0
2017	C	E. Coli	6	21	9	1046	236/126	0/0
2018	C	E. Coli	6	35	11	727	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **BWS (note this site changed from WSM to BWS in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	7	8.5	7.4	9.5	5	0
2010	C	5	8.6	6.9	11.0	5	0
2011	C	7	9.8	7.7	13.7	5	0
2012	C	5	8.9	7.6	10.7	5	0
2013	C	5	8.9	7.9	9.9	5	0
2014	C	5	8.6	6.5	10.9	5	0
2015	C	6	8.9	7.2	11.0	5	0
2016	C	6	9.0	7.5	10.6	5	0
2017	C	6	8.6	7.4	10.7	5	0
2018	C	6	9.0	7.7	10.9	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **BWS (note this site changed from WSM to BWS in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	92	81	103	60	0
2011	C	7	97.8	91.0	107.1	60	0
2012	C	5	96.8	87.6	105.4	60	0
2013	C	5	92.5	86.7	101.9	60	0
2014	C	6	96.3	84.5	108.4	60	0
2015	C	6	94.0	86.7	98.6	60	0
2016	C	6	97.6	90.9	105.3	60	0
2017	C	6	93.5	87.6	104.9	60	0
2018	C	6	98.8	93.3	104.5	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **BWS (note this site changed from WSM to BWS in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	21.0	18.0	25.3	n/a	n/a
2010	C	5	19.8	12.2	25.3	n/a	n/a
2011	C	7	16.4	4.9	24.7	n/a	n/a
2012	C	5	19.6	14.9	24.5	n/a	n/a
2013	C	5	19.2	15.1	25.6	n/a	n/a

2014	C	6	18.5	14.4	23.6	n/a	n/a
2015	C	6	18.3	9.8	24.5	n/a	n/a
2016	C	6	19.4	13.0	24.9	n/a	n/a
2017	C	6	19.0	14.3	25.0	n/a	n/a
2018	C	6	20.2	13.4	25.0	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **BWS (note this site changed from WSM to BWS in 2011).**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	71	39	93	n/a	n/a
2010	C	4	103	54	112	n/a	n/a
2011	C	7	86	58	136	n/a	n/a
2012	C	5	109	105	111	n/a	n/a
2013	C	5	80	65	94	n/a	n/a
2014	C	3	73	64	85	n/a	n/a
2015	C	6	112	60	170	n/a	n/a
2016	C	6	134	97	165	n/a	n/a
2017	C	6	98	70	120	n/a	n/a
2018	C	6	101	78	125	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **BWS (note this site changed from WSM to BWS in 2011).**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo*) *revised August 1, 2018)	# Exceeding Criterion
2009	C	E. Coli	7	46	15	365	236/126	1/0
2010	C	E. Coli	5	26	9	86	236/126	0/0
2011	C	E. Coli	7	73	24	457	236/126	0/0
2012	C	E. Coli	6	29	12	101	236/126	0/0
2013	C	E. Coli	5	36	17	73	236/126	0/0
2014	C	E. Coli	6	95	17	770*	236/126	1/0
2015	C	E. Coli	6	23	3	238	236/126	0/0
2016	C	E. Coli	6	16	9	31	236/126	0/0
2017	C	E. Coli	6	22	10	727	236/126	0/0
2018	C	E. Coli	6	71	18	1986	236/100	1/0

*Maximum of 770 mpn/100ml was on 10/19/14, outside the criteria timeline at that time. The criterion was exceeded on 8/17/14 with a reading of 326 mpn/100ml.

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **IVL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2016	C	6	8.8	7.5	10.3	5	0
2017	C	6	8.5	7.0	10.6	5	0
2018	C	6	8.5	6.8	10.4	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **IVL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2016	C	6	94.3	88.9	102.8	60	0
2017	C	6	91.3	83.3	102.8	60	0
2018	C	6	92.7	81.4	100.5	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **IVL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2016	C	6	19.2	13.0	24.0	n/a	n/a
2017	C	6	19.5	14.2	24.4	n/a	n/a
2018	C	6	20.4	13.0	24.5	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **IVL**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2016	C	6	127	82	160	n/a	n/a
2017	C	6	88	40	120	n/a	n/a
2018	C	6	105	66	144	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **IVL**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo*) *revised August 1, 2018**	**# Exceeding Criterion**
2016	C	E. Coli	6	24	8	82	236/126	0/0
2017	C	E. Coli	6	27	13	214	236/126	0/0
2018	C	E. Coli	6	35	5	866	236/100	1/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **BBB**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	8.5	7.5	9.8	5	0
2010	C	5	8.2	6.4	10.7	5	0
2011	C	7	9.4	7.1	13.5	5	0
2012	C	6	8.4	7.2	10.3	5	0
2013	C	4	8.6	7.8	9.8	5	0
2014	C	5	8.4	6.7	10.5	5	0
2015	C	6	8.5	7.0	9.8	5	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **BBB**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2010	C	5	88	78	99	60	0
2011	C	7	94.0	84.9	107.4	60	0
2012	C	6	90.8	83.5	103.5	60	0
2013	C	4	92.1	85.2	101.1	60	0
2014	C	6	92.7	80.7	103.0	60	0
2015	C	6	88.7	83.7	96.7	60	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **BBB**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2009	C	6	19.4	17.5	20.9	n/a	n/a
2010	C	5	19.8	12.7	25.1	n/a	n/a
2011	C	7	16.5	5.0	24.3	n/a	n/a
2012	C	3	18.8	16.2	20.7	n/a	n/a
2013	C	4	19.7	15.7	25.4	n/a	n/a
2014	C	6	19.0	14.5	23.8	n/a	n/a
2015	C	6	18.0	8.9	24.3	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **BBB**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2009	C	5	64	40	93	n/a	n/a
2010	C	4	87	54	115	n/a	n/a
2011	C	7	67	35	125	n/a	n/a
2012	C	6	81	58	108	n/a	n/a
2013	C	4	57	49	71	n/a	n/a
2014	C	3	71	63	81	n/a	n/a
2015	C	6	110	70	160	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **BBB**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo*) *revised August 1, 2018**	**# Exceeding Criterion**
2009	C	E. Coli	4	24	15	41	236/126	0/0
2010	C	E. Coli	5	26	8	90	236/126	0/0
2011	C	E. Coli	7	81	22	816	236/126	0/0
2012	C	E. Coli	6	34	10	78	236/126	0/0
2013	C	E. Coli	4	18	7	35	236/126	0/0
2014	C	E. Coli	6	117	24	816	236/126	2/0
2015	C	E. Coli	6	17	1	291	236/126	0/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **HLK**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2018	B	5	8.7	7.8	10.1	7	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **HLK**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2018	B	5	92.8	88.0	98.5	75	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **HLK**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2018	B	5	18.9	13.3	24.2	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **HLK**							
Year	**Class**	**# Sample Points**	**Mean**	**Minimum**	**Maximum**	**Criterion**	**# Not Meeting Criterion**
2018	B	6	73	61	87	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **HLK**								
Year	**Class**	**Bacteria Type**	**# Sample Points**	**Geo-Mean**	**Minimum**	**Maximum**	**Criterion (Insta/geo)**	**# Exceeding Criterion**
2018	B	E. Coli	6	27	9	157	236/64	0/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **GRK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	5	8.4	7.6	10.2	7	0

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **GRK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	5	91.6	88.0	98.4	75	0

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **GRK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	5	19.6	13.5	25.1	n/a	n/a

A summary of mean, minimum and maximum specific conductance (micro-ohms/cm, µS/cm) values at Friends of Merrymeeting Bay monitoring site: **GRK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	6	85.3	64	125	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **GRK**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo)	# Exceeding Criterion
2018	C	E. Coli	6	29	3	118	236/64	0/0

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Friends of Merrymeeting Bay monitoring site: **ABK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	6	7.9	5.7	9.6	7	1

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring site: **ABK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	6	86.7	68.0	108.0	75	1

A summary of mean, minimum and maximum water temperature (°C) values at Friends of Merrymeeting Bay monitoring site: **ABK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	6	19.8	13.4	23.7	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Friends of Merrymeeting Bay monitoring site: **ABK**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2018	B	3	1.1	0.6	1.8	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 ml) values at Friends of Merrymeeting Bay monitoring site: **ABK**

Year	Class	Bacteria Type	# Sample Points	Geo-Mean	Minimum	Maximum	Criterion (Insta/geo)	# Exceeding Criterion
2018	B	E. Coli	6	32	12	74	236/64	0/0

Appendix A

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

** "N/A" = normal environmental sample ; "D" = field duplicate; "L" = lab duplicate.

*** D.O. = dissolved oxygen; "Spec. Cond" = specific conductance; "TDS" = Total disolved solids; "TSS" = total suspended solids."

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	*** D.O. (MG/L)	*** D.O. Sat. (%)	*** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	*** TDS (MG/L)	*** TSS (MG/L)	E. coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
Androscoggin River & Kennebec River - Friends of Merrymeeting Bay: Approved Sites																
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	5/20/2018	7:30 AM	NA			15.0	10.4	100.7	70					11	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	5/20/2018	7:30 AM	D			15.0	10.4	100.7	70					23.3	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	6/17/2018	7:30 AM	NA			21.0	9.0	100.6	100					16	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	7/15/2018	6:10 AM	NA			24.5	7.5	92.2	110					21.6	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	8/12/2018	7:08 AM	NA			25.0	7.6	91.4	83					26.2	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	9/9/2018	7:35 AM	NA			22.0	8.2	94.4	107					26.6	
BCP	ANDROSCOGGIN RIVER - A06 - VRMP	10/14/2018	7:31 AM	NA			12.8	10.0	95.1	104					727	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	5/20/2018	7:05 AM	NA			15.0	10.4	103.6	78					23.3	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	6/17/2018	7:10 AM	NA			21.0	9.1	102.0	101					18.1	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	7/15/2018	5:50 AM	NA			24.6	7.9	95.3	108					50.4	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	8/12/2018	6:55 AM	NA			25.0	7.7	93.3	85					46.4	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	9/9/2018	7:15 AM	NA			22.0	8.2	94.3	106					66.3	
WSM	ANDROSCOGGIN RIVER - A-09 - VRMP	10/14/2018	7:12 AM	NA			13.4	10.9	104.5	125					1986.3	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	5/20/2018	8:35 AM	NA											56.5	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	6/17/2018		NA											9.7	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	8/12/2018	8:20 AM	NA											12	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	8/12/2018	8:20 AM	D											4.1	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	9/9/2018		NA											16	
DBN	ANDROSCOGGIN RIVER - A149 - VRMP	10/14/2018	8:20 AM	NA											1732.9	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	5/20/2018	7:26 AM	NA			14.9	9.8	97.9	67					6.3	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/17/2018	7:12 AM	NA			21.0	8.3	94.5	99					15.8	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	6/17/2018	7:12 AM	D			21.6	8.5	94.2	99					16	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	7/15/2018	7:12 AM	NA			24.8	7.6	90.1	120					13.4	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	8/12/2018	7:25 AM	NA			24.5	7.9	94.6	90					32.7	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	9/9/2018	7:06 AM	NA			22.3	7.6	88.2	120					24.1	
BIL	ANDROSCOGGIN RIVER - A24 - VRMP	10/14/2018	7:24 AM	NA			13.2	9.8	93.1	110					866.4	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	5/20/2018	7:00 AM	NA			14.7	10.2	100.1	66					5.2	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	6/17/2018	6:50 AM	NA			21.1	8.3	92.9	99					13.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	7/15/2018	6:45 AM	NA			24.9	7.7	93.2	120					193.5	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	8/12/2018	7:00 AM	NA			24.6	8.2	98.7	90					18.9	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	9/9/2018	6:40 AM	NA			22.9	7.9	90.8	120					27.9	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/14/2018	6:54 AM	NA			13.2	10.0	95.7	110					727	
FPD	ANDROSCOGGIN RIVER - A45 - VRMP	10/14/2018	6:54 AM	D			13.1	10.0	95.8	110					648.8	

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	*** D.O. (MG/L)	*** D.O. Sat. (%)	*** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	*** TDS (MG/L)	*** TSS (MG/L)	E. coli Bacteria (MPN/ 100ML)	Entero-cocci (MPN/ 100ML)
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	5/20/2018	6:41 AM	NA			14.9	9.7	96.7	64					5.2	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	6/17/2018	6:38 AM	NA			20.9	8.4	94.0	100					6.3	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	7/15/2018	6:33 AM	NA			24.4	7.6	92.4	120					8.6	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	8/12/2018	6:47 AM	NA			24.5	7.5	90.3	90					12.2	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	9/9/2018	6:26 AM	NA			22.3	7.3	84.1	120					23.8	
FPU	ANDROSCOGGIN RIVER - A47 - VRMP	10/14/2018	6:40 AM	NA			13.0	9.3	88.1	110					1119.9	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	5/20/2018	6:10 AM	NA			14.9	9.8	97.0	72					27.2	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	6/17/2018	6:10 AM	NA			21.0	8.7	96.6	101					12.1	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	7/15/2018	6:01 AM	NA			24.3	7.5	89.7	120					9.6	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/12/2018	6:13 AM	NA			24.3	7.8	94.2	90					31.8	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	8/12/2018	6:13 AM	D			24.7	7.8	94.0	90					24.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	9/9/2018	5:58 AM	NA			21.9	7.6	88.1	120					37.3	
PBL	ANDROSCOGGIN RIVER - A71 - VRMP	10/14/2018	6:17 AM	NA			12.8	9.5	91.2	110					1986.3	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	5/20/2018	6:35 AM	NA			15.0	10.0	99.5	66					5.2	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	6/17/2018	6:45 AM	NA			22.0	8.8	100.5	125					23.1	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	7/15/2018	5:30 AM	NA			24.3	6.8	81.4	144					19.9	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	8/12/2018	6:35 AM	NA			24.5	7.4	88.8	88					29.5	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	9/9/2018	6:46 AM	NA			22.0	7.9	89.7	104					28.8	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	9/9/2018	6:46 AM	D			22.0	7.9	89.7	104					62.4	
IVL	ANDROSCOGGIN RIVER- A-45 -VRMP	10/14/2018	6:51 AM	NA			13.0	10.4	99.4	106					866.4	
GRK	KENNEBEC RIVER-K-100-VRMP	5/20/2018	7:29 AM	NA			14.9	9.5	95.7	74					3.1	
GRK	KENNEBEC RIVER-K-100-VRMP	6/17/2018	7:34 AM	NA			21.0	7.7	88.7	90					25.9	
GRK	KENNEBEC RIVER-K-100-VRMP	6/17/2018	7:34 AM	D			21.0	7.7	88.7	90					37.9	
GRK	KENNEBEC RIVER-K-100-VRMP	7/15/2018	7:27 AM	NA			25.1	7.6	89.8	82					22.8	
GRK	KENNEBEC RIVER-K-100-VRMP	8/12/2018	7:30 AM	NA						72					117.8	
GRK	KENNEBEC RIVER-K-100-VRMP	9/9/2018	6:41 AM	NA			22.1	7.6	88.0	64					28.8	
GRK	KENNEBEC RIVER-K-100-VRMP	10/14/2018	7:48 AM	NA			13.5	10.2	98.4	125					93.4	
ABK	KENNEBEC RIVER-K-269-VRMP	5/20/2018	7:50 AM	NA			14.7	9.6	95.8						12.2	
ABK	KENNEBEC RIVER-K-269-VRMP	6/17/2018	7:55 AM	NA			20.9	9.5	108.0		1.8				35	
ABK	KENNEBEC RIVER-K-269-VRMP	7/15/2018	7:15 AM	NA			23.2	7.2	85.0						20.9	
ABK	KENNEBEC RIVER-K-269-VRMP	8/12/2018	7:25 AM	NA			23.7	5.7	68.0						74.3	
ABK	KENNEBEC RIVER-K-269-VRMP	9/9/2018	7:45 AM	NA			21.2	7.0	79.4		0.9				51.2	
ABK	KENNEBEC RIVER-K-269-VRMP	9/9/2018	7:45 AM	D			21.2	7.0	79.9		0.9				27.2	
ABK	KENNEBEC RIVER-K-269-VRMP	10/14/2018	7:55 AM	NA			13.4	9.5	90.5		0.6				30.7	
HLK	KENNEBEC RIVER-K-58-VRMP	5/20/2018	7:06 AM	NA			13.5	9.7	98.5	62					8.5	
HLK	KENNEBEC RIVER-K-58-VRMP	6/17/2018	7:02 AM	NA			21.4	7.8	88.0	80					43.5	
HLK	KENNEBEC RIVER-K-58-VRMP	7/15/2018	7:02 AM	NA			24.2	7.9	92.1	73					12.2	
HLK	KENNEBEC RIVER-K-58-VRMP	8/12/2018	7:01 AM	NA						61					20.6	
HLK	KENNEBEC RIVER-K-58-VRMP	9/9/2018	7:12 AM	NA			22.1	8.2	92.7	87					27.9	
HLK	KENNEBEC RIVER-K-58-VRMP	9/9/2018	7:12 AM	D											23.3	
HLK	KENNEBEC RIVER-K-58-VRMP	10/14/2018	7:10 AM	NA			13.3	10.1	92.9	75					156.5	

Site	Monitor	Date	Sample Time	Weather	Adversities	Sample Type
			a.m.			Monthly/Rain
2019 Androscoggin dissolved O2 and coliform data, and others						
DBN	Helen Watts	5/19/2019	8:00	Overcast	L	Monthly/river
DBN-R	Helen Watts	5/19/2019	8:00	Overcast	L	Monthly/river
	Helen Watts	6/19/2019		Clear, overcast	P:L	Monthly/river
	Helen Watts	7/14/2019	8:40	overcast	W	Monthly/river
	Helen Watts					Monthly/river
	Helen Watts	9/8/2019	8:25	Overcast	P	Monthly/river
	Helen Watts	10/13/2019	8:25	Clear	P:L	Monthly/river
Pejepscot Boat Launch (PBL)	C. Spies	5/19/2019	6:05:00	Overcast, drizzle	L	Monthly/river
	C. Spies and Ed Friedman	6/19/2019	6:10:00	Overcast	L	Monthly/river
PBL-R	Charlie Spies	6/19/2019	6:10:00	Overcast	L	Monthly/river
	Charlie Spies	7/14/2019	6:04:00	Clear		Monthly/river
	Ed Friedman	8/11/2019	6:30:00	Clear		Monthly/river
	Charlie Spies	9/8/2019	5:52:00	Overcast	P:M,N	Monthly/river
	Charlie Spies	10/13/2019	6:04:00	Clear	P:M	Monthly/river
Fish Park Up (FPU)	Charlie Spies	5/19/2019	6:26	Drizzle	L	Monthly/river
	Charlie Spies	6/19/2019	6:42:00	Overcast	L	Monthly/river
	Charlie Spies	7/14/2019	6:26:00	Clear		Monthly/river
	Ed Friedman	8/11/2019	7:10:00	Clear		Monthly/river
	Charlie Spies	9/8/2019	6:16:00	Overcast	P:M	Monthly/river
	Charlie Spies	10/13/2019	6:30:00	Clear	P:M	Monthly/river

FPU-R	Charlie Spies	10/13/2019	6:40:00	Clear	P:M	Monthly/river
						Monthly/river
Fish Park below Dam (FPD)	Charlie Spies	5/19/2019	6:44		L	Monthly/river
	Charlie Spies	6/19/2019	6:59:00	Overcast	L	Monthly/river
	Charlie Spies	7/14/2019	6:41:00	Clear		Monthly/river
	Ed Friedman	8/11/2019	7:30:00	Clear		Monthly/river
	Charlie Spies	9/8/2019	6:28:00	Overcast	P:M	Monthly/river
	Charlie Spies	10/13/2019	6:51:00	Clear	M	Monthly/river
Brunswick Interstate Ledges (BIL)	Charlie Spies	5/19/2019	7:08		L	Monthly/river
	Charlie Spies	6/19/2019	7:23:00	Overcast	L	Monthly/river
	Charlie Spies	7/14/2019	7:01:00	Clear		Monthly/river
BIL-R	Charlie Spies	7/14/2019	7:10:00	Clear		Monthly/river
	Ed Friedman	8/11/2019	8:00:00	Clear		Monthly/river
	Charlie Spies	9/8/2019	6:48:00	Overcast	P:M	Monthly/river
	Charlie Spies	10/13/2019	7:16:00	Clear	M	Monthly/river
						Monthly/river
Brunswick Canoe Portage (BCP)	Rebecca Bowes	5/19/2019	7:50	Overcast		Monthly/river
BCP-R	Rebecca Bowes	6/19/2019	7:40:00	Overcast		Monthly/river
	Ed Friedman	7/14/2019	7:15:00	Clear		Monthly/river
	Rebecca Bowes	8/11/2019	7:15:00	Clear	N	Monthly/river
	Rebecca Bowes	9/8/2019	7:30:00	Overcast	P:L	Monthly/river
	Rebecca Bowes	10/13/2019	7:35:00	Clear		Monthly/river
Brunswick Water St. (BWS)	Rebecca Bowes	5/19/2019	7:30	Overcast	N	Monthly/river
	Rebecca Bowes	6/19/2019	7:15:00	Overcast	N	Monthly/river
	Ed Friedman	7/14/2019	6:55:00	Clear	N	Monthly/river
	Rebecca Bowes	8/11/2019	7:05:00	Clear	N	Monthly/river
	Rebecca Bowes	9/8/2019	7:06:00	Overcast	P:L,N	Monthly/river
BWS-R	Rebecca Bowes	9/8/2019	7:06:00	Overcast	P:L,N	Monthly/river
	Rebecca Bowes	10/13/2019	7:20:00	Clear	N	Monthly/river

Island View Lane (IVL)	Rebecca Bowes	5/19/2019	7:12:00	Overcast		Monthly/river
	Rebecca Bowes	6/19/2019	6:55	Overcast		Monthly/river
	Ed Friedman	7/14/2019	6:30	Clear		Monthly/river
	Rebecca Bowes	8/11/2019	6:35	Clear		Monthly/river
IVL-R	Rebecca Bowes	8/11/2019	6:40	Clear		Monthly/river
	Rebecca Bowes	9/8/2019	6:45	Overcast	P:L,N	Monthly/river
	Rebecca Bowes	10/13/2019	6:50	Clear		Monthly/river

E. coli /100 ml	Total Coliform /100 ml	Lab	Notes	Mg/l	%	Air temp	Water temp	Spec cond
8.4	686.7					50F		
8	579.4					50F		
9.8	156.4		One person fishing, said he caught a few.					
13.5	>2419.6					75F		
			NO DATA SHEET FOR AUGUST					
6.3	>2419.6					53F		
76.3	1299.7					50F		
146.7	1203.3		Problem with Lisbon POTW?	11.7	104	8.9C	10.0C	60
517.2	>2419.6		Problem with Lisbon POTW?	9	97.1	16.1C	18.9C	90
131.4	>2419.6		Problem with Lisbon POTW?	9	96.1	16.1C	18.7C	90
209.8	>2419.6		Problem with Lisbon POTW?	7.5	90.6	17.8C	24.8C	100
48.7	>2419.6		Couple people fishing at boat ramp. Trimmed path, tons of bittersweet. High water but very little flow.	7.9	94	11.5C	24.4C	114.6
22.3	>2419.6		Small, intermittent stream from swamp 30yards upstream	7.9	86.7	11.7C	20C	140
133.4	2419.6		Beaver circling and tail slapping; probably not nearby	9.9	95.5	6.1	13.6	130
6.3	579.4			11.7	104.1	8.9C	10.1C	50
19.9	365.4			8.8	96.1	15.6C	19.4C	90
93.3	>2419.6			7.3	87.5	17.8C	24.8C	100
16.1	1299.7		Warm sunny. Trimmed access - bittersweet, alder, etc.	7.4	88.8	16C	24.8C	114.9
8.5	1046.2			8.1	90.8	11.1C	20.3C	140
108.1	1413.6			9.8	94.3	7.8C	13.7C	120

75.9	1299.7			9.8	94	7.8C	13.7C	120
8.5	547.5			11.8	104.5	8.9C	10.0C	50
19.9	579.4			8.8	95.9	15.6C	19.4C	90
69.7	>2419.6			7.2	87.3	17.8C	24.9C	100
13.5	1413.6		Trimmed path - honeysuckle, alder, maple, hemlock, poisen ivy	7.3	87.6	16C	25C	113.5
30.9	1413.6			8.1	90	11.1C	20.7C	140
110.6	1732.9			9.6	93.5	7.8C	13.8C	120
5.2	648.8			11.8	104.4	8.9C	10.1C	50
21.1	547.5			8.7	95.3	16.1C	19.3C	90
62.7	>2419.6			7.2	86	17.8C	24.5C	100
101.4	>2419.6			7.1	85.4	17.8C	24.5C	100
14.6	1986.3			7.3	87.4	17C	24.8C	114
9.6	1299.7			7.9	88.3	11.7C	20.5C	140
82	1986.3			9.7	92.6	8.9C	13.7C	120
7.5	547.5			11.8	105.7	51F	10C	60
*	*	EF	*No E Coli or total coliforms on sheet. Also, light scum on water - possibly pollen. Surface looked a bit oily.	9.4	102.2	61F	19C`	80
103.9	>2419.6			6.8	81.5	20.8C	24.3C	92.3
14.5	1732.9			7.1	85	55F	25C	130
13.5	1299.7			8.1	88.2	53F	20.3C	150
88.4	1553.1			10.9	104.2	47F	13.7C	120
25.9	517.2		Sampled from shore (boat put-in); float not in water yet.	11.9	106.5	50F	10C	120
33.1	686.7			10	108.7	61F	19C	80
101.4	>2419.6		Ebb tide, salinity 0, wind 0.	7.2	86.3	19.5C	24.1C	95
25.6	>2419.6			7.4	88.8	53F	25C	140
10.9	2419.6			8.2	91.1	53F	20.4C	150
23.3	1986.3			8.2	91.2	53F	20.4C	150
95.9	1553.1			12	116	47F	13.7C	120

10.9	436			11.8	105.1	50F	10C	50
32.8	980.4		Water lightly stained	10	104.3	61F	19C	80
167.4	>2419.6		Ebb tide, some brown foam on upstream end of float, wind 0.	16.8	81.6	19C	24.2C	93.7
6.3	>2419.6			6.9	82.3	54F	24C	130
19.3	>2419.6			6.9	82.1	53F	24C	130
17.1	1203.3			7.9	87.1	53F	20C	120
70.8	>2419.6			10.8	105.8	47F	13.5C	120