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July 8, 2022

VIA Electronic Filing (followed by hard copy regular mail)

Susan M. Lessard, Chair
Board of Environmental Protection
c/o Ruth Ann Burke
17 State House Station
Augusta, ME 04333-0017

Re: Notice of Appeal and Request for Public Hearing — Approval of Water Quality Certification, Pejepscot Hydroelectric Project, #L007867-33-S-N (Approval).

Dear Chair Lessard:

By this letter, Friends of Merrymeeting Bay ("FOMB"); Grow L+A; The Downeast Salmon Federation ("DSF"); Native Fish Coalition ("NFC"), Maine Chapter; Friends of Sebago Lake ("FOSL") and the Maine Council of Trout Unlimited (TU) ("MCTU") (collectively "Appellants") hereby appeal the approval of a water quality certification pursuant to Section 401 of the Clean Water Act ("WQC") regarding the Pejepscot Hydroelectric Project located on the Androscoggin River in the towns of Topsham, Lisbon, Durham and Brunswick, Maine (the "Project") and issued by the Department of Environmental Protection ("DEP" or the "Department") on June 8, 2022 (the "WQC Approval"). The WQC is attached hereto as Exhibit 1.

In the WQC Approval, the Department concluded that the Project "will result in all waters affected by the Project being suitable for all designated uses and meeting all other applicable water quality standards."[1] Specifically, DEP found as follows:

> Based on evidence in the record, the Department finds that upstream of the dam, the Project meets Class C water quality standards under current and proposed operating conditions";[2] and that with respect to downstream oxygenated Project waters the DEP also found that "… the Project meets Class C water quality standards under current and proposed operating conditions."[3]

The premise for these findings was the DEP statement that "The portion of the Androscoggin River at issue in the application is designated as Class C waters…"[4] citing to 38 M.R.S. § 467(1)(A)(2) and noting:

> On March 31, 2022, the Governor signed Public Law 2021 Chapter 551 into law. This law reclassifies certain waters of the state, including changing the

[1] Record Exhibit 1 at 27.
[2] Record Exhibit 1 at 22-23.
[3] Record Exhibit 1 at 23.
[4] Record Exhibit 1 at 7.

classification for a portion of the lower Androscoggin River that includes the Pejepscot Project from Class C to Class B. The reclassification becomes effective on August 8, 2022, *which is after the issuance date of this Water Quality Certification*. Therefore, this Water Quality Certification applies Class C water quality standards to the Pejepscot Project. Chapter 2, § 11(F)."[5] (emphasis supplied).

Appellants appeal the WQC Approval on the following grounds: (1) the Department's analysis and requirement that waters affected by the Project meet Class C numeric standards rather than Class B standards is not supported by Maine law and the explicit intent of the Board of Environmental Protection (the "Board"), the Maine legislature, the Governor and Maine's Anti-degradation policy requirements, and is therefore incorrect, arbitrary and capricious, and an egregious abuse of discretion and professional judgement on the part of the Department; and (2) the Department's finding that actual water quality standards achieved at the Project (which Applicant's own data indicate Class B and in some cases Class A water quality standards are met) meet Class C criteria is inaccurate and misleading; not based on due consideration of all data available to the Department; does not consider all information provided to the Department or enacted Maine law, and is therefore incorrect, arbitrary and capricious; and (3) the availability of a draft WQC, issued on May 27, 2022, was not provided to certain interested parties including without limitation Appellants at time of issuance in violation of DEP Administrative Rule (see note 10 infra) and when later provided not done so with sufficient time for review so that these issues could be vetted and resolved prior to the issuance of the WQC.

To be clear, Appellants are not arguing that technically the Project waters were classified as Class B at the time the WQC Approval was issued, but that it was a gross abuse of discretion and professional judgement on the part of the Department to issue a WQC Approval without (1) considering the full scope of actual water quality data from the Project affected waters which showed a higher classification was in fact being met; and (2) to ignore the Board's, the Legislature's and the Governor's express intent for the segment in question to be classified as Class B and impose a lower classification literally days before the enacted law was to become effective, without provision for any means to *require* compliance with Class B standards when the law goes into effect. As currently provided for in the WQC, this egregious error will have an impact for 30-50 years (the next WQC review associated with relicensing).

Appellants respectfully requests a public hearing on these issues.

I. Background

The Project is located on the Androscoggin River in the towns of Topsham, Lisbon, Durham and Brunswick, Maine, and consists of:

…a 560-foot-long dam; a 225-acre impoundment; a 480-foot-long spillway at the crest of the dam, consisting of five hydraulically operated steel gates; two intake

[5] Record Exhibit 1 at 7, note 9.

structures (one for each powerhouse) that are integral to the dam and powerhouses; an original powerhouse containing three generation units with a combined rated capacity of 1.588 megawatts (MW); a newer powerhouse containing one generation unit with a rated capacity of 12.3 MW; a tailrace directly below the dam; upstream fish passage facilities; downstream fish passage facilities; and appurtenant facilities.[6]

The Project has been licensed by the Federal Energy Regulatory Commission ("FERC") since 1982 (FERC Project No. P-4784) for a period of 40 years. The Applicant must by law, obtain a WQC from the State of Maine in order to receive a new FERC license, which will incorporate the terms of the WQC into the FERC license which will have a new term of 30-50 years, during which FERC will arguably have the exclusive jurisdiction to enforce the terms of the license. Accordingly, the next WQC review will also occur 30-50 years from this WQC, assuming the owner/operator of the dam applies for relicensing at that time. On June 9, 2021, Topsham Hydro Partners Limited Partnership ("Topsham Hydro" or "Applicant") applied to the DEP for WQC for the proposed relicensing and continued operation of the Project.

Well prior to Topsham Hydro's WQC application to the Department, the DEP had begun (as of January 9, 2020) and was thoroughly engaged in its Triennial Review ("TR") process of water quality classification for Maine waterways having received all proposals (by March 31, 2020) and public comments.[7] Concurrently with Applicant's WQC Application at DEP, the Board of Environmental Protection ("Board") was also engaged in reviewing TR comments, proposals, data submissions and DEP draft recommendations concerning, among other waterways, the potential reclassification of the Lower Androscoggin to Class B, including portions of river that Project affected waters are located in.[8] This included discussions, presentations, public hearings and/or receiving written comments on August 19, October 7, 25, December 2 and 16, 2021. Minutes from December 16th when the Board voted to recommend the legislature reclassify the lower Androscoggin from Merrymeeting Bay to Worumbo dam from C to B were approved 6-0 at the Board's January 20, 2022 meeting.[9]

The federal Clean Water Act (§ 303(c)(1); 40 CFR Part 131.20) requires that states periodically, but at least once every 3 years, hold public hearings for the purpose of reviewing water quality standards and, as appropriate, modifying and developing those standards. Maine Statute contains similar language in 38 M.R.S. § 464.3.B. The TR requires consultation with the public and interested state and federal agencies, *including DEP which was extensively involved throughout the entire process*. DEP had received extensive comments, proposals and actual river data demonstrating that the lower Androscoggin River was meeting Class B numeric standards for DO, macroinvertebrates and E. Coli among other things.[10] DEP initially opposed the re-classification of the lower Androscoggin, even as the proposal changed the upper boundary designation from Gulf Island Pond to a location downstream at Worumbo dam. However, after reconsideration

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[6] Record Exhibit 1 at 2. A description of the Project and its operations are summarized at pp. 2-4.
[7] See Exhibit (Supplemental) 2.
[8] See e.g. Exhibits (Supplemental) 3, 4, and 6.
[9] See Exhibits (Supplemental) 7, 8, and 9.
[10] See e.g. Exhibit (Supplemental) 2.

the Department supported the Androscoggin amendment in testimony before the Joint Committee on Environment and Natural Resources. DEP's own Director, Brian Kavanah testifying on February 28, 2022 (*fully eight months after the Topsham Hydro's WQC application had been submitted*)[11] stated:

> One upgrade in particular is worth noting. Section 19 upgrades the classification for the lower Androscoggin River, from Worumbo Dam to Merrymeeting Bay, from Class C to Class B. As you know, L.D. 676, *An Act to Reclassify Part of the Androscoggin River to Class B*, was carried over from last session to allow the Triennial Review process to proceed so that the ENR Committee could be informed by the Board's recommendation on this issue….
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> The Board, after considering all of the public comments on this issue, and the Department's recommendation to not support this upgrade, voted 4-0 to recommend to the Legislature that the section of the lower Androscoggin River from Worumbo Dam in Lisbon Falls to Merrymeeting Bay be upgraded to Class B. This section is significantly shorter than the section that was proposed in L.D. 676, as it starts at Worumbo Dam in Lisbon Falls rather than Gulf Island Dam which is approximately 19 miles upriver in the northern tip of Lewiston. Additional information on this issue is provided in the Board's report to the Legislature[1], on pages 48-51….
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> In summary, L.D. 1964, is the result of an extensive public process. It contains a variety of recommendations from the Board of Environmental Protection that would update Maine's water quality standards to make them more consistent with the Clean Water Act and to reclassify certain water bodies consistent with the latest data and highest use of these waters.[12] (internal footnote omitted).

Similarly, On December 16, 2022, the Board, following its deliberations supported the revised proposal (Merrymeeting Bay to Worumbo dam) and in January, 2022 recommended to the legislature the entire TR reclassification package which included the re-classification from Class C to Class B of the Lower Androscoggin from Worumbo dam to Merrymeeting Bay. The Project and affected waters are located within this segment of the river. Following public comment,[13] the Environment and Natural Resources Committee unanimously voted out the proposal, now LD 1964 "ought to pass" on March 17 and the legislature approved the reclassification enacting the proposal into law on March 29 (by Senate unanimous Roll Call following similar action by the House on March 24), and the Governor signed the bill into law on March 31, 2022.[14] The effective date of the law, as per statute is 90 days from closure of the legislative session (May 9) which would be August 8, 2022. FOMB and the other Appellants proposing the re-classification had participated extensively in this process and the proposal to re-

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[11] See Exhibit (Supplemental) 1, Affidavit of Ed Friedman and Exhibit 1 to that Affidavit, a timeline that has been compiled of both the TR and WQC processes.
[12] Exhibit (Supplemental) 11 at 3-4.
[13] See Exhibit (Supplemental) 10.
[14] See Exhibit (Supplemental) 12 and 13.

classify to Class B over a period of at least 8 years and in some cases had been advocating this change for nearly 20 years.

FOMB also provided comments to the Hydropower Coordinator during the DEP WQC process alerting DEP that lower Androscoggin reclassification would affect Brunswick, Pejepscot and Worumbo dams all coming up for relicensing within this decade.[15] It became rapidly apparent that with respect to the Pejepscot dam, a unique situation was occurring where the WQC was being issued during an extremely brief transitional time between the bill being enacted by the Governor's signature and its effective date 90 days following legislative adjournment. FOMB suggested a WQC amendment that would bring the WQC into compliance with the law with a simple condition – requiring compliance with Class B as of August 8, 2022.[16] DEP appears to have disregarded the classification comments while accepting other last-minute comments regarding the inclusion of MDMR participation in the WQC. DEP provided the draft and final WQC to FOMB only on the final issue date (June 8) despite FOMB's initial interest demonstrated by email on June 3. FOMB received the draft WQC on June 6 from the Atlantic Salmon Federation ("ASF," an organization also commenting on the WQC process) who received it from MDMR. DEP's failure to follow rule protocols regarding the availability of a draft WQC at least five days prior to the final draft being issued[17] was an apparent violation of DEP notice rules, precluded any realistic exploration, discussion or resolution of potential legal and technical issues related to the impending re-classification. Instead, the Department found time to incorporate some of the ASF suggestions[18] which were apparently submitted the at the same time. DEP has provided no explanation or justification for this discriminatory practice of selecting certain comments to respond to or incorporate in the WQC while apparently disregarding others.

II. Aggrieved Party Status

An aggrieved person may appeal to the Board for review of a licensing decision by the DEP Commissioner. See 06-096 CMR 2 SS 24(B)(1). "Aggrieved person" means "any person whom the Board determines may suffer particularized injury as a result of a licensing or other decision." Id. at I(B). Appellants, all working to improve Maine's water quality suffer significant particularized injury by issuance of this WQC locking in Class C conditions for the next 30-50 years. The practical effect of the Class C issuance for Class B water is to perpetuate the "room to pollute" status present prior to the upgrade

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[15] *See* Record Exhibit 2.

[16] Record Exhibit 2 at 3, Record Exhibit 3 at 1, and Record Exhibit 4 at 1. Record Exhibit 5 was also referenced in the FOMB/DEP communications and is a FOMB excerpted comment that was also submitted to BEP in the TR. It includes Topsham Hydro's Gomez & Sullivan, April 2020 study ("Gomez and Sullivan April 2020 Study").

[17] 06-096 DEP Rules Chapter 2 (18)(A) at 16 states: "Availability of a Draft License Decision. When an applicant or interested person submits a written request for a draft license decision, that draft decision must be provided to the requester, and made available at the Augusta Office and appropriate regional offices of the Department, at least 5 working days prior to the Commissioner taking final action on the application …." There is no provision for other deadlines that the DEP may self-impose.

[18] See Record Exhibit 7.

because as the actual river conditions were better than the classification, conditions could be degraded while still meeting the then current Class C conditions (for example 5ppm dissolved oxygen minimum instead of 7ppm). This can occur simply through Applicant's future modification of the dam's flow regime. This degraded water quality is harmful to fish life including the endangered Atlantic salmon for which the entire project area is Critical Habitat, all other aquatic species and human river users either in the river or near it. The harm is measurable and under the current WQC potentially sustained for decades. With respect to each co-Appellant's status:

FOMB works through research, advocacy, land conservation and education to protect and enhance the unique ecosystems of Merrymeeting Bay, the watershed and Gulf of Maine. Many of FOMB's members recreate and/or live on the lower Androscoggin River and are directly or indirectly affected by water quality in the Project area. FOMB hold numerous conservation easements around the Bay and has protected thousands of acres of valuable wildlife habitat around the Bay and six tributaries most of which are affected by lower Androscoggin water quality. FOMB has monitored water quality conditions on the lower Androscoggin generally and specifically including the project area for over 20 years and has orchestrated multiple upgrade efforts. They have the most complete actual data set, collected under DEP and EPA protocols, available for the lower river. Finally, it was FOMB together with Grow L+A that were the sponsors/authors of this most recent TR reclassification effort. They would suffer egregiously if this WQC is allowed to stand "as is" and are suffering greatly in time, resources and substantial attorney fees by having to appeal something that never should have occurred in the first place given the outcome from the TR.

Grow L+A is a non-profit dedicated to grow Lewiston and Auburn; promote responsible development, sustainable growth, social responsibility, healthy community and economic progress. A sizeable portion of their work is done by focusing on health of the Androscoggin because a healthy river translates to a vibrant, engaged and economically better-off community. Their members and constituency utilize the river in a variety of ways from recreation (i.e. boating and fishing), to real estate (promoting clean river views) and tourism (i.e. the river walk and balloon festival). Grow L+A was prime instigator of the current TR reclassification proposal and is significantly impacted by a Class C carve out the WQC Approval imposes.

Downeast Salmon Federation's mission is to conserve wild Atlantic salmon, other sea-run fish and their habitats, restore a viable recreational salmon fishery, and protect other important river, scenic, recreational, and ecological resources in eastern Maine. But understanding all Maine rivers are connected, DSF has been an avid supporter of the lower Androscoggin reclassification. Historically, the Androscoggin had an incredibly large salmon run and DSF as well as the other appellants would like to see this restored and spend significant time, effort and money towards that goal. As mentioned above, the entire project area is Critical Habitat for endangered Atlantic salmon as well as providing habitat for associated species like sea lamprey and river herring necessary for successful salmon restoration. DSF provided support for the TR upgrade proposal and testimony in favor of the upgrade and the existing WQC causes them particularized injury.

Native Fish Coalition Maine's mission is to protect, preserve and restore native fish populations through stewardship of the fish and their habitats. To this end NFC works on the Androscoggin and many other rivers and streams through such projects as educational heritage fish sign postings, removal of informal small rock dams, campaigning for Atlantic salmon as our "National Fish" and active participation in IF&W fish management plans. NFC actively assisted in preparation of the FOMB/Grow L+A TR upgrade proposal, supported it and testified in favor of it. A Class C carve out in the middle of otherwise Class B river habitat is injurious to the fish restoration efforts of NFC.

Friends of Sebago Lake's mission is to promote an understanding of the interconnected harmful impacts of unnatural freshwater flows by dam regulation and to advocate for the restoration of natural freshwater seasonal water flows from inland waters to the seas. This is a holistic mission encompassing virtually all artificially regulated rivers and lakes in Maine including the lower Androscoggin. As such, FOSL members suffer particularized injury when WQC's are issued, as is this case, where an improperly assigned lower classification allows for more restrictive flows than a higher classification may. FOSL has a long history of advocacy before this Board, the DEP and FERC and was an early supporter of upgrading the lower Androscoggin including the project area.

Maine Council of Trout Unlimited represents six local chapters with over 2,000 fisher-conservationists in Maine. The mission of the organization is to bring together diverse interests to care for and recover rivers and streams so our children can experience the joy of wild and native trout and salmon. Its members recreate and fish in the Project's affected waters. The affected segment of the Androscoggin River and all the waters below Lewiston Falls are also formally designated as critical habitat for endangered Atlantic Salmon. As TU has stated repeatedly in its prior filings, it is completely incongruous for this habitat to be designated Class C, Maine's lowest level of water quality. It is clear that major improvements to the water quality have already been realized, the Water Quality Certification should recognize this achievement and protect it.

Collectively Appellants have a long history of working to improve water quality and fish passage on many Maine rivers and specifically have actively worked to upgrade and or supported upgrade efforts and proposals on the lower Androscoggin including the project area. They have worked diligently to collect data, conduct analysis and participate over a period of approximately 20 years, multiple triennial reviews and multiple legislative initiatives to achieve Legislative approval and enactment of Maine law re-classifying this segment of the Androscoggin to Class B. Appellants will collectively and individually suffer a significant negative impact if a WQC Approval creates a Class C pollution "carve out" in the middle of a segment of river that has been legally re-classified to Class B.

III. Basis for the Appeal

1. The Department erred in approving the WQC on grounds that contravene enacted Maine Law regarding the water quality re-classification to Class B for the waters affected by the Project.

a. The Applicable Class B and Class C water quality standards.

DEP has publicly summarized the relevant water quality standards regarding river and stream water quality classification and they are reproduced in Exhibit (Supplemental) 5.[19]

b. The Project meets Class B and Class A standards for DO (which are the same), Class B bacteria numeric standards and Class A habitat and aquatic life narrative criteria downstream of the dam and water quality standards appropriate for impoundments above the dam.

In every known Project area data set recently sampled, the quantifiable water quality standards for dissolved oxygen (DO) do not just meet Class C water quality standards, they far exceed it. Water quality *surpasses* not only Class C but also Class A and B minimum standards (which are the same).[20] Similarly, for the tail race area below the dam, the modelled classification for aquatic life was Class A.[21]

Moreover, Applicant's study results indicate that water quality at the Project was within the DEP's other state water quality standards. Water temperatures and dissolved oxygen were relatively uniform throughout the water column within the Project impoundment, which resulted in no summer stratification. Over the study period, water temperature within the Project impoundment ranged from 12.0 ºC (October) to 26.9 ºC (August).[22]

Dissolved oxygen concentrations (as shown in the impoundment-from data collected by Applicant) ranged from 7.0 mg/l (July) to 9.9 mg/l (in October) and were well above the minimum state standard for Class C waters (5.0 mg/l). The dissolved oxygen percent saturation in the Project impoundment ranged from 82.2 percent (July) to 103.6 (September) percent throughout the monitoring period. The dissolved oxygen percent saturation in the Project impoundment exceeded the established state standard of 60 percent saturation for Class C waters (*and far exceeding 75% saturation for classes A and B).*[23]

Also, the water temperature in the Project tailwater ranged from 16.8 ºC (October) to 27.3 ºC (August) with an average of 23.5 ºC. [24] All of these parameters are within at least Class B classification criteria.[25]

Therefore, the actual data collected for the Project affected waters by the Applicant and others show that the waters meet or exceed Class B standards. A finding

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[19] Exhibit (Supplemental) 5 at p. 2.
[20] See Record Exhibit 5. See also Exhibit (Supplemental) 4 at 5 which referenced certain exhibits that were included in that submission (data exhibits 26, 27, 28, 38).
[21] See Exhibit 5 at 44.
[22] Id. at p.21.
[23] Id. at 25.
[24] Id. at 33.
[25] Record Exhibit 6 at 1.

by the DEP that the affected waters meet Class C is therefore on its face uncharacteristic of reality.

> 06-096 DEP rules Chapter 579, (3)(G) provides the following:
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> Professional judgment. Where there is documented evidence of conditions that could result in uncharacteristic findings, allowances may be made to account for those situations by adjusting the classification attainment decision through use of professional judgement, as provided in this section, paragraphs 3(G)(1) to 3(G)(3). The department may make adjustments to the classification attainment decision based on analytical, biological, and habitat information or may require that additional monitoring of affected waters be conducted prior to issuing a classification attainment decision.

Clearly, there is extensive documented evidence of Class B conditions and a finding of Class C under these circumstances is at best "uncharacteristic". The DEP made no "adjustment" to the classification attainment here and made no effort to accommodate what the data and information actually showed. Instead it force fit 2018 Applicant data into a justification for Class C instead of the higher classification it was revealing.

It was therefore clear error and an abuse of discretion and professional judgement for the DEP to conclude the Project meets Class C standards when the Project not only meets the re-classified Class B standards but in certain cases Class A and AA requirements under the DEP's own water quality guidelines and standards. This error is compounded by the fact that DEP was aware that the clear intent of the Board, the Legislature and the Governor was to re-classify the Project affected waters as Class B.

2. The WQC Approval violates Maine's antidegradation policy.

Maine's antidegradation policy (38 M.R.S. Section 464.4.F.4) provides, "When the actual quality of any classified water exceeds the minimum standards of the next highest classification, that higher water quality must be maintained and protected. The board shall recommend to the Legislature that that water be reclassified in the next higher classification."

These requirements have been met here and the Board did in fact recommend to the legislature that the Project's affected waters be re-classified as Class B and that re-classification was enacted into law. That is undisputed.

In fact, the DEP may only approve WQC which would result in lowering the existing quality of any water body after making the finding, following opportunity for public participation, that the action is necessary to achieve important economic or social benefits to the State.[26] The statutory provision that allows this provides that, in approving any lowering of existing water quality, the DEP must still find that the standards of classification of the water body and all other provisions of the antidegradation policy are met. The State's antidegradation policy has been duly and fully approved by EPA (by letters dated July 16, 1986; May 21, 1987; and December 20, 1990) as being in

[26] 38 MRSA § 464(4)(F)(5).

conformance with the requirements of the Clean Water Act and EPA's Water Quality Standards regulation (40 CFR Section 131.12). DEP has made no such appropriate findings and conclusions regarding antidegradation for the Project's affected waters, with full knowledge of the actual water quality meeting Class B. DEP has provided no specific findings and determinations with respect to whether the WQC will result in a significant lowering of existing water quality and whether the lowering of water quality is necessary to achieve important economic or social benefits to the State. Here the WQC, based on Class C standards will occur in a location that will be Class B in less than 30 days (possibly before this appeal is docketed on the Board's agenda for hearing) lowering the allowable water quality for this river segment for the next 40 years. DEP offers none of the required findings - only the conclusory statement that "the Department concludes that the Project meets the state's antidegradation policy."[27]

As set forth above, Applicant's own data, as well as data and information submitted in connection with the Board's TR[28] show that the Project and its affected waters meet the next highest classification, Class B. Issuing a WQC approval based on Class C requirements when the actual water quality meets Class B and in some cases exceeds Class B minimum standards is in direct violation of Maine's statutory antidegration policy and is therefore arbitrary, capricious and otherwise not in accordance with the law.

3. The WQC reopener is a critical jurisdictional flaw that may not be enforceable under state law.

The WQC Approval contains a "Reopener" Provision which is wholly inadequate to resolve the difference in legal timing between the LD 1964 enactment date March 31, 2022 and the effective date of August 8, 2022 when the Class B law becomes effective. It does not reference the re-classification of the affected waters specifically but merely states:

> The Department reserves the right to, in its discretion and upon notice to the applicant and opportunity for a hearing in accordance with its regulations, reopen the certification for the Pejepscot Hydroelectric Project to consider requiring further modifications or additional conditions as may be deemed necessary by the Department to ensure that the Project does not cause or contribute to any non-attainment of water quality standards.[29]

Further, DEP earlier includes in its Decision and Order the following statement:

> Upon any future determination by the Department that operation of the Pejepscot Project, as approved by the certification and as conditioned by FERC for the Project, may be causing or contributing to a decline in water quality or non-attainment of water quality standards, *the Department reserves the right to, in its discretion and upon notice to the Applicant and opportunity for hearing in accordance with its regulations, reopen this certification to consider requiring*

[27] Record Exhibit 1 at 28.
[28] See Exhibits (Supplemental) 2, 3, 4 and Record Exhibit 5.
[29] Record Exhibit 1 at 33.

> *modifications to the certification* or additional conditions as may be deemed necessary by the Department to ensure that the Project does not cause or contribute to any decline in water quality or non-attainment of water quality standards.[30] (emphasis supplied).

In addition to suggesting the "reopener" is discretionary when the re-classification to Class B is occurring at a date certain and as a matter of Maine law; these provisions are fundamentally flawed both in failing to acknowledge the imminent re-classification of the Project's affected waters to Class B as well as the open legal question of whether DEP would have the jurisdiction to reopen the WQC at all. There is also no provision procedurally for what if any recourse DEP or other affected parties will have if the Applicant objects and challenges DEP's authority to act. This is in addition to the needless time, cost and resources spent by all involved in pursuit of (or opposed to) a resolution that has already been resolved by the Legislature and the Governor.

Enforcement of hydroelectric facilities starts with the Federal Power Act (16 U.S.C. §791 *et seq*.). It charges FERC with licensing the development, improvement, and operation of hydroelectric projects along navigable waterways *and the enforcement of the terms of any license issued*. This jurisdiction applies to licensed hydroelectric facilities on all navigable waters, including state waterways. FERC re-licenses existing projects and oversees post-relicensing ongoing project operations, including through dam safety inspections and environmental monitoring. FERC jurisdiction over hydroelectric operations therefore presents a fundamental dilemma, and in Appellant's view, an open jurisdictional question in who can enforce the state water quality standards in a WQC once they are adopted and subsumed into the FERC license. Certainly, FERC can, but whether the state can enforce its own water quality standards when there is an ongoing violation or, as here, where it may wish to "reopen" the WQC, is unclear when it may be pre-empted from doing so during FERC licensed operations.

Accordingly, the WQC's "reopener" is not only begging a jurisdictional challenge or objection from the Applicant, but does not make any contextual sense in light of a date certain and imminent change in the law governing the affected waters. *As ordered by DEP this WQC, issued under Class C standards, will explicitly contribute to a decline in water quality and non-attainment of water quality standards in a designated Class B waterway on August 8, 2022.* This is a blatant abuse of discretion and professional judgement and in derogation of enacted Maine law.

4. The WQC issuance under Class C standards despite clear intent of Board, legislature, and Governor to re-classify by law the affected Project waters to Class B is therefore arbitrary, capricious and otherwise not in accordance with the law.

The standard for Board review of a DEP decision is whether the decision is arbitrary, capricious or characterized by an abuse of discretion.[31] Here there is no question or dispute that on August 8, 2022, just 30 days from the date of this Notice of Appeal, that the Project's legal Class B water status will become technically effective. It

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[30] Record Exhibit 1 at 32.
[31] 5 M.R.S.A. §11007(4)(C) (2021).

is therefore arbitrary, capricious and not otherwise in accordance with Maine law to issue a WQC Approval based on Class C water quality standards with no mandatory condition that the Project meet Class B standards when the law becomes effective. This highly unique if not "first of its kind" situation of a WQC being issued in the post-session transition period between enactment and effectiveness and requires the appropriate professional judgement based on context and explicit Board and Legislative intent.

5. The WQC Issuance is counter to the purposes of the Clean Water Act and the mission of the Maine Department of Environmental Protection.

The issuance was made on the basis of a technicality of the implementation date of the revised water quality classification of C to B. The CWA aims to prevent, reduce, and eliminate pollution in the nation's water in order to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters", as described in CWA section 101(a). Regarding the mission of Maine Department of Environmental Protection, DEP has been quoted publicly on its website stating "Legislative mandate directs DEP to prevent, abate and control the pollution of the air, water and land. The charge is to preserve, improve and prevent diminution of the natural environment of the State." The DEP WQC Approval ignores the intent of both and instead of capitalizing on an opportunity to act in furtherance of the Clean Water Act and its own mission, relies on a technicality to maintain the status quo. Issuing the certification specifying Class B was well within the discretion of the Department, especially given that its mission to "…improve and prevent diminution of the natural environment of the State."

IV. Existing Record/Supplemental Evidence.

A list of the exhibits to this Appeal is provided in Attachment A. These exhibits largely consist of correspondence with the Department, testimony, comments, attachments that were included in submitted comments (excerpted where possible) and information from the TR review, legislative materials, affidavit testimony and excerpted documents containing technical data and other publicly available information from FERC, the TR review or the DEP that may have formed the basis for DEP's decision.

Further, while FOMB and others made a request for the draft WQC, DEP has acknowledged the request and provided a copy but not with sufficient time for review as provided by rule. Thus, it has not been possible for Appellants to determine the full scope of the administrative record that the Department relied upon in making the WQC Approval determination or the extent to which DEP reviewed or relied upon much of the information contained in the Board's Triennial Review related to the Project. Therefore, as a precaution, Appellants are requesting that all documents listed in Attachment A be considered, if applicable, supplemental evidence, as well as incorporating the supplemental evidence so designated in Attachment A that are excerpted from the Triennial Review, the legislative record and Governor's office related to the Class B reclassification of the Lower Androscoggin River.

To the extent the non-designated documents in Attachment A constitute supplemental evidence, such supplemental evidence along with those documents designated as "supplemental evidence" meet the criteria of Chapter 2 of the Department's

Rules concerning administrative matters, including appeals of Commissioner License Decisions, 06-096 CMR Section 24(D), in that these records are relevant and material. Pursuant to Section 24(d)(2)(a), the person seeking to supplement the Department's administrative record must have shown due diligence in bringing the evidence to the attention of the Department at the earliest possible time. Many, if not all of the documents referenced in this Appeal were available to the Department directly as part of the Triennial Review process in addition to the WQC application process. Because the WQC Approval was issued on June 8, 2022, on or about the time Applicants were able to obtain a copy of the draft WQC, the submittal of any documents referenced in this Appeal that are not in the existing administrative record should be considered timely, as it would be unreasonable for Appellants to have identified and submitted those documents in less than 30 days since it had only one (1) day to review the draft WQC (acquired, not as provided for by Rule from DEP, but from another interested party), and it is at best unclear what records constituted the entirety of the Department's files on, or the administrative record for, this matter.

V. Evidence to be Presented.

Appellants anticipate presenting evidence on the history of water classification of the Androscoggin River and technical information regarding studies conducted for assessment of water classification in in the Project area and affected waters.

The evidence will be in the form of documents in the record and supplemental evidence presented (including the exhibits referenced herein), testimony of subject matter experts and witnesses relative to the issues identified above, demonstrative exhibits based upon information in the record or supplemental evidence, and other information relevant to the issues presented.

VI. Remedy.

Appellants do not agree that the “Reopener” provided for in the WQC Approval is legally or practically sufficient to ensure compliance with Maine Class B water quality standards becoming effective Maine law on August 8 of this year. This is because: (1) the Project already meets the higher classification (as demonstrated by Applicant’s own data and admission[32] plus additional data sources); (2) the date the Class B law becomes effective is date certain and imminent; and (3) the technical information, data and other information showing Class B status and reclassification has been in the Department’s hands since at least March of this year and indeed many years earlier as the DEP was a direct participant in the Board’s Triennial Review. There is also the time and uncertainty as to the notice and opportunity for hearing that is completely at odds with a non-discretionary enactment of law that is known to occur within approximately one month of this appeal. It also *requires* nothing of the DEP or the Applicant in the face of impending law. Accordingly, for these and the other reasons articulated above, Appellants request that the Board:

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[32] Record Exhibit 5 at p. 44. “The final determination indicated that the macroinvertebrate community sampled downstream of Pejepscot during August 2018 met Class A standards.”

A. Accept jurisdiction over this appeal and hold a public hearing on the issues raised in the appeal.

B. Withdraw the WQC Approval and issue a WQC finding that:

(1) the Project meets the applicable Class B water quality standards including applicable numeric and narrative criteria for this segment of the Androscoggin River; and/or

(2) amending and conditioning the existing WQC Approval with the express, *mandatory* condition that the Project will be required to meet Class B standards upon the August 8, 2022 effective date of legal reclassification; or

(3) deny the WQC and remand to the Department the WQC to approve or deny the WQC in accordance with Class B water quality standards.

Importantly, the legal questions regarding WQC conditions or requirements when that WQC is issued in the transition period between when a law is passed and enacted and when it technically goes into effect (90 days following legislative adjournment), need not be resolved by the Board if simple language requiring Class B compliance by the Applicant as a condition upon the law's effective date is inserted into the WQC. Should DEP's WQC Approval be upheld by the Board, appeals from that decision would not likely be resolved until after the effective date of the new law goes into effect which would make the WQC classification issue even more egregious. A simple mandatory condition[33] would obviate the need for any legal challenges that conceivably could be raised if the WQC licensee was being held to outdated legislative and legal requirements not yet technically effective at date of permit issuance.

Appellants reluctantly, and they believe unnecessarily, have been forced to pursue this appeal at great cost in time and expense to all participants. They reserve all rights available to them under state and federal law, including pursuit of any claims or appeals they may have judicially and before FERC with respect to the WQC Approval. Appellants note procedurally that should the Board approve the WQC as proposed by DEP in its current form, judicial review of the final agency action will almost certainly

[33] DEP has four options when receiving a WQC application, it can deny the application, approve the application, approve the application with conditions or waive its authority. WQCs with conditions predicated on future events are, and have been, very common in some cases with conditions that are much more complex that the remedy suggested here. Such conditions are often premised on settlement agreements or policy. If future WQC conditions can and are set according to policies and agreements they can certainly be codified based on existing, enacted law. *See e.g.* Sappi North America, Inc. Water Quality Certification and Amendments, Presumpscot River Hydro Projects #L-19713-33-N-M (Dundee), #L-19714-33-G-M (Gambo), #L-19715-33-G-M (Little Falls), #L-19716-33-G-M (Mallison Falls), #L-19717-3D-M-N (Saccarappa), October 10, 2018 Finding of Facts and Order (multiple conditions imposed in connection with future fish passage obligations.).

occur after the Class B law goes into effect. Appellants hope the Board will find a speedy common-sense resolution in keeping with their earlier recommendation and conditions, legislated by LD 1964 and enacted by the Governor when signed into law, that will avoid such a needless and wasteful outcome.

Please contact me should you have any questions,

Sincerely,

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Portland, Maine 04102
207 523-3477
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Counsel to Appellant,
Friends of Merrymeeting Bay

(co-Appellant signature blocks to follow)

Grow L+A

By: ___________________________
Peter Rubins
Its:

Downeast Salmon Federation

By:
Dwayne Shaw
Its: Executive Director

Native Fish Coalition, Maine Chapter

By:_____________________________
Tom Johnson
Its:

Friends of Sebago Lake

By:_____________________________
Roger Wheeler
Its:

Sebago Chapter of Trout Unlimited

By:_____________________________
Steve Heinz
Its:

Grow L+A

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Peter Rubins
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Dwayne Shaw
Its: Executive Director

Native Fish Coalition, Maine Chapter

By:______________________________
Tom Johnson
Its:

Friends of Sebago Lake

By:______________________________
Roger Wheeler
Its: President

Maine Council of Trout Unlimited

By:_ ____________________________
Steve Heinz
Its: Maine TU Council FERC Coordinator

Grow L+A

By: ____________________________
Peter Rubins
Its:

Downeast Salmon Federation

By:______________________________
Dwayne Shaw
Its: Executive Director

Native Fish Coalition, Maine Chapter

By:___o/s/b Tom Johnson___([illegible]) initialed
Tom Johnson
Its: Chairman

Friends of Sebago Lake

By:______________________________
Roger Wheeler
Its: President

Maine Council of Trout Unlimited

By:_ _____________________________
Steve Heinz
Its: Maine TU Council FERC Coordinator

Grow L+A

By: ____________________________
Peter Rubins
Its:

Downeast Salmon Federation

By:______________________________
Dwayne Shaw
Its: Executive Director

Native Fish Coalition, Maine Chapter

By:______________________________
Tom Johnson
Its:

Friends of Sebago Lake

By: Roger Wheeler
Roger Wheeler
Its: President

Sebago Chapter of Trout Unlimited

By:______________________________
Steve Heinz
Its:

Grow L+A

By:
Peter Rubins

Its: Treasurer & Chair, River Working Group

Downeast Salmon Federation

By:______________________________
Dwayne Shaw
Its: Executive Director

Native Fish Coalition, Maine Chapter

By:______________________________
Tom Johnson
Its:

Friends of Sebago Lake

By:______________________________
Roger Wheeler
Its:

Sebago Chapter of Trout Unlimited

By:______________________________
Steve Heinz
Its:

ATTACHMENT A

RECORD EXHIBITS

Exhibit 1. DEP Pejepscot Water Quality Certification Approval.

Exhibit 2. Compilation of Email correspondence between Ed Friedman and Kyle Olcott, DEP Hydropower Coordinator.

Exhibit 3. FOMB Letter to Olcott 6/5/22.

Exhibit 4. FOMB Comments to Olcott 6/6/22.

Exhibit 5. FOMB Comments (pp. 1-5 of exhibit) including Topsham Hydro Study (prepared by Gomez and Sullivan April, 2020) which is reproduced within comments on pp. 6-54 of exhibit. It is also the FOMB Triennial Review Exhibit 39 [print pages 1-54- Water Monitoring Sections] referenced in FOMB WQC comments.

Exhibit 6. FERC DEA pdf page 26 [2018 water quality summary] referenced in FOMB WQC comments.

Exhibit 7. ASF comments to Olcott 6/7/22 referenced in WQC Comments.

SUPPLEMENTAL EVIDENCE

Exhibit 1 (Supplemental). Ed Friedman Witness Affidavit and Timeline.

Exhibit 2 (Supplemental) FOMB TR Exhibit 28 DEP/FOMB VRMP Reports 2010-2018 (exhibits excerpted from comments and proposal submitted in TR showing actual water quality data in Project affected waters from 2010 to 2018).

Exhibit 3 (Supplemental) FOMB BEP Presentation 10-7-21.

Exhibit 4 (Supplemental) FOMB Andro Upgrade BEP Comments 10-25-21 (portions excerpted).

Exhibit 5. (Supplemental) Maine DEP Submission Guidelines, Proposals for Changes to Maine Water Quality Standards Under Triennial Review, Page 5 Appendix A Designated Uses and Criteria for Maine River and Stream Classifications.

Exhibit 6. (Supplemental) 10/21/2022 FOMB comments on Lower Androscoggin Upgrade (specifically referencing Topsham Hydro water quality data) (portions excerpted).

Exhibit 7. (Supplemental) Board of Environmental Protection Meeting Minutes 12/02/2021.

Exhibit 8. (Supplemental) Board of Environmental Protection Meeting Minutes 12/16/2021.

Exhibit 9. (Supplemental) Board of Environmental Protection Meeting Revised Agenda 12/16/202.

Exhibit 10. (Supplemental) LD 1964 Public Hearing Comments at Environmental and Natural Resources Hearing Monday, February 28, 2022 9:00 AM, Cross Building, Room 216.

Exhibit 11. (Supplemental) Testimony of Brian Kavanah, Director Bureau of Water Quality Maine Department of Environmental Protection speaking in support of L.D. 1964, 2/2/2022.

Exhibit 12. (Supplemental) State of Maine Legislature Summary of LD 1964.

Exhibit 13. (Supplemental) CH 551 Public Law S.P. 690 - L.D. 1964, An Act To Update Certain Water Quality Standards and To Reclassify Certain Waters of the State, approved by the Governor.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP Topsham, Lisbon, Durham, and Brunswick Sagadahoc, Cumberland, and Androscoggin Counties PEJEPSCOT HYDROELECTRIC PROJECT PROJECT #L007867-33-S-N (APPROVAL)	MAINE WATER QUALITY PROGRAM CLEAN WATER ACT WATER QUALITY CERTIFICATION

Pursuant to the provisions of 38 M.R.S. §§ 464 *et seq*., Section 401 of the Clean Water Act, 33 U.S.C. §§ 1341, and Department Rules 06-096 CMR Chapters 579-581, the Department of Environmental Protection (Department) has considered the application of TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP (Applicant or Topsham Hydro) with all supporting data, agency review comments, public review comments, and other related materials in the administrative record. Based on the record evidence and its professional judgment and expertise, the Department makes the following findings of fact, determinations, and conclusions:

1. APPLICATION SUMMARY

A. Application

On June 9, 2021, the Applicant applied to the Department for Water Quality Certification (WQC) pursuant to Section 401 of the CWA for the proposed relicensing and continued operation of the existing Pejepscot Hydroelectric Project, P-4784, (Pejepscot Project, or Project) located on the Androscoggin River in the towns of Topsham, Lisbon, Durham, and Brunswick, Maine.

B. History

The site of the Pejepscot Project was first developed in 1893 as part of a paper mill. The original timber crib dam failed between 1893 and 1896, and the spillway was rebuilt in 1896 in the current alignment. The Project was first licensed by FERC in 1982 for a term of 40 years. Originally, the Project included a single powerhouse, constructed in 1898. The Project was redeveloped between 1985 and 1987, which included rehabilitation of the dam, construction of a new powerhouse and fish passage, and modifications to the original powerhouse.

C. Existing Project Features

The existing Pejepscot Project consists of a 560-foot-long dam; a 225-acre impoundment; a 480-foot-long spillway at the crest of the dam, consisting of five hydraulically operated steel gates; two intake structures (one for each powerhouse) that are integral to the dam and powerhouses; an original powerhouse containing three generation units with a combined rated capacity of 1.588 megawatts (MW); a newer powerhouse containing one generation unit with a rated capacity of 12.3 MW; a tailrace directly below the dam; upstream fish passage facilities; downstream fish passage facilities; and appurtenant facilities.

1) *Project Dam*: The Pejepscot dam is a 560-foot-long, 47.5-foot-high, rock- and gravel-filled, timber-crib, overflow structure with a sheet-pile cutoff to bedrock along the upstream side. The cribs are topped with a 5-foot-thick reinforced concrete slab to protect the dam from erosion during periods of high river flow. There is no cribwork on the west end of the dam where the abutment rock level is high. The dam is abutted on the west side by a high bedrock outcrop and on the east side by a mass-concrete and stone-masonry pier.

2) *Project Spillway*: The 480-foot-long spillway runs along the crest of the dam. Spillway capacity is provided by operating five, 96-foot-long by 3-foot-high, hydraulically operated, steel bascule gates separated by concrete piers. The gates can be operated automatically or manually. The hydraulic pump units that operate the gates are contained in the mass-concrete pier forming the east abutment of the dam. The crest gate seals are heated to permit operation of the gates during cold weather, including movement when subjected to heavy ice pressure. The spillway has a discharge capacity of 95,000 cubic feet per second (cfs). Overtopping of the dam does not occur until the headwater reaches elevation 81 feet,[1] at which point the spillway discharge is approximately 110,000 cfs.

3) *Project Impoundment*: The Project dam impounds approximately 3,278 acre-feet of water over 225 acres at a normal full pond elevation of 67.2 feet, which is 0.3 feet below the top of the spill gates. The impounded water extends approximately 3 miles upstream of the dam. The Project is operated in run-of-river mode. During low inflow conditions, Topsham Hydro operates the Project to maintain the impoundment level near 67.2 feet and to provide the required minimum downstream releases and flows necessary for operation of the fish

[1] All elevations described in this water quality certification are referenced to U.S. Geological Service (USGS) datum.

passage structures. Under higher river flow conditions, water in excess of the hydraulic capacity of the generating units is spilled at the dam.

4) *Original Powerhouse*: The original powerhouse was constructed in 1898 and measures approximately 146 feet long by 97 feet wide. Its concrete intake structure is integral to the dam and includes a 71.4-foot-wide trashrack with 1.5-inch clear spacing. The powerhouse contains three horizontal Francis turbine-generator units (identified as Units No. 21, 22, and 23) with a combined output capacity of 1.58 MW. The maximum flow through each turbine is 350 cfs. Each of the units has an intake gate for dewatering and the tailrace water passage for the three units can be isolated from the downstream tailwater by means of a bulkhead-type gate, which is operated from the newer powerhouse intake deck using a mobile crane. Wicket gates are used to adjust the flow settings of the units. Outflows from the original powerhouse discharge into the tailrace directly below the dam.

5) *Newer Powerhouse*: The newer powerhouse was constructed in 1987 and is a concrete building with a steel frame measuring approximately 115 feet long by 60 feet wide. Its concrete intake structure is integral to the dam and includes a 91.6-foot-wide trashrack with 1.5-inch clear spacing at the top and 2.5-inch clear spacing at the bottom. The powerhouse contains a single, vertical-shaft Kaplan turbine-generator unit (identified as Unit No. 1) rated at 12.3 MW. The turbine has a minimum flow of 1,170 cfs and a maximum flow of 7,550 cfs. Wicket gates are used to adjust the flow settings of the unit. Outflows from the newer powerhouse discharge into the tailrace directly below the dam.

6) *Upstream Fish Passage Facility*: The upstream fish passage facility is a vertical lift (elevator) that lifts migratory fish in a hopper about 30 feet vertically from near the powerhouse tailrace to the impoundment level. The hopper is constructed of steel and is approximately 20 feet long and 7 feet wide with a sloping bottom. The hopper has a capacity of approximately 1,000 gallons. The inlet to the hopper is a V-trap about 8 inches wide by 8 feet high. There are four attraction pumps in front of the entry gate that create an additional flow up to 160 cfs through the entry channel to attract fish to the lift. The hopper discharges fish into a metal flume about 6 feet wide by 8 feet high. The flume is approximately 110 feet long from the lift hopper to the gate at the dam. There is a continuous flow of about 30 cfs from the impoundment to the hopper to attract fish to the impoundment.

7) *Downstream Fish Passage Facility*: The downstream fish passage facility consists of two steel entry weirs, one on either side of the Unit 1 turbine intake. Each entry weir has an invert elevation of 65.5 feet. From each weir, an outlet pipe conveys downstream migrating fish in water down to the tailwater. The weir gates are 4 feet wide and are part of an inlet box with the outlet pipe located on the side opposite the weir. The northerly weir has a 30-inch-diameter steel transport pipe that is approximately 60 feet long. Both pipes have a free discharge to the water below the dam. Each downstream bypass can pass approximately 13 cfs, 29 cfs, and 87 cfs at headpond elevations of 66.5 feet (low), 67.2 feet (normal), and 69.0 feet (high), respectively.

D. <u>Existing Project Operation</u>

The Project is operated as a run-of-river facility. The main turbine generator unit (Unit 1) controls the turbine wicket gates to maintain a preset pond level which is normally at about elevation 67.2 feet or 0.3 feet below the top of the spill gates. When Unit 1 nears its maximum flow capacity of 7,550 cfs, one or more of the three small units (Units 21, 22, and 23) is manually started. The small units are mainly operated during high spring runoff and after large storm events that increase river flows. Inflows in excess of the hydraulic capacity of the units are passed at the dam spillway. Inflows to the Project exceed the maximum capacity of the units approximately 25 percent of the time, on average. When the pond level reaches 69.0 feet (1.5 feet above the spill gates), the gates begin to lower starting with the gate closest to the powerhouse. The gates operate on pond level control and as flow increases, they maintain the pond level of 69.0 feet until all five gates are open. When the flow starts decreasing and the pond level drops to 68.0 feet, the gates start to close in order to maintain a level above 68.0 feet. When all five gates are closed, outflow is discharged through the generating units until the pond level exceeds 69.0 feet.

The Project releases a continuous minimum flow of 1,710 cfs, as measured immediately downstream of the Project powerhouse, or inflow to the impoundment, whichever is less.

E. <u>Project Proposals</u>

No new power development structures or generating facilities are proposed in this license application for the Project.

In its Final License Application[2] (FLA), the Applicant proposes to modify the Project boundary to fully enclose Project transmission lines and to include the access road to the

[2] The Final License Application is incorporated into the WQC Application by reference.

Pejepscot Fishing Park recreation area. Additionally, the Applicant proposes to work with the licensee of the adjacent, directly upstream, Worumbo Project (FERC No. 3428) to clarify and establish an appropriate project boundary for an approximately 0.95-acre area where the boundaries for the two projects currently overlap.

F. Proposed Operation, Minimum Flow, and Impoundment Water Level

The Project is located at river mile 14 on the Androscoggin River. The Androscoggin River flow regime is set by the Upper Androscoggin River Storage System, which consists of a series of headwater storage reservoirs located in Maine and New Hampshire. The upper portion of the Androscoggin River contains 16 run-of-river hydroelectric projects until reaching the Gulf Island Hydroelectric Project, which then re-regulates downstream flow for the lower Androscoggin River. The lower portion of the Androscoggin River contains 5 run-of-river hydroelectric projects, including the Project, which is the second dam upstream of the Androscoggin River's confluence with Merrymeeting Bay. The Project dam is approximately 4 miles upstream of the Brunswick Hydroelectric Project and 3.25 miles downstream of the Worumbo Hydroelectric Project.

The Applicant proposes to maintain year-round minimum flows of 1,710 cfs or inflow, whichever is less, and to operate in a run-of-river mode maintaining a normal pond elevation of 67.2 feet or 0.3 feet below the top of the spill gates.

G. Proposed Protection, Mitigation and Enhancement Measures

The Applicant proposes the following measures to protect and enhance environmental resources:

1) Topsham Hydro proposes to finalize and implement a Recreation Management Plan that includes measures improve and maintain Project recreation facilities.

2) Topsham Hydro proposes to finalize and implement a Historic Properties Management Plan.

3) Topsham Hydro proposes to finalize and implement an Operations Monitoring Plan.

4) Topsham Hydro executed two separate Settlement Agreement[s] for Modified Prescription for Fishways (Settlement Agreements) with the relevant federal agencies. One Settlement Agreement pertains to anadromous fish passage

and was signed by the National Marine Fisheries Service (NMFS), which is part of the U.S. Department of Commerce.[3] The other Settlement Agreement pertains to American eel passage and was signed by the U.S. Fish and Wildlife Service (FWS), which is part of the U.S. Department of Interior.[4] No Maine State agencies, including the Maine Department of Marine Resources (MDMR) and Maine Department of Inland Fisheries and Wildlife, are party to either Settlement Agreement or, to the Department's knowledge, to any other settlement agreement with the Applicant with respect to the Pejepscot Project.[5] Additionally, the Applicant did not revise its WQC application to reflect either Settlement Agreement nor did it notify the Department of any changes to its relicensing proposal as submitted in the FLA. The Department became aware of the Settlement Agreements when the Applicant filed copies with FERC via the FERC electronic filing system. On March 29, 2022, FERC staff issued an Additional Information Request to the Applicant asking it to clarify whether the Settlement Agreements were intended to modify its proposal in the FLA. On April 1, 2022, the Applicant responded to FERC staff and confirmed that the Settlement Agreements modify what it had proposed in the FLA.

2. JURISDICTION

The proposed continued operation of the Project qualifies as an "activity…which may result in [a] discharge into the navigable water [of the United States]" under Section 401 of the Clean Water Act (CWA). Section 401 of the CWA requires that any applicant for a federal license or permit to conduct such an activity must obtain a certification that the discharge will comply with applicable State water quality standards. State law authorizes

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[3] Under the terms of the Settlement Agreement with NMFS, signed February 3, 2022, Topsham Hydro will implement interim and permanent downstream fish passage measures for anadromous fish (Atlantic salmon, river herring, and American shad), based on the outcome of studies to be conducted by Topsham Hydro. For upstream passage, the Settlement Agreement includes initial modifications to operations of the existing fish lift, effectiveness monitoring of the initial modifications for the target species, potential additional modifications to the existing fish lift in the event that defined performance standards cannot be met, and effectiveness monitoring of the modifications.

[4] Under the terms of the Settlement Agreement with FWS, signed January 28, 2022, Topsham Hydro will implement both interim and permanent downstream passage measures for American eel, based on the outcome of studies to be conducted by Topsham Hydro. For upstream passage of American eel, the Settlement Agreement includes temporary upstream passage measures, permanent upstream passage measures, and effectiveness testing of those permanent measures.

[5] Maine State resource agencies do enter into settlement agreements for fisheries mitigation measures at hydroelectric projects and have done so with respect to other projects operated by the Applicant's parent company.

the Department to issue a WQC pursuant to Section 401 of the CWA when the standards of classification of the water body and the State's antidegradation policy are met.[6]

State WQC for the Project was last issued by the Department on October 27, 1982. Under a 1996 Executive Order of the Governor of the State of Maine, the Department is designated as the certifying agency for issuance of Section 401 WQC for all activities in the State not subject to Land Use Planning Commission (LUPC) permitting and review. Therefore, the DEP is the certifying agency for the Project.[7]

The Project is licensed by FERC as a water power project under the Federal Power Act (FERC Project No. 4784). The original FERC license was issued on September 16, 1982, and expires on August 31, 2022. Topsham Hydro has filed an Application for New License with FERC to continue to operate the project for another 30-50 years. That application is currently pending before FERC.

3. APPLICABLE STATE WATER QUALITY STANDARDS

A. Classification

The Androscoggin River meets the definition of a river, stream or brook pursuant to 38 M.R.S. § 480-B(9). The portion of the Androscoggin River at issue in the application is designated as Class C waters from the confluence with the Ellis River to a line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction.[8,9]

B. Designated Uses

The Applicant must demonstrate that the Pejepscot Project riverine impoundment and Androscoggin River below the Project meet the Class C water classification standards and the designated uses described in 38 M.R.S. § 465(4)(A):

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[6] 38 M.R.S. § 464(4)(F)(3).
[7] Executive Order No. 3 FY 96/97.
[8] 38 M.R.S. § 467(1)(A)(2).
[9] On March 31, 2022, the Governor signed Public Law 2021 Chapter 551 into law. This law reclassifies certain waters of the state, including changing the classification for a portion of the lower Androscoggin River that includes the Pejepscot Project from Class C to Class B. The reclassification becomes effective on August 8, 2022, which is after the issuance date of this Water Quality Certification. Therefore, this Water Quality Certification applies Class C water quality standards to the Pejepscot Project. Chapter 2, § 11(F).

> Class C waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, Section 403; navigation; and as habitat for fish and other aquatic life.

C. Numeric Standards

The Applicant must demonstrate that the Pejepscot Project impoundment and the Androscoggin River below the Project dam meet the following numeric Class C standard set forth in 38 M.R.S. § 465(4)(B):

> The dissolved oxygen (DO) content of Class C waters may be not less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes must be maintained.[10]

D. Narrative Standards

The Applicant must demonstrate that the Androscoggin River below the Pejepscot dam meets the following Class C narrative standards:

1) Discharges into Class C waters may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.[11]

2) Hydropower facilities managed under riverine classifications under 38 M.R.S. § 465 (such as the Pejepscot riverine impoundment) are additionally subject to 38 M.R.S. § 464(10) in recognition of some changes to aquatic life and habitat that have occurred due to the existing impoundments of these projects. Under Section 464(10), Class C riverine impoundments are generally deemed to meet classification standards if the aquatic life and habitat in those impounded waters achieve Class C aquatic life criteria found at 38 M.R.S. § 465(4)(C), provided that no changes can be made to improve such habitat that does not significantly affect existing energy generation capacity.[12]

[10] The Pejepscot Project is not located in an identified salmonid spawning area.
[11] 38 M.R.S § 465(4)(C).
[12] 38 M.R.S. § 464(10)(A)-(B).

E. Antidegradation

The Department may only approve WQC if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve WQC for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification.[13]

F. Department Rules

Attainment of water quality standards is assessed through application of the following Department Rules.

1) 06-096 Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams.

Criteria to quantify aquatic life standards for Classes AA, A, B, and C waters are defined in this chapter. The benthic macroinvertebrate community is used as a surrogate to determine conformance with statutory aquatic life standards, related statutory definitions, and statutory provisions for the implementation of biological water quality criteria that are provided in Maine's standards for classification of fresh surface waters. Methods described in this chapter are used to make decisions about classification attainment.

2) 06-096 Chapter 581: Regulations Relating to Water Quality Evaluations.

These rules provide for the maintenance of stream and lake classifications without violations by computing capacity of the waters to break down waste and shows fish, wildlife, and organisms in the receiving water to migrate both up and downstream in an undisturbed section of river adjacent to the waste discharge outfall. In addition, a scale of 0-100 is established in order to measure the trophic state or degree of enrichment of lakes due to nutrient input.

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[13] 38 M.R.S. § 464(4)(F)(3).

4. DEPARTMENT ANALYSIS

A. Aquatic Habitat (38 M.R.S. § 465(4)(A); 38 M.R.S. § 464(10)(A)(1))

For this standard, the Applicant must demonstrate that the Pejepscot riverine impoundment and outlet stream below the dam are suitable for the designated use as habitat for fish and other aquatic life. The Applicant also must demonstrate that this impounded section of the Androscoggin River and portion of the river below the dam are of sufficient quality to support indigenous aquatic species consistent with the applicable narrative standard.

Additionally, since indigenous aquatic species native to the section of the Androscoggin River occupied by the Project, both above and below the Pejepscot Dam, include diadromous fish, the Applicant must demonstrate that the waters of the Androscoggin River, including where these waters flow through and over the Pejepscot Dam, provide for the safe, timely, and effective passage of diadromous fish, ensuring that the river is of sufficient quality to support all indigenous aquatic species and that the discharge of the river water from the dam does not cause an adverse impact to indigenous diadromous fish.

1) Aquatic Habitat – Riverine Impoundment (38 M.R.S. § 465(4)(A); 38 M.R.S. § 464(10)(A)(1))

Attainment of aquatic habitat standards can be demonstrated in a variety of ways, including through evaluation of the structure and function of the biotic community, and measurement or submission of other data or evidence that demonstrates a sufficient maintenance of the impoundment's littoral zone.[14] Absent other evidence, and based on its professional experience, expertise, and judgment, the Department generally presumes the presence and suitability of sufficient aquatic life and habitat, especially for small or young fish as well as other aquatic life that rely on that refuge and forage provided by nearshore aquatic vegetation, when at least 75% of an impounded area, called the littoral zone, as measured from full pond conditions, remains watered at all times. Conversely,

[14] The 'littoral zone' of lakes and lake-like waterbodies, including some riverine impoundments, is defined in limnology as the portion of a lake where light penetration allows plant growth on the bottom. The littoral zone extends from the shoreline to the maximum depth where plants on the bottom receive enough sunlight for photosynthesis. This depth, known as the euphotic zone, is commonly estimated as the depth which receives approximately 1% of incident light. (Cole, 1979.) While depth of the zone varies with many factors, it can be estimated as a multiple of the Secchi disk transparency (SDT). Based on Tyler (1968), for more than 20 years the Department has delineated the littoral zone using a depth two times the SDT for purposes of determining attainment of Maine's Water Quality Standards.

and again absent other evidence, water levels that provide wetted conditions for approximately 75% of the littoral zone of an impounded area, as measured from full pond conditions, are generally presumed necessary to meet aquatic life and habitat standards. This rebuttable presumption, as developed through the exercise of the Department's professional experience, expertise, and judgment also is reflected in the Department's Hydropower Project Flow and Water Level Policy, dated February 4, 2002 (Water Level Policy). This rebuttable presumption is not a rule, but a guideline the Department applies on a case-by-case basis, informed by best professional judgment, and considering site-specific circumstances.

a. Existing Habitat and Resources

The Department finds that the Pejepscot riverine impoundment extends approximately three miles upstream of the Project dam with a surface area of 225 acres at normal full pond elevation of 67.5 feet. The Project is operated as a run-of-river facility, has no significant storage capacity, and has no significant effect on the overall river flow of the Androscoggin River. Operation of the bascule gates minimizes impoundment fluctuations to approximately 1.5 feet of the normal full pond elevation (69.0 feet) when inflows exceed the hydraulic capacity of the units, and the impoundment is typically held near 67.2 feet (0.3 feet below the top of the bascule gates). High flow conditions beyond the Applicant's control may result in water levels exceeding 69.0 feet.

The Department finds that the run-of-river operations provide a relatively stable head pond elevation while passing inflows. Such operations protect existing littoral habitats from changes related to water level fluctuations.
The Little River enters the Androscoggin in the furthest upstream areas of the Project impoundment and is the only major tributary in the vicinity of the Project.

b. Studies

In the FLA, the Applicant provides historical discharge and impoundment water level data. The data indicates that Project operations generally maintain consistent water levels, and attenuate high-inflow events. Project operations limit impoundment water level fluctuations to approximately two feet, typically ranging from a baseline of 67.2 feet to a maximum of 69.0 feet during periods of high inflow.

c. Discussion and Findings

The Department finds that the Project is operated as a run-of-river facility and that the Applicant demonstrated this by providing discharge and impoundment water level data.

The Department further finds, based on data submitted by the Applicant, that Project operations do not cause the water level to fluctuate or draw down the riverine impoundment water level for the purpose of hydropower generation. Run-of-river operations maintain relatively stable water levels with minimal impoundment fluctuation from full pond conditions, subject only to natural variations related to precipitation events. Therefore, the Project maintains 75% of the littoral zone in wetted conditions as measured from full pond, protecting habitat in the littoral zone. Except for fish passage, which is discussed separately below in Section 4(A)(3), based on the evidence provided by the Applicant, the Department, applying its professional judgement through application of its Water Level Policy, determines that the Pejepscot riverine impoundment meets the applicable aquatic life and habitat criteria.

2) Aquatic Habitat – Outlet Stream (38 M.R.S. § 465(4)(A), (C))

For this standard, the Applicant must demonstrate that the Class C waters, such as those at the outlet of the Pejepscot dam, are of such quality that they are suitable for the designated use of habitat for fish and other aquatic life. Discharges to Class C waters may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

To meet Class C aquatic life standards in the riverine outlet waters, the Applicant must demonstrate two things. First, the Applicant must show that the macroinvertebrate community attains Class C aquatic life criteria according to the Department's Chapter 579 rule. The benthic macroinvertebrate community is an indicator of the general state of aquatic life for the purpose of attainment of outlet stream aquatic classification standards.

Second, the Applicant must show that the flow of water in the Androscoggin River is sufficient to support the designated use of habitat for fish and other aquatic life. The Department generally presumes, absent evidence to the contrary, that flow providing wetted conditions for at least 75% of the cross-sectional area of the affected river or stream, as measured from bankfull conditions, is needed to meet aquatic life and habitat standards. The Applicant can demonstrate attainment of these standards by providing evidence that 75% of the cross-section of the outlet stream is wetted at all times. This rebuttable presumption, as developed through the exercise of the Department's professional experience, expertise, and judgement is also reflected in the Department's Water Level Policy.

a. Existing Habitat and Resources

The reach of the Pejepscot River downstream of the Project dam includes backwater, pool, riffle, run, and glide mesohabitat types with a variety of substrate types including gravel, cobble, sand, mixed bedrock, small boulder, rubble, and large bolder. The most common mesohabitat types are pool (38% of total habitat area), backwater (28% of total habitat area), and run (20% of total habitat area).

b. Studies

The Applicant completed a survey of aquatic habitat in the Androscoggin River downstream of the Pejepscot dam and a Benthic Macroinvertebrate study to determine if the aquatic community meets Maine's water quality standards in the waters downstream of the Project tailrace. Additionally, the Applicant submitted Project water level and flow data that indicate that the Project operates in run-of-river mode.

The Applicant conducted the Benthic Macroinvertebrate study downstream of the Project dam and tailwater in accordance with the Department's standard methods.[15] The Applicant installed rock baskets approximately 660 feet downstream of the Project at the approved sampling location on August 2, 2018, and retrieved them on August 29, 2018. The samples were sent to a laboratory for sorting and examination. The Department input the study data into its linear discriminant model and the results of the model indicate that the area below the Project dam meets Class C aquatic life criteria.

c. Discussion and Findings

Studies conducted by the Applicant demonstrate and the Department finds and determines that the existing Project flow regime maintains and supports habitat for aquatic species in the Androscoggin River downstream of the Project dam.

The Applicant demonstrated through a Benthic Macroinvertebrate study and the Department determined using its linear discriminant model that the benthic community downstream of the Project meets Class C aquatic life criteria.

The Applicant demonstrated through its submission of Project water level and flow data that the project operates in run-of-river mode and that the flow of water in the area downstream of the Project dam is sufficient to support a variety of aquatic habitat types. Project operations ensure a flow providing wetted conditions for at least 75% of the

[15] Davies and Tsomides. 2014. *Methods for Biological Sampling and Analysis of Maine's Inland Waters.*

cross-sectional area of the Androscoggin River below the Project dam, as measured from bankfull conditions. Except for fish passage, which is discussed separately below in Section 4(A)(3), based on the evidence provided by the Applicant, the Department, applying Chapter 579 and its professional judgement through application of its Water Level Policy, determines that the area downstream of the Project dam meets the applicable aquatic life and habitat criteria.

The Department, therefore, determines that flows provided by current and proposed Project operations provides sufficient water quality and sufficient water quantity to support the Class C designated use of habitat for fish and other aquatic life downstream of the Project.

3) Aquatic Habitat – Fish Passage (38 M.R.S. § 465(4)(A), (C))

The Pejepscot Project is a run-of-river project with all of the water of the Androscoggin River flowing through or over the dam, discharging to the river. By influencing the flow of the water in the river, the dam and its discharge impacts the ability of fish to pass the section of the river where the dam is located. By influencing fish passage, the dam and its discharge affect the biological integrity[16] of the waters in the river. As an aquatic ecosystem, the Androscoggin River is home to and supports a variety of aquatic life. Diadromous fish are part of the biological community in the river and, due to their migratory nature and life cycle needs, must be able to pass the Pejepscot Dam to spawn. Unless diadromous fish have the ability to pass the dam, the Androscoggin River cannot support these species of fish.

For the Applicant to satisfy applicable State water quality standards, the Applicant must demonstrate that the water flowing through and over the Pejepscot Dam, which discharges into the Androscoggin River, supports indigenous species and does not cause adverse impact to aquatic life. This requires showing that the discharge from the dam supports safe, timely, and effective upstream and downstream fish passage. Safe, timely, and effective fish passage is necessary to avoid detrimental changes in the resident biological community.

[16] The department understands biological integrity to generally mean the ability of an aquatic ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats within a region.

a. Existing Habitat and Resources

In the lower reaches of the Androscoggin River, including in the Project vicinity, the fish assemblage consists of but is not limited to native diadromous species such as Atlantic salmon, American shad, alewife, and blueback herring, sea lamprey, and American eel.

b. Studies

In 2019, the Applicant conducted studies evaluating the effectiveness of the existing upstream passage facilities for adult American shad and river herring (alewife and blueback herring), as well as downstream effectiveness studies for American shad, river herring, and American eel. No effectiveness testing was conducted for sea lamprey.

The results of the upstream passage studies indicate that overall fish lift effectiveness was poor, with passage rates of 19.8% for river herring and 0% for American shad. The results of the downstream passage studies indicate that the downstream fish bypass is similarly ineffective, with most river herring, American shad, and American eel passing the Pejepscot dam via the spill gates or through the Unit 1 turbine instead of through the downstream fish bypass. Specifically, 22% of adult river herring, 31% of juvenile river herring, 9% of adult American shad, and 2% of adult American eels passed downstream of the dam via the downstream fish bypass. These study results demonstrate that the Project's existing upstream and downstream fish passage facilities do not provide safe, timely, and effective fish passage.

c. Applicant's Proposal

The applicant proposes to improve fish passage at the Pejepscot dam. Its proposal is best reflected in the two separate Settlement Agreements that the Applicant developed with the FWS and NMFS, as opposed to in the FLA and WQC application filed with the Department. The Applicant's intent to modify its Project proposal to incorporate the terms of the Settlement Agreements is evident from the Applicant's April 1, 2022 filing with FERC, responding to questions from FERC staff and confirming that the Settlement Agreements modify what the Applicant had proposed in the FLA.[17] Therefore, the

[17] While in this case the Department learned of the Applicant's modification of its proposed operation of the Pejepscot Project with respect to fish passage – a modification that directly bears on the Department's evaluation of whether the Project meets State water quality standards – through monitoring and review of documents filed with FERC, the responsibility rests with applicants to provide the Department with its water quality certification application and any

Department reviewed the fish passage measures contained in the Settlement Agreements. The Settlement Agreement that the Applicant executed with NMFS includes the following measures:

1. Interim spillage for Atlantic salmon smolt passage.
2. Interim nighttime shutdowns for American eel downstream passage beginning in the first passage season after license issuance through 2032.
3. An optional study to determine the effectiveness of the interim nighttime shutdowns after three passage seasons with results reported in 2028.
4. If the nighttime shutdowns described in the Settlement Agreement with FWS are a viable long-term means of protection for American eel downstream passage, the Applicant will install a fish guidance boom to direct downstream migrating river herring and Atlantic salmon to a new bypass within bascule gate No. 1 to be operational for the 2029 downstream passage season.
5. Effectiveness testing of the fish guidance boom to be conducted over two seasons after a one-year shakedown.
6. If the nighttime shutdowns described in the Settlement Agreement with FWS are not a viable long-term means of protection for American eel downstream passage or if the Applicant chooses not to conduct the optional effectiveness study, then the Applicant will install permanent downstream protection measures consisting of seasonal trashracks with bar spacing of a maximum of ¾-inches by the 2033 downstream passage season.
7. Initial fish lift modifications to operate the attraction water system at full capacity unless monitoring studies indicate different operations are warranted.
8. Determination of fish lift operation schedule on an annual basis in consultation with NMFS and FWS.
9. Fish lift effectiveness monitoring beginning in the first full passage season after license issuance conducted over two passage seasons. The studies will evaluate the effectiveness of the initial modifications for adult Atlantic salmon, river herring, and American shad.
10. Identification of anticipated performance standards with establishment of final fish passage performance standards in consultation with NMFS.
11. No later than 2027, modification to the fish lift flap gate if the defined performance standards for river herring and American shad cannot be met.

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modifications to the proposed activity for which a federal license and corresponding WQC is sought. Filings with FERC associated with a FERC license application are not automatically incorporated in the WQC application record before the Department.

The Settlement Agreement that the Applicant executed with FWS includes the following measures:

1. Interim nighttime shutdowns for American eel downstream passage beginning in the first passage season after license issuance through 2032.
2. An optional study to determine the effectiveness of the interim nighttime shutdowns after three passage seasons with results reported in 2028.
3. If the nighttime shutdowns are not a viable long-term means of protection for American eel downstream passage or if the Applicant chooses not to conduct the optional effectiveness study, then the Applicant will install permanent downstream protection measures consisting of seasonal trashracks with bar spacing of a maximum of ¾-inches by the 2033 downstream passage season.
4. Deployment of temporary upstream eel ramps until permanent measures are implemented.
5. Final design, permitting, and construction of permanent upstream eelway during the third year of the new license. The eelway will be operational by the fourth year after license issuance.

The Department has reviewed the Settlement Agreements and finds that the two agreements contain similar but slightly different measures, particularly related to the proposed fish guidance boom included in the NMFS Settlement Agreement but not included in the FWS Settlement Agreement. Additionally, the FWS Settlement Agreement includes no mention of any consultation with other State or federal resource agencies, while the NMFS Settlement Agreement includes some requirements to consult with other resource agencies regarding some, but not all, conditional or adaptive management measures. Common among the two Settlement Agreements is that they are iterative in nature, involving interim measures, effectiveness testing, and permanent measures that are to be developed based on results.

The most important components of the Applicant's proposal involve the following three measures: 1) establishment of performance standards for fish passage, 2) permanent downstream fish protection measures consisting of seasonal trashracks with bar spacing of a maximum of ¾-inches, and 3) modifications to the fish elevator to install a flap gate. These measures are described in the Applicant's proposal and are contingent on the results of additional studies and future consultation. The Applicant's proposal, as reflected in the NMFS Settlement Agreement, identifies "anticipated performance standards for alosines"[18] that may be similar to those from other river systems such as the Connecticut River. The anticipated performance standards for alosines described in the Applicant's proposal are upstream passage efficiency of at least 70% within 48 hours of a fish approaching the Project works and a downstream survival required to exceed 95%. The Applicant proposes to install permanent downstream fish protection measures only if it either chooses not to conduct an effectiveness study, or if its proposed, optional 3-year effectiveness study fails to indicate that nighttime shutdowns are a viable long-term means of protection for American eel passing downstream of the Project. Additionally, the Applicant proposes to modify the fish elevator to install a flap gate only if either it chooses not to conduct an effectiveness study or if its proposed, optional upstream passage effectiveness study indicates that the current entrance to the fish elevator does not meet performance standards.

d. Discussion and Findings

The data provided by the Applicant demonstrates that the Project's existing upstream and downstream fish passage facilities do not provide safe, timely, and effective fish passage. The study results indicate that the water flowing through and over the Pejepscot Dam, which discharges into the Androscoggin River causes adverse impacts to aquatic life and detrimental changes in the resident biological community.

The Applicant's proposal, which has been modified by the Settlement Agreements as indicated in the Applicant's April 1, 2022, response to FERC Additional Information Request, is reflected in these two separate agreements with NMFS and FWS. Central to both is the implementation of interim measures, monitoring of outcomes, further consultation with resource agencies, and implementation of permanent passage measures. The goal of both agreements is to improve upstream and downstream passage and, as stated in the Applicant's correspondence with FERC submitting the Settlement Agreements to the federal licensing agency, "to establish a comprehensive approach to safe, timely, and effective passage for all species at the Project."

To obtain certification, the Applicant must demonstrate that its proposed operation of the Project will meet State water quality standards. This includes demonstrating that the water flowing through and over the Pejepscot Dam, which discharges into the Androscoggin River, supports indigenous species and does not cause adverse impact to aquatic life. This requires showing that the discharge from the dam supports safe, timely, and effective upstream and downstream fish passage. Safe, timely, and effective fish passage is necessary to avoid detrimental changes in the resident biological community.

[18] Alosine refers to members of the subfamily Alosinae, which includes alewives, American shad, and blueback herring.

The Department finds that the Applicant's proposal for improving fish passage at the Project, as reflected in the Settlement Agreements, provides a framework for achieving safe, timely, and effective fish passage. However, adherence to this framework and the decisions made within this framework ultimately will determine whether this level of passage is achieved and the Project is operated to support indigenous species in accordance with State water quality standards.

For example, with respect to American eel passage, the Applicant proposes interim nighttime shutdowns during the downstream migration season. The Applicant proposes to study the effectiveness of the interim measures over three years and to determine whether the interim measures are sufficient in consultation with FWS and NMFS. If the interim measures are not effective, then the Applicant proposes to install permanent downstream protection measures for American eel consisting of angled 3/4-inch trashracks. The results of any decision to continue the proposed interim measures or to implement the proposed permanent measures has the potential to significantly influence fish passage at the Project. To ensure that the State's interest with respect to achieving safe, timely, and effective fish passage consistent with the State water quality law is represented and that the Applicant has the full benefit of the fisheries expertise of the State with respect to this Maine river, the Applicant must consult with MDMR as part of and prior to determining whether the proposed permanent measures must be implemented. If during this consultation and after review of the three years of effectiveness studies MDMR provides written comments to the Applicant that the interim measures have not achieved safe, timely, and effective passage for American eel, within 60 days of receipt these comments the Applicant must provide a written response the Department for review. The response must identify any points of agreement and explain the basis for any areas of disagreement.

Further, along with initial fish lift modifications the Applicant proposes, through the NMFS Settlement Agreement, to adaptively manage both the lift frequency and operating hours on an annual basis, with the schedule set annually prior to each fish passage season. This schedule has the potential to significantly influence fish passage at the Project. To ensure that the State's interest with respect to achieving safe, timely, and effective fish passage consistent with State water quality law is represented and that the Applicant has the full benefit of fisheries expertise of the State with respect to this Maine river, the Applicant must consult with MDMR as part of and prior to determining lift frequency and facility operating hours before each fish passage season. If during this consultation MDMR provides written comments to the Applicant recommending lift frequency or operating hours determined by MDMR to be necessary to provide safe, timely, and effective passage for all fish species using the lift, within 60 days of receipt of these comments the Applicant must provide a written response to the Department for review.

The response must identify any points of agreement and explain the basis for any areas of disagreement.

Additionally, an important component of the NMFS Settlement Agreement is the identification of anticipated performance standards for alosines with an upstream passage efficiency of at least 70% within 48 hours of a fish approaching the Project works and a downstream survival required to exceed 95%. Achievement of appropriately set performance standards will ensure safe, timely, and effective fish passage. The anticipated standards proposed by the Applicant appear, at least in part, to have been based on performance standards for a separate project located on a river in Massachusetts. To verify these standards are appropriate for translation to the Androscoggin River in Maine or to establish final, project-specific standards, consideration of the fisheries resources in this river is needed to ensure passage is adequate to support indigenous species and not cause adverse impact to aquatic life. Consistent with MDMR's comments on the draft Order, this involves recognition that each species of alosine (American shad, blueback herring, and alewife) has different life history requirements and measures that result in effective passage of one species may not yield the same results for another species. Therefore, the final standards should be tailored to each alosine species, which may result in different performance standards for individual species or clarification that a single standard applies individually to each alosine species. This will ensure inefficient passage for one species will not be masked by successful passage of another and is consistent with the Applicant's stated goal "to establish a comprehensive approach to safe, timely, and effective passage for all species at the Project."

To ensure that the State's interest with respect to achieving safe, timely, and effective fish passage consistent with the State water quality law is represented and that the Applicant has the full benefit of the fisheries expertise of the State with respect to individual alosine species in the Androscoggin River , as part of the establishment of final standards, the Applicant must consult with MDMR prior to establishment of final performance standards for alosines. The Project must then be operated to achieve these final performance standards. If during consultation MDMR provides written comments to the Applicant recommending specific performance standards determined by MDMR to be necessary to provide safe, timely, and effective passage for each species of alosine, within 60 days of receipt of these comments the Applicant must provide a written response to the Department for review. The response must identify any points of agreement and explain the basis for any areas of disagreement.

Until the establishment of final performance standards following consultation with MDMR, the Project must be operated to achieve the anticipated performance standards identified in the NMFS Settlement Agreement and incorporated into the Applicant's proposed operation of the Project.

The Applicant's proposal for passage for alosines includes a series of interim measures and related studies. For downstream passage, evaluation of the effectiveness of a fish guidance boom is proposed, but implementation of the boom depends on what measures are implemented for downstream American eel passage. Alternatively, trash racks will be installed as permanent downstream protection measures. For upstream passage, initial fish lift modifications followed by monitoring and potential flap gate modifications are proposed. If following the monitoring and study of downstream and upstream passage of alosines proposed by the Applicant as reflected in the NMFS Settlement Agreement, fish passage at the Project does not achieve the final downstream and upstream performance standards, or the anticipated downstream and upstream performance standards if they remain controlling as outlined above, the Applicant must prepare an adaptive management plan. The plan must contain improvements and a clear implementation timeline to efficiently and effectively achieve passage equal to or better than the performance standard(s) it failed to meet. Improvement measures may include, among other things, minor modifications to operation or building an additional upstream fishway. The plan must provide for testing and reporting to the Department on the success of implemented improvements. The adaptive management plan must be submitted to the Department for review and approval within six months of effectiveness monitoring, conducted in accordance with the Applicant's proposals as reflected in the NMFS Settlement Agreement, showing the upstream or downstream performance standards are not being met.

Provided the Applicant complies with the requirements included in this Section 4(A)(3)(d) and conditions below, the Department finds the fish passage proposed by the Applicant, as reflected in the Settlement Agreements, will be safe, timely, and effective and sufficient to avoid detrimental changes in the resident biological community. The water flowing through and over the Pejepscot Dam, which discharges into the Androscoggin River, will support indigenous species and will not cause adverse impact to aquatic life.

B. Dissolved Oxygen (38 M.R.S. § 465(4)(B))

For this standard, the Applicant must demonstrate that the dissolved oxygen (DO) content will not be less than 5 parts per million (ppm) or 60% saturation, whichever is higher. The Applicant also must demonstrate that DO will not be less than 6.5 ppm as a 30-day average based on a temperature of 22 degrees centigrade or the ambient temperature of the water body, whichever is less.

1) Existing Habitat and Resources

The Department finds that the Pejepscot impoundment has a surface area of approximately 225 acres at full pond, with a water surface elevation of 67.5 feet. The impoundment extends approximately 3 miles upstream at full pond. The Androscoggin River below the Pejepscot Project powerhouse and dam receives flows released from the powerhouse, leakage flow from the dam, runoff, and ice melt. The Project is located approximately 14 miles upstream of the mouth of the Androscoggin River, 3.4 miles downstream of the Worumbo Hydroelectric Project and 4.7 miles upstream of the Brunswick Hydroelectric Project. The drainage area at the Pejepscot dam is 3,420 square miles.

2) Studies

The Applicant submitted data collected during water quality studies in the impoundment, collected twice each month between June and October 2018. Samples were collected at the deepest location of the impoundment (approximately 23 feet deep and 2,100 feet upstream of the Project dam), to assess the effects of Project operation on impoundment water quality. Water temperatures and DO were relatively uniform through the water column within the impoundment, with no indication of summer stratification. DO profiles in the Pejepscot riverine impoundment ranged from an average of 7.2 mg/L to 9.8 mg/L,[19] and DO saturation was above 60% throughout the monitoring period.

The Applicant collected continuous water temperature and DO data in the Androscoggin River downstream of the Project dam from August 2 to October 2, 2018. Data was collected using a datasonde deployed at approximately mid-depth within the water column. Water temperature ranged from 16.8 ºC to 27.3 ºC, averaging 23.5 ºC throughout the sampling period. Hourly DO concentrations ranged from 7.8 mg/L to 9.7 mg/L, and DO saturation was above 60% throughout the monitoring period.

3) Discussion and Findings

DO data collected by the Applicant in the Pejepscot riverine impoundment and submitted for Department consideration indicates that water in the Project riverine impoundment is sufficiently oxygenated. Based on evidence in the record, the Department finds that

[19] One ppm is equal to 1 mg/L.

upstream of the dam the Project meets Class C water quality standards under current and proposed operating conditions.

DO data collected by the Applicant indicates, and the Department finds, that water in the Androscoggin River downstream of the Project dam is sufficiently oxygenated. Based on evidence in the record, the Department finds that the Project meets Class C water quality standards under current and proposed operating conditions.

C. Fishing, Navigation and Recreational Access and Use (38 M.R.S. § 465 (4)(A))

For this standard, the Applicant must demonstrate that the project waters are suitable for the designated uses of recreation in and on the water, fishing, and navigation. It is the Department's longstanding position that a hydropower impoundment may be found suitable for recreation in and on the water if it has a stable or decreasing trophic state and is free of culturally induced algal blooms that impair its use and enjoyment.

The Department considers an impoundment to have stable or declining trophic state unless it exhibits (1) a perceivable and sustained increase in its trophic state as characterized by its Trophic State Index or other appropriate indices, or (2) the onset of algal blooms.[20] The trophic state is the ability of water to produce algae and other aquatic plants. The trophic state of a body of water is a function of its nutrient content and may be estimated using the Maine Trophic State Index (TSI), which includes measurements of chlorophyll, phosphorus or Secchi disc transparency.[21] An algal bloom is defined as a planktonic growth of algae that causes Secchi disk transparency to be less than 2.0 meters.[22]

1) Existing Facilities and Use

The Project includes three formal recreation sites: the Pejepscot Boat Ramp, the Pejepscot Fishing Park, and the Lisbon Falls Fishing Park.

2) Water Quality Data.

The Applicant conducted a Trophic State Study in accordance with the Department's Lake Trophic State Sampling Protocol for Hydropower Studies (2017). Water quality samples were collected from the deepest portion of the impoundment approximately 2,100 feet upstream of the Project dam at a depth of approximately 23 feet, once in the

[20] 06-096 C.M.R. Chapter 581 § 6(C).
[21] 06-096 C.M.R. Chapter 581 § 6(A).
[22] 06-096 C.M.R. Chapter 581 § 6(B).

month of June and twice per month from July through October 2018. Sample results indicate that the Pejepscot riverine impoundment does not stratify and is mesotrophic (total phosphorus ranged from 13 µ/L to 23 µ/L with an average of 19 µ/L; chlorophyll-*a* ranged from 0.001 mg/L to 0.004 mg/L, averaging 0.003 mg/L; and Secchi disk transparency measurements ranged from 2.42 meters to 4.66 meters, averaging 3.98 meters). Both phosphorus and chlorophyll-*a* concentration measured in the Pejepscot riverine impoundment were below the threshold for mesotrophic waters. Secchi disk transparency measurements indicate no nuisance algal blooms were present, supporting a finding that the Pejepscot impoundment is mesotrophic.

3) Discussion and Findings

Based on the evidence in the record, the Department determines that Project operations meet the Class C designated uses of recreation in and on the water, fishing, and navigation.

D. Hydroelectric Power Generation (38 M.R.S. § 465(4)(A))

For this standard, the Applicant must demonstrate that the Project waters are suitable for the designated uses of hydroelectric power generation.

1) Existing Generation

The Department finds that the Project has a total authorized generating capacity of 13.88 MW and is capable of producing a gross average energy output of 68,516 megawatt hours of electricity annually.

2) Energy Utilization

Topsham Hydro sells Project power wholesale to ISO[23] New England for the New England market. The Project interconnects with the electrical grid via a single 900-foot-long, 15-kV cable connection to both a main and a secondary substation.

[23] ISO means Independent System Operator. ISO New England serves as the independent system operator of the regional bulk power system and administers the wholesale marketplace. Its primary responsibilities are to coordinate, monitor, and direct the operations of the major generating and transmission facilities in the region while its objective is to promote a competitive wholesale electricity marketplace while maintaining the electrical system's integrity and reliability.

3) Discussion and Findings

The Applicant proposes to continue generating power under the current operational mode during the term of a new Project license, providing a dependable source of energy to the public power grid. The Applicant proposes no changes or additions to the existing turbine-generator units or other redevelopment activities. Based on the evidence on record, the Department determines that the Project operations meet the Class C designated use of hydroelectric power generation.

E. Drinking Water Supply (38 M.R.S. § 465(4)(A))

Class C standards indicate that water must be of sufficient quality to be used as drinking water after disinfection.

1) Discussion and Findings.

The Applicant did not submit information indicating that the Pejepscot Project impoundment or the Androscoggin River is used as a drinking water supply. However, water quality data collected for the Trophic State Study in the Project riverine impoundment and DO data collected downstream of the dam indicate that water quality meets State standards and there are no culturally induced algal blooms. Based on the evidence on record, the Department determines that the Project operations meet the Class C designated use of drinking water after disinfection.

F. Industrial Process or Cooling Water Supply (38 M.R.S. § 465(4)(A))

Class C standards indicate that water must be of sufficient quality to be used as industrial process or cooling water supply.

1) Discussion and Findings

The Applicant did not submit information indicating that there are any industrial process water uses in either the Pejepscot Project impoundment or the Androscoggin River downstream of the dam besides a cooling water supply for energy generation equipment at the Project. However, water quality data indicates that it would be suitable as an industrial process water supply in addition to its present use as a cooling water supply. Based on the evidence on record, the Department determines that the Project operations meet the Class C designated use of industrial process or cooling water supply.

G. Antidegradation (38 M.R.S. § 464(4)(F))

For this standard, the Applicant must demonstrate that the Project waters maintain existing in-stream water uses occurring on or after November 28, 1975. The Department may approve a WQC pursuant to Section 401 of the CWA if the standards of classification of the water body and the State's antidegradation policy are met, or for a project affecting a water body in which the standards are not met, if the Project does not cause or contribute to the failure of the water body to meet the standards of classification.[24]

1) Discussion and Findings

The Department finds that the Pejepscot Project was first developed for power generation in 1896 and included an original powerhouse. A second powerhouse, upstream fish passage facilities, and downstream fish passage facilities were constructed between 1985 and 1987. While structures have been replaced and maintained over time, in-stream uses are generally the same on and after November 1975 and include hydropower generation, recreation in and on the water including fishing and navigation, and as habitat for fish and other aquatic life. Based on the evidence on record, the Department determines that Project operations will meet the requirement of the antidegradation policy provide the Project is operated in accordance with the requirements and conditions of this WQC.

5. PUBLIC COMMENTS

On May 27, 2022, the Department issued a draft Order approving water quality certification for the continued operation of the existing Pejepscot Hydroelectric Project. At the Applicant's request, the Department provided a draft Order to the Applicant for comment. The Department also provided a draft Order to MDMR and Maine Department of Inland Fisheries and Wildlife. The deadline for comments was 5:00 P.M. on June 6, 2022. After the draft Order was issued for comments, but prior to the comment deadline, the Department received requests to review the draft Order from the Atlantic Salmon Federation (ASF) and the Natural Resources Council of Maine (NRCM). The Department provided a draft Order to those two groups. Maine Rivers contacted Department staff and requested a copy of the draft Order on June 7, 2022, and Department staff provided it. Additionally, Friends of Merrymeeting Bay (FOMB) obtained a copy of the draft order.

The Department received comments on the draft Order from the Applicant, ASF, FOMB, Maine Rivers, MDMR, and NRCM.

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[24] 38 M.R.S. § 464(4)(F).

The Applicant's comments are generally minor corrections and are incorporated into the final Order, as appropriate.

MDMR comments that the draft Order does not provide assurances that fish passage will be effective enough to meet water quality standards, that it relies too heavily on the Applicant's Settlement Agreements with federal agencies, and that it is too deferential to the Applicant for critical decisions regarding fish passage measures. MDMR provides several suggested edits to the draft Order. MDMR recommends that separate performance standards be established for each alosine species (alewive, American shad, and blueback herring) rather than a single aggregate standard as proposed by the Applicant. The final Order has been modified to require the establishment of separate performance standards for each alosine species, which is consistent with the Applicant's stated goal to establish a comprehensive approach to safe, timely, and effective passage for all species at the Project.

The bulk of MDMR's remaining comments provide similar recommendations that it, or the Department, have review and approval authority for the various iterative steps in the Applicant's proposal for fish passage. Additional suggested edits include adding measures related to sea lamprey, including additional study requirements, modification to the description of the Department's findings related to fish passage, and modification to the reopener provision. The Department reviewed MDMR's comments on the draft Order and incorporated them into the final Order, as appropriate.

Comments from ASF, FOMB, Maine Rivers, and NRCM (conservation groups) dispute the application of Class C standards in this certification, and instead argue that the Department should apply the pending, but not yet effective, reclassification to Class B standards. The conservation groups also expressed concern with the adequacy of the fish passage measures proposed by the Applicant and required in this certification. The Department reviewed the conservation groups' comments on the draft Order and incorporated them into the final Order, as appropriate.

6. DEPARTMENT CONCLUSIONS

BASED on the above Findings of Fact and the evidence contained in the application and supporting documents, and subject to the conditions listed below, the Department CONCLUDES that the continued operation of the PEJEPSCOT HYDROELECTRIC PROJECT, as described above, will result in all waters affected by the project being suitable for all designated uses and meeting all other applicable water quality standards:

A. The Applicant provided sufficient evidence and the Department finds and determines that, as discussed in Section 4(A)(1) and (2), the Project meets the classification standards for aquatic habitat in the Project impoundment and in the outlet stream below the Project dam. The Department concludes that water discharged from the impoundment meets the classification standards for Class C waters.[25]

B. The Applicant provided sufficient evidence and the Department finds and determines that, as discussed in Section 4(A)(3) above and provided the Applicant complies with Conditions 3(A)-(C) below, Project operations related to fish passage will meet the narrative classification standards related to the designated use of habitat for fish and other aquatic life.[26]

C. The Applicant provided sufficient evidence and the Department finds and determines that the Androscoggin River in the Pejepscot Project impoundment and downstream of the Project dam meets the remaining narrative classification standards for Class C waters and is determined to be of such quality that it is suitable for the designated uses of drinking water after disinfection; recreation in and on the water; fishing; agriculture; industrial process and cooling water supply; hydroelectric power generation; and navigation.[27]

D. The Applicant provided sufficient evidence that DO concentrations in the Pejepscot Project impoundment meet the applicable Class C DO standard. The Applicant further provided evidence that DO concentrations in the Androscoggin River downstream of the Pejepscot dam meets the Class C standards of 60% of saturation and 5 parts per million all of the time. The Department concludes that the DO concentrations in the Androscoggin River meet applicable numeric Class C DO standards.[28]

E. The Applicant provided sufficient evidence and the Department finds and determines that existing in-stream uses which have actually occurred on or after November 28, 1975 and the level of water quality necessary to protect those uses are maintained. The Department concludes that the Project meets the state's antidegradation policy.[29]

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[25] 38 M.R.S. § 465(4)(A).
[26] 38 M.R.S. § 465(4)(A) and 38 M.R.S. § 465(4)(C).
[27] 38 M.R.S. § 465(4)(A).
[28] 38 M.R.S. § 465(4)(B).
[29] 38 M.R.S. § 464(4)(F)(3).

7. DECISION AND ORDER

THEREFORE, the Department APPROVES the water quality certification of TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP and CERTIFIES pursuant to Section 401(a) of the Clean Water Act that there is a reasonable assurance that the continued operation of the PEJEPSCOT HYDROELECTRIC PROJECT, as described above will not violate applicable Class C water quality requirements, SUBJECT TO THE FOLLOWING CONDITIONS:

1) WATER LEVELS

A. Except as temporarily modified by 1) approved maintenance activities, 2) extreme hydrologic conditions,[30] 3) emergency electrical system conditions,[31] or 4) agreement between the Applicant, the Department, and appropriate state and/or federal agencies, impoundment water levels must be maintained at 67.2 feet (0.3 feet below the top of the bascule gates). Project operation, described above in Section 1(D), may result in water level fluctuations up to 69.0 feet based on the operation of the bascule gates that are used to adjust the impoundment water level. High flow conditions beyond the Applicant's control may result in water levels exceeding 69.0 feet.

B. These conditions regarding water levels are necessary to ensure that the discharge from the Project will comply with water quality requirements, including those found at 38 M.R.S. § 465(4)(A) and as discussed above at Section 4(A) and (C). The water levels of the impoundment, which are determined by the discharge, affect, among other things, the water quality requirements of the designated uses of fishing; recreation in and on the water; navigation; and habitat for fish and other aquatic life.

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[30] For the purpose of the certification and Order, extreme hydrologic conditions mean the occurrence of events beyond the Licensee's control such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions, drought, or other hydrologic conditions such that operational restrictions and requirements contained herein are impossible to achieve or are inconsistent with the safe operation of the Project.

[31] For the purpose of this certification and Order, emergency electrical system conditions mean operating emergencies beyond the Licensee's control which require changes in flow regimes to eliminate such emergencies which may in some circumstances include, but are not limited to, equipment failure or other temporary abnormal operating conditions, generating unit operations or third-party mandated interruptions under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

2) MINIMUM FLOWS

A. The Applicant must provide flow releases from the Pejepscot Hydroelectric Project in accordance with the Applicant's proposal in the FLA. Except as temporarily modified by 1) approved maintenance activities, 2) extreme hydrological conditions (see footnote 30), 3) emergency electrical system conditions (see footnote 31), or 4) agreement between the Applicant, the Department and appropriate state and/or federal agencies, the Applicant must provide a year-round minimum flow of 1,710 cfs or inflow, whichever is less. All required flows shall be the sum of generating flows from the powerhouse and bascule gates/leakage/spillage flows from the dam.

B. These conditions regarding minimum flows are necessary to ensure that the discharge from the Project will comply with water quality requirements, including 38 M.R.S. § 465(4)(A) as discussed above at Section 4(A) and (C). The flow of the discharge from the Project affects, among other things, whether the receiving waters are of sufficient quality to support the designated uses of fishing; recreation in and on the water; navigation; and habitat for fish and other aquatic life.

3) UPSTREAM and DOWNSTREAM FISH PASSAGE

A. The Applicant must consult with MDMR as part of and prior to determining whether interim nighttime shutdowns are an effective long-term protection measure for downstream passage of American eel.

B. With respect to passage for alosines (alewives, American shad, and blueback herring):

1. The Applicant must consult with MDMR as part of and prior to determining lift frequency and facility operating hours before each fish passage season.

2. The Applicant must consult with MDMR prior to establishment of final upstream and downstream performance standards. Final performance standards must be established for each individual alosine species (alewife, American shad, and blueback herring) as explained in Section 4(A)(3)(d) above. The Project must then be operated to achieve these final performance standards. Until the establishment of final performance standards following consultation with MDMR, the Applicant must operate the Project to achieve the anticipated performance standards identified in the NMFS Settlement

Agreement. Consistent with and as stated more fully in Section 4(A)(3)(d) above, the Applicant must evaluate achievement of the controlling performance standards and, if the Project does not meet the upstream or downstream performance standards, the Applicant must prepare a plan and schedule for additional modifications. The plan and schedule must also be submitted to the Department for review and approval within six months of effectiveness monitoring, conducted in accordance with the Applicant's proposals as reflected in the NMFS Settlement Agreement, showing the upstream or downstream performance standards are not being met.

C. Within 30 days of the issuance of a new license for the Project, the Applicant must submit a single plan detailing its proposed measures for both upstream and downstream fish passage to the Department for review and approval. The plan must be consistent with the Applicant's proposals as reflected in the Settlement Agreements and with the conditions of this Water Quality Certification, including, among other components, the consultation requirements in this Condition 3 as described more fully in Section 4(A)(3)(d). The Department will determine if additional consultation requirements are necessary when it reviews and approves the Applicant's plan.

D. As described more fully above in Section 4(A)(3)(d), and as required by Condition 3(A-C), this Certification requires the Applicant to consult with MDMR in several instances. During each required consultation, if MDMR provides written comments to the Applicant, then the Applicant must provide a written response to the Department for review within 60 days of receipt of MDMR's comments. The Applicant's response must identify any points of agreement and explain the basis for any areas of disagreement.

E. These conditions regarding fish passage measures are necessary to ensure that the discharge from the Project will comply with water quality requirements, including 38 M.R.S. § 465(4)(A) as discussed above at Sections 4(A) and (C). The nature of the Project's discharge affects, among other things, whether the receiving waters are of sufficient quality to support the designated uses of fishing and habitat for fish and other aquatic life, including use of all Project waters.

4) RECREATIONAL ACCESS AND USE

A. The Applicant must continue to provide formal and informal access to the Project waters upstream and downstream of the Project dam for the purpose of recreation in and on the water, for fishing, and for navigation to the extent possible, for the term of a New License. The Applicant must submit a final Recreation Management Plan to the Department that provides for the maintenance and management of Project recreation sites.

B. This condition is necessary to ensure that the discharge from the Project will comply with water quality requirements, including 38 M.R.S. § 465(4)(A), as discussed above at Section 4(A) and (C). Because the discharge affects, among other things, the water level of the impoundment and the flow downstream of the dam, it necessarily affects the water quality requirements of the designated uses of fishing, recreation in and on the water, and navigation, among others.

5) WATER QUALITY

Upon any future determination by the Department that operation of the Pejepscot Project, as approved by the certification and as conditioned by FERC for the Project, may be causing or contributing to a decline in water quality or non-attainment of water quality standards, the Department reserves the right to, in its discretion and upon notice to the Applicant and opportunity for hearing in accordance with its regulations, reopen this certification to consider requiring modifications to the certification or additional conditions as may be deemed necessary by the Department to ensure that the Project does not cause or contribute to any decline in water quality or non-attainment of water quality standards.

6) STANDARD CONDITIONS

The Applicant must comply with all Standard Conditions attached to the certification, with such compliance to be determined by the Department.

7) LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to the Department by the Applicant. Any variations from the plans and proposals contained in said documents are subject to the review and approval of the Department prior to implementation.

8) COMPLIANCE WITH ALL APPLICABLE LAWS

The Applicant must secure and appropriately comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and Orders required for the operation of the Project, in accordance with the terms and conditions of the certification, as determined by the Department.

9) EFFECTIVE DATE

This water quality certification will be effective concurrent with the effective date of the New License issued by FERC for the Project.

10) SEVERABILITY

In the event any provision, or part thereof, of this certification is declared to be unlawful by a reviewing court, the remainder of the certification will remain in full force and effect, and will be construed and enforced in all respects as if such unlawful provision, or part thereof, had been omitted, unless otherwise ordered by the court.

11) REOPENER

The Department reserves the right to, in its discretion and upon notice to the applicant and opportunity for a hearing in accordance with its regulations, reopen the certification for the Pejepscot Hydroelectric Project to consider requiring further modifications or additional conditions as may be deemed necessary by the Department to ensure that the Project does not cause or contribute to any non-attainment of water quality standards.

DONE AND DATED AT AUGUSTA, MAINE, THIS 8TH DAY OF JUNE, 2022.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:________________________________
For: Melanie Loyzim, Commissioner

PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

KO/L007867SN/ATS87712

FILED
June 8th, 2022
State of Maine
Board of Environmental Protection

STANDARD CONDITIONS

1. Noncompliance. Should the project be found, at any time, not to be in compliance with any of the conditions of this approval, or should the permittee construct or operate this project in any way other than specified in the application or supporting documents, as modified by the conditions of this approval, then the terms of this approval will be considered to have been violated.

2. Inspection and Compliance. Authorized representatives of the Commissioner or the Attorney General must be granted access to the premises of the permittee at any reasonable time for the purpose of inspecting the operation of the project and assuring compliance with the conditions of this approval.

3. Assignment of Transfer of Approval. This approval will expire upon the assignment or transfer of the property covered by this approval unless written consent to transfer this approval is obtained from the Commissioner. To obtain approval of transfer, the permittee must notify the Commissioner 30 days prior to assignment or transfer of property which is subject to this approval. Pending Commissioner determination on the application for a transfer or assignment of ownership of this approval, the person(s) to whom such property is assigned or transferred must abide by all of the terms and conditions of this approval. To obtain the or Commissioner's approval of transfer, the proposed assignee or transferee must demonstrate the financial capacity and technical ability to (1) comply with all terms and conditions of this approval and (2) satisfy all other applicable statutory criteria.

   A "transfer" is defined as the sale or lease of property which is the subject of this approval or the sale of 50 percent or more of the stock of or interest in a corporation or a change in a general partner of a partnership which owns the property subject to this approval.

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: August 2021 **Contact: (207) 314-1458**

SUMMARY

This document provides information regarding a person's rights and obligations in filing an administrative or judicial appeal of a licensing decision made by the Department of Environmental Protection's (DEP) Commissioner.

Except as provided below, there are two methods available to an aggrieved person seeking to appeal a licensing decision made by the DEP Commissioner: (1) an administrative process before the Board of Environmental Protection (Board); or (2) a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S. § 3451(4)) or a general permit for an offshore wind energy demonstration project (38 M.R.S. § 480-HH(1)) or a general permit for a tidal energy demonstration project (38 M.R.S. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

A person filing an appeal with the Board should review Organization and Powers, 38 M.R.S. §§ 341-D(4) and 346; the Maine Administrative Procedure Act, 5 M.R.S. § 11001; and the DEP's *Rule Concerning the Processing of Applications and Other Administrative Matters* (Chapter 2), 06-096 C.M.R. ch. 2.

DEADLINE TO SUBMIT AN APPEAL TO THE BOARD

Not more than 30 days following the filing of a license decision by the Commissioner with the Board, an aggrieved person may appeal to the Board for review of the Commissioner's decision. The filing of an appeal with the Board, in care of the Board Clerk, is complete when the Board receives the submission by the close of business on the due date (5:00 p.m. on the 30th calendar day from which the Commissioner's decision was filed with the Board, as determined by the received time stamp on the document or electronic mail). Appeals filed after 5:00 p.m. on the 30th calendar day from which the Commissioner's decision was filed with the Board will be dismissed as untimely, absent a showing of good cause.

HOW TO SUBMIT AN APPEAL TO THE BOARD

An appeal to the Board may be submitted via postal mail or electronic mail and must contain all signatures and required appeal contents. An electronic filing must contain the scanned original signature of the appellant(s). The appeal documents must be sent to the following address.

Chair, Board of Environmental Protection
c/o Board Clerk
17 State House Station
Augusta, ME 04333-0017
ruth.a.burke@maine.gov

The DEP may also request the submittal of the original signed paper appeal documents when the appeal is filed electronically. The risk of material not being received in a timely manner is on the sender, regardless of the method used.

At the time an appeal is filed with the Board, the appellant must send a copy of the appeal to: (1) the Commissioner of the DEP (Maine Department of Environmental Protection, 17 State House Station, Augusta, Maine 04333-0017); (2) the licensee; and if a hearing was held on the application, (3) any intervenors in that hearing proceeding. **Please contact the DEP at 207-287-7688 with questions or for contact information regarding a specific licensing decision.**

REQUIRED APPEAL CONTENTS

A complete appeal must contain the following information at the time the appeal is submitted.

1. *Aggrieved status*. The appeal must explain how the appellant has standing to bring the appeal. This requires an explanation of how the appellant may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions, or conditions objected to or believed to be in error.* The appeal must identify the specific findings of fact, conclusions of law, license conditions, or other aspects of the written license decision or of the license review process that the appellant objects to or believes to be in error.
3. *The basis of the objections or challenge.* For the objections identified in Item #2, the appeal must state why the appellant believes that the license decision is incorrect and should be modified or reversed. If possible, the appeal should cite specific evidence in the record or specific licensing criteria that the appellant believes were not properly considered or fully addressed.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license to changes in specific license conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those matters specifically raised in the written notice of appeal.
6. *Request for hearing.* If the appellant wishes the Board to hold a public hearing on the appeal, a request for hearing must be filed as part of the notice of appeal, and it must include an offer of proof regarding the testimony and other evidence that would be presented at the hearing. The offer of proof must consist of a statement of the substance of the evidence, its relevance to the issues on appeal, and whether any witnesses would testify. The Board will hear the arguments in favor of and in opposition to a hearing on the appeal and the presentations on the merits of an appeal at a regularly scheduled meeting. If the Board decides to hold a public hearing on an appeal, that hearing will then be scheduled for a later date.
7. *New or additional evidence to be offered.* If an appellant wants to provide evidence not previously provided to DEP staff during the DEP's review of the application, the request and the proposed supplemental evidence must be submitted with the appeal. The Board may allow new or additional evidence to be considered in an appeal only under limited circumstances. The proposed supplemental evidence must be relevant and material, and (a) the person seeking to add information to the record must show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process; or (b) the evidence itself must be newly discovered and therefore unable to have been presented earlier in the process. Requirements for supplemental evidence are set forth in Chapter 2 § 24.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, and is made accessible by the DEP. Upon request, the DEP will make application materials available to review and photocopy during normal working hours. There may be a charge for copies or copying services.

2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing the appeal.* DEP staff will provide this information upon request and answer general questions regarding the appeal process.
3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed, the license normally remains in effect pending the processing of the appeal. Unless a stay of the decision is requested and granted, a licensee may proceed with a project pending the outcome of an appeal, but the licensee runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will acknowledge receipt of an appeal, and it will provide the name of the DEP project manager assigned to the specific appeal. The notice of appeal, any materials admitted by the Board as supplementary evidence, any materials admitted in response to the appeal, relevant excerpts from the DEP's administrative record for the application, and the DEP staff's recommendation, in the form of a proposed Board Order, will be provided to Board members. The appellant, the licensee, and parties of record are notified in advance of the date set for the Board's consideration of an appeal or request for a hearing. The appellant and the licensee will have an opportunity to address the Board at the Board meeting. The Board will decide whether to hold a hearing on appeal when one is requested before deciding the merits of the appeal. The Board's decision on appeal may be to affirm all or part, affirm with conditions, order a hearing to be held as expeditiously as possible, reverse all or part of the decision of the Commissioner, or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, the licensee, and parties of record of its decision on appeal.

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court (see 38 M.R.S. § 346(1); 06-096 C.M.R. ch. 2; 5 M.R.S. § 11001; and M.R. Civ. P. 80C). A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration project, or a general permit for a tidal energy demonstration project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board Clerk at 207-287-2811 or the Board Executive Analyst at 207-314-1458 bill.hinkel@maine.gov, or for judicial appeals contact the court clerk's office in which the appeal will be filed.

Note: This information sheet, in conjunction with a review of the statutory and regulatory provisions referred to herein, is provided to help a person to understand their rights and obligations in filing an administrative or judicial appeal. The DEP provides this information sheet for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.

Document Content(s)

Pejepscot DEP-FOMB Email Record

From: Ed Friedman <edfomb@comcast.net>
Sent: Friday, June 3, 2022 1:06 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: Androscoggin relicensing

Hi Kyle,

With Pejepscot and Worumbo relicensing in the works and Brunswick coming up I wanted to be sure you know that the lower river is now Class B so that will need to be a part of the water quality certifications for those three dams. See attached new FOMB newsletter for story.

Thanks,

Ed
666-3372
www.friendsofmerrymeetingbay.org

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Friday, June 03, 2022 1:27 PM
To: Ed Friedman
Subject: RE: Androscoggin relicensing

Thank you. I am aware of the pending change. It will become effective on August 8th. The change will not apply to the Pejepscot WQC, which will be issued next week.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Friday, June 3, 2022 7:21 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: Androscoggin relicensing

Surely you have the flexibility to make that change Kyle, since I believe the WQC runs with the FERC license in terms of longevity? Obviously makes no sense to have a long-term Class C carve out in the middle of Class B especially with the ongoing effort to treat the river in a more coordinated and holistic way. Unless you can make up for it with Worumbo and Brunswick but that would probably mean proportionately greater burden [if any] on those two facilities.

Ed
666-3372
www.friendsofmerrymeetingbay.org

From: Ed Friedman <edfomb@comcast.net>
Sent: Friday, June 6, 2022 12:28 AM
CC: Scott Sells, John Burrows, Steve Heinz, Stacy Brenner, Ralph Tucker, Ruth Burke

To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: Androscoggin relicensing

Kyle,

Please see **attached** regarding the Pejepscot water quality certification. *[First FOMB Comments-not having seen draft WQC yet although clearly an interested party]*

Thank you,

Ed
666-3372
www.friendsofmerrymeetingbay.org

From: Ed Friedman <edfomb@comcast.net>
Sent: Friday, June 7, 2022 2:53 AM
CC: Scott Sells, John Burrows, Steve Heinz, Stacy Brenner, Ralph Tucker, Ruth Burke
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: Androscoggin relicensing

Kyle,

Please see attached FOMB additional comments for the record on the Pejepscot Water Quality Certificate. *[FOMB second set of comments, having quickly seen draft WQC sent by John Burrows who got it from DMR]*

Thanks,

Ed

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Tuesday, June 07, 2022 8:06 AM
To: Ed Friedman
Subject: RE: Further FOMB Comments on Pejepscot

Thank you Ed. If you are interested in receiving a draft WQC for a project in the future, please let me know sufficiently in advance of the WQC issuance deadline (1 year from the filing of the WQC application). Our policy is to provide copies of the draft to those who request it. Since you did not request a draft for Pejepscot, I did not send it to you.

Unfortunately, as you are probably aware, we are subject to a strict one year federal deadline so we have no flexibility on the timing. This inflexible federal deadline certainly hampers us in a number of ways, but if we do not meet it, then the WQC is considered to be waived.

I do realize that some controversial WQC's have been posted online for public review, but we typically don't do that for every project. This seems to have created some confusion here, and I apologize for that.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Tuesday, June 7, 2022 12:39 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Further FOMB Comments on Pejepscot

Thanks Kyle. I hope you will insert a "phase-in" clause requiring Class B compliance after August 8. This is easy to do and will save us ALL a lot of hassle in dealing with an appeal, probably to the Board, which we will definitely file.

Ed

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Tuesday, June 07, 2022 12:47 PM
To: Ed Friedman
Subject: RE: Further FOMB Comments on Pejepscot

Thanks Ed. The appeal procedure is attached to the final Order, which will be issued tomorrow. It will be filed with FERC but I will send you a copy if you are not subscribed to the FERC docket.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Tuesday, June 7, 2022 2:31 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Further FOMB Comments on Pejepscot

Please send me the copy Kyle. Thank you. It sounds like you are not willing to make a change to the draft at this point and will make us all plow ahead. Language something like the below would be an easy addition in lieu of more lengthy edits.

As of issuance date for this WQC, existing DEP surface water classification of the Pejepscot Project area is Class C [see Footnote 9]. Legislation has been signed upgrading this section to Class B which goes into effect on August 8. Beginning August 9th, all references and requirements [compliance and otherwise] in this document relevant to Class C must be considered changed to Class B.

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Tuesday, June 07, 2022 2:28 PM
To: Ed Friedman
Subject: RE: Further FOMB Comments on Pejepscot

The decision about what standard to apply is not something I have any personal control over. I will send you a copy of the final order when I file it with FERC.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Tuesday, June 7, 2022 3:12 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Further FOMB Comments on Pejepscot

Thanks Kyle.

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Wednesday, June 08, 2022 12:28 PM
To: Ed Friedman
Subject: Pejepscot final WQC

Hi Ed,

Please see the attached document for the final Pejepscot WQC.

Thank you,

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Tuesday, June 08, 2022 1:04 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: Pejepscot final WQC

Thanks Kyle.

Thanks. I had wondered if there were earlier drafts as I know there have been in other proceedings?

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Wednesday, June 08, 2022 3:41 PM
To: Ed Friedman
Subject: Pejepscot WQC

Hi Ed,

Here is a copy of the WQC with the "stamp" indicating that it was filed with the Board of Environmental Protection. The copy I sent earlier did not have that.

Thank you,

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Wednesday, June 8, 2022 3:58 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Pejepscot WQC

Thank you Kyle! Are their different draft versions you can send me?

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Wednesday, June 08, 2022 5:31 PM
To: Ed Friedman
Subject: RE: Pejepscot WQC

There is the initial draft version that you commented on, and the final version issued today. I've attached both to this email.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Wednesday, June 08, 2022 5:31 PM
To: Ed Friedman
Subject: RE: Pejepscot WQC

There is the initial draft version that you commented on, and the final version issued today. I've attached both to this email.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Wednesday, June 8, 2022 5:33 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Pejepscot WQC

Thanks. I had wondered if there were earlier drafts as I know there have been in other proceedings?

From: Ed Friedman <edfomb@comcast.net>
Sent: Wednesday, June 8, 2022 3:58 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Pejepscot WQC

Thank you Kyle! Are their different draft versions you can send me?

From: Olcott, Kyle [mailto:Kyle.Olcott@maine.gov]
Sent: Wednesday, June 08, 2022 5:40 PM
To: Ed Friedman
Subject: RE: Pejepscot WQC

For this proceeding there is only the draft WQC issued on 5/27/2022 and the final WQC issued today.

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012

From: Ed Friedman <edfomb@comcast.net>
Sent: Wednesday, June 8, 2022 5:41 PM
To: Olcott, Kyle <Kyle.Olcott@maine.gov>
Subject: RE: Pejepscot WQC

Okay, thanks.

Friends of Merrymeeting Bay

P.O. Box 233, Richmond, ME 04357 www.fomb.org

6/5/22
<u>Via Email</u>

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012
Kyle.Olcott@maine.gov

Kyle,

On June 3rd I emailed you a note to ensure you were aware the Lower Androscoggin River has been upgraded to Class B as this will influence Water Quality Certifications (WQC) in the various FERC relicenses for Brunswick, Pejepscot and Worumbo dams. I enclosed our new Spring FOMB newsletter with an article on the upgrade in case you were not familiar. You responded:

> "Thank you. I am aware of the pending change. It will become effective on August 8th. The change will not apply to the Pejepscot WQC, which will be issued next week."

To which I replied that evening:

> "Surely you have the flexibility to make that change Kyle, since I believe the WQC runs with the FERC license in terms of longevity? Obviously makes no sense to have a long-term Class C carve out in the middle of Class B especially with the ongoing effort to treat the river in a more coordinated and holistic way. Unless you can make up for it with Worumbo and Brunswick, but that would probably mean proportionately greater burden [if any] on those two facilities."

Having not heard back yet I wanted to get this letter out as soon as possible.

When you state above, the WQC will be issued this coming week, presumably this is the final version. Is there a draft WQC as I believe required and if so will you please email me a copy as well as providing an FTP link to documents pertaining to its issuance? We are certainly an interested party as witnessed by our long involvement with water monitoring and upgrade efforts on the lower Androscoggin but have never been copied on any licensing materials by the Department. <u>Please ensure this letter and attachments become part of the official record with regards to the WQC and relicensing.</u>

As you know, this is an unusual situation. The BEP, legislature and Governor have all expressed their intent to see this section of river upgraded to Class B and have made it so through LD 1964, signed into law on March 31, 2022. Yet, passed legislation does not technically go into effect until 90 days after the end of legislative session. As you know, the DEP is generally afforded a great deal of discretion and nearly unlimited flexibility, which in this case can be put to good use, bringing common sense to bear in making Class B a condition of the WQC. It makes absolutely no sense to do otherwise which would be locking in a Class C carve-out for the duration of this FERC license.

Incorporating the "upcoming" Class B into the WQC is not much of a stretch since this is the actual ambient water condition and has been for many years. The Department has been fully aware of these conditions from years of FOMB data but also presumably since April 2020 with the submission by Topsham Hydro/Brookfield of their detailed Updated Draft Study Report by Gomez & Sullivan. And, if not in 2020 than for sure in early 2021 as FOMB included this report as Exhibit 39 in our proposal to upgrade the lower Androscoggin.

Not only are detailed water quality conditions exceeding Class B made clear in the documents specified above but also in the more recently issued FERC Draft Environmental Assessment (DEA) where monitoring data are summarized on page 26, including these statements showing not only do waters above and below the dam surpass Class C standards but they surpass §465 Class B standards "B. The dissolved oxygen content of Class B waters may not be less than 7 parts per million or 75% of saturation, whichever is higher…: Obviously 82.2% and 94.3% saturations easily exceed Class B minimum of 75%:

Impoundment Sampling
Water temperatures and DO were relatively uniform throughout the water column, which resulted in no summer stratification. Over the study period, water temperatures ranged from 12.0ºC in October to 26.9ºC in August. DO concentrations ranged from 7.0 mg/L in July to 9.9 mg/L in October and were above the minimum state standard for Class C waters (5.0 mg/L). Similarly, DO percent saturation ranged from 82.2 percent in July to 103.6 percent in September, which exceeds the state standard of 60 percent saturation for Class C waters.

Riverine Sampling
Water temperatures in the project tailwater ranged from 16.8^{0}C in October to 27.3^{0}C in August with an average of 23.5^{0}C. DO concentrations in the tailwater ranged from 7.8 mg/L in August to 9.7 mg/L in October with an average of 8.5 mg/L. Observed concentrations were above the minimum state standard for Class C waters (5.0 mg/L). DO percent saturation ranged from 94.3% to 106.2% with an average of 99.6%. These values were above the minimum state standard of 60 percent saturation for Class C waters.

Only relatively minor changes to the DEA would be necessary to accommodate replacing Class C references with Class B.

We don't know which AAG is working with you on this matter but suggest it is worth a discussion before issuance of the WQC. Even more useful might be a discussion with your contact at Topsham Hydro/Brookfield explaining the situation. It may well be they will have no objection to the classification change since they already surpass Class B conditions unless they will fight to preserve their "right to pollute." We would be happy to participate on a telephone conference with you and the AAG if this is something that might be useful.

Thank you for your prompt attention and inclusion of our comments and attachments into the record.

Sincerely,

Ed Friedman, Chair
666-3372
edfomb@comcast.net

Enclosures (hyperlinked):
FOMB Spring 2022 Newsletter (Andro Upgrade article)
Exhibit 39, Gomez & Sullivan Study with comments, FOMB Androscoggin Upgrade Proposal
FERC DEA for Pejepscot

C.C. Scott Sells, sls@sellslawfirm.com ; John Burrows jburrows@asfmaine.org ; Steve Heinz, heinz@maine.rr.com ; Sen. Stacey Brenner, Stacy.Brenner@Legislature.Maine.gov , Rep. Ralph Tucker, Ralph.Tucker@legislature.maine.gov ; Ruth Ann Burke, ruth.a.burke@maine.gov

Friends of Merrymeeting Bay
P.O. Box 233, Richmond, ME 04357 www.fomb.org

FOMB Additional Comments on Pejepscot WQC

6/6/22
Via Email

Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
207 641 9012
Kyle.Olcott@maine.gov

Kyle,

We have received no response to our request of last night as to whether or not a draft Water Quality Certificate (WQC) or 401 has been issued for the Pejepscot Project and if it has, to please email it to me. This evening I heard from John Burrows at ASF that you and he spoke today and that a draft WQC was issued. He forwarded it to me late this evening and said you needed comments by noon tomorrow (later today)-6/7. To our knowledge, the draft was never posted on the DEP website or made available for public comment although our understanding was it was sent to the applicant, Brookfield/Topsham Hydro, and to DMR. John only heard about it through DMR. We submit these additional comments on the draft for the record.

On **Page 7**, Footnote 9 appears to clarify that despite the upcoming upgrade in water quality classification to Class B, it is the Department's intention to lock in the lower Class C requirements for the next 40 years or term of the license:

> "[9] On March 31, 2022, the Governor signed Public Law 2021 Chapter 551 into law. This law reclassifies certain waters of the state, including changing the classification for a portion of the lower Androscoggin River that includes the Pejepscot Project from Class C to Class B. The reclassification becomes effective on August 8, 2022, which is after the issuance date of this Water Quality Certification. Therefore, this Water Quality Certification applies Class C water quality standards to the Pejepscot Project."

As I made clear in yesterday's letter, we believe you have the discretion and flexibility to change the draft language to reflect the Class B upgrade, particularly as the bill has been signed and an upgrade through this segment is clearly the legislative, BEP and Governor's intent.

Just as on **Page 18** of the draft it is noted that a comprehensive approach needs to be taken for fish restoration at the project:

"…The goal of both [*NMFS/FWS]* agreements is to improve upstream and downstream passage and, as stated in the Applicant's correspondence with FERC submitting the Settlement Agreements to the federal licensing agency, "to establish a comprehensive approach to safe, timely, and effective passage for all species at the Project."

So too is it the intent of the management agencies that that a comprehensive approach be taken to all the upcoming FERC license renewals in the lower watershed. The following excerpt is the Abstract from NOAA Fisheries *Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes, 2020.* https://www.greateratlantic.fisheries.noaa.gov/policyseries/index.php/GARPS/article/view/20/15

"In the next ten years, multiple hydropower projects in the lower Androscoggin River watershed will begin relicensing; several have already started. Licensing actions present a rare opportunity to develop a comprehensive watershed plan prioritizing diadromous fish restoration and conservation efforts. A comprehensive plan outlines a framework that balances restoration of diadromous fishes, the interests of diverse stakeholders, and the need for sustainable energy production. Additionally, Section 10(A) of the Federal Power Act requires consideration of non-power generation uses of a waterway, such that a new or successive license shall, "…be best adapted to a *comprehensive plan* for improving or developing a waterway or waterways…" This includes the protection, mitigation, and enhancement of fish, wildlife, and habitat. The *Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes* (Androscoggin CP) builds off existing management actions in the *Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar)* and *Draft Androscoggin Fisheries Management Plan* to provide synergistic restoration benefits. The geographic scope of the Androscoggin CP is the Androscoggin River watershed with a restoration focus downstream from Lewiston Falls, the Little Androscoggin River, the Sabattus River, and the Little River. These areas align with critical habitat for Atlantic salmon and represent a practical portion of the historical diadromous fish habitat on which we intend to focus our efforts. The vision for the Androscoggin CP is to support development of terms and conditions in the hydropower licensing process, foster coordination among agencies and stakeholders, and support a collaborative restoration approach."

And DMR's 2017 *Draft Fisheries Management Plan for the Lower Androscoggin River, Little Androscoggin River and Sabattus River* states in the Introduction:
https://www.auburnmaine.gov/CMSContent/Planning/Rivers_and_Hydropower/11_2017%20Docs/2017%20Draft%20Fisheries%20Management%20Plan%20for%20the%20Lower%20Andro,%20Little%20Andro%20and%20Sabattus%20Rivers.pdf

"The goal of this management plan is to protect, conserve, and enhance the fisheries resources of the Androscoggin River for their intrinsic, ecological, economic, recreational, scientific, and educational values and for use by the public."

With the comprehensive fishery management intent clearly articulated by fishery management agencies, it would be anathema to create a lower quality carve out, particularly in the middle of higher quality habitat. As you know, the entire project area constitutes Critical Habitat for endangered Atlantic salmon.

The draft makes a number of errors regarding current classification, low-balling it in regards to aquatic invertebrates below the dam and dissolved oxygen above and below the dam. Examples include:

"The Department input the study data into its linear discriminant model and the results of the model indicate that the area below the Project dam meets Class C aquatic life criteria." [**pg. 13**]

"The Applicant demonstrated through a Benthic Macroinvertebrate study and the Department determined using its linear discriminant model that the benthic community downstream of the Project meets Class C aquatic life criteria." [**pg. 13**]

"The Department, therefore, determines that flows provided by current and proposed Project operations provides sufficient water quality and sufficient water quantity to support the Class C designated use of habitat for fish and other aquatic life downstream of the Project." [**pg. 14**]

"Based on evidence in the record, the Department finds that upstream of the dam the Project meets Class C water quality standards under current and proposed operating conditions." [**pg. 21, 22**]

In all these cases, the water quality does not meet Class C water quality standards. Water quality *surpasses* not only Class C but also Class B standards. In fact for the tail race area below the dam, the modelled classification for aquatic life was Class A (Gomez & Sullivan, 2020 pg. 51).

Page 15 in the draft is but one place where the totally unsatisfactory nature of fish passage based on radio telemetry studies is detailed:

"The results of the upstream passage studies indicate that overall fish lift effectiveness was poor, with passage rates of 19.8% for river herring and 0% for American shad. The results of the downstream passage studies indicate that the downstream fish bypass is similarly ineffective,… Specifically, 22% of adult river herring, 31% of juvenile river herring, 9% of adult American shad, and 2% of adult American eels passed downstream of the dam via the downstream fish bypass. These study results demonstrate that the Project's existing upstream and downstream fish passage facilities do not provide safe, timely, and effective fish passage."

Despite the near total absence of decent and effective upstream and downstream fish passage (dare we say egregious?), the WQC will be issued because fish passage improvements under the Settlement Agreements are to be phased in over time. In contrast, ambient water quality conditions actually surpass those of the current Class C classification (surpassing even Class B) but the draft WQC holds the river hostage to Class C for the next 40 years. As Footnote 9 articulates:

"The reclassification becomes effective on August 8, 2022, which is after the issuance date of this Water Quality Certification. Therefore, this Water Quality Certification applies Class C water quality standards to the Pejepscot Project."

These two differing approaches are inconsistent and illogical. While the Department may be reticent to hold the licensee at present to a legal standard in statute but not technically effectuated for another month or so, actions taken vis a vis fish passage in the instant case (and in virtually all fish passage or relicensing proceedings) demonstrate a phased in approach is not only acceptable but is the norm. So, if the Department possibly feels on shaky legal ground requiring Class B compliance at time of WQC issuance, there is absolutely no good reason not to require as a condition in the WQC, that Class B be phased in by August 8, 2022 when the upgrade legislation becomes effectuated. This approach would be consistent with fish passage provisions and without the heavy lifting for goal attainment passage requirements have.

Thank you for your prompt attention and inclusion of our comments and attachments into the record.

Sincerely,

Ed Friedman, Chair
666-3372
edfomb@comcast.net

Enclosures (hyperlinked):
Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes, 2020.
https://www.greateratlantic.fisheries.noaa.gov/policyseries/index.php/GARPS/article/view/20/15

C.C. Scott Sells, sls@sellslawfirm.com ; John Burrows jburrows@asfmaine.org ; Steve Heinz, heinz@maine.rr.com ; Sen. Stacey Brenner, Stacy.Brenner@Legislature.Maine.gov , Rep. Ralph Tucker, Ralph.Tucker@legislature.maine.gov ; Ruth Ann Burke, ruth.a.burke@maine.gov

<u>Pejepscot Dam Impoundment & Tailrace- 2018 DO & Temp Profiles & Benthic Invertebrate Summary</u>.

Source Topsham Hydro Partners Pejepscot Project Water Quality Study Report April 2020. FERC Project 4784. Comparable to FOMB FPU (upstream) & FPD (downstream) sites.

Figure 5.4-2: Dissolved Oxygen Profiles at the Project Impoundment, 2018

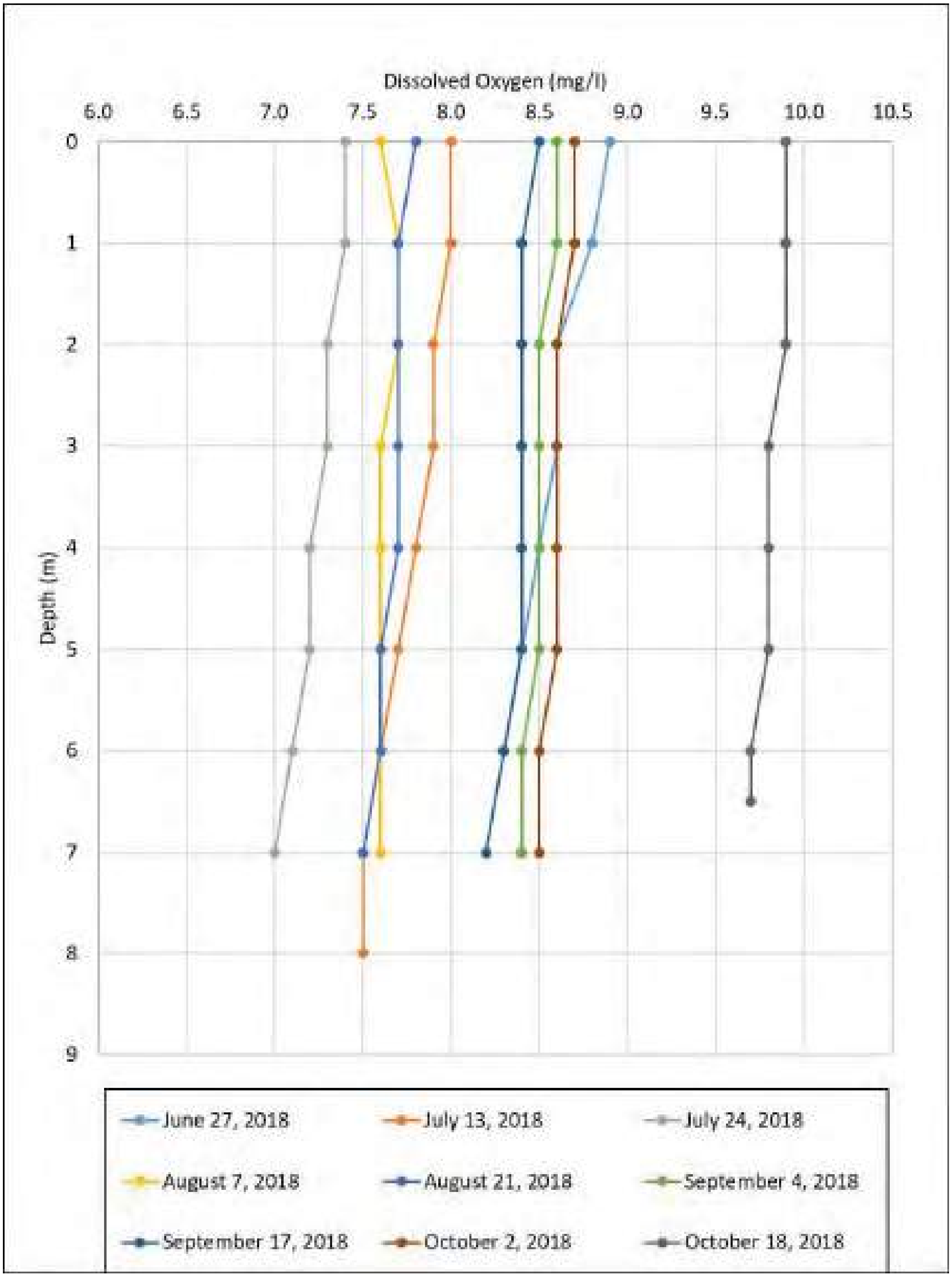


Figure 5.4-3: Dissolved Oxygen Percent Saturation Profiles at the Project Impoundment, 2018

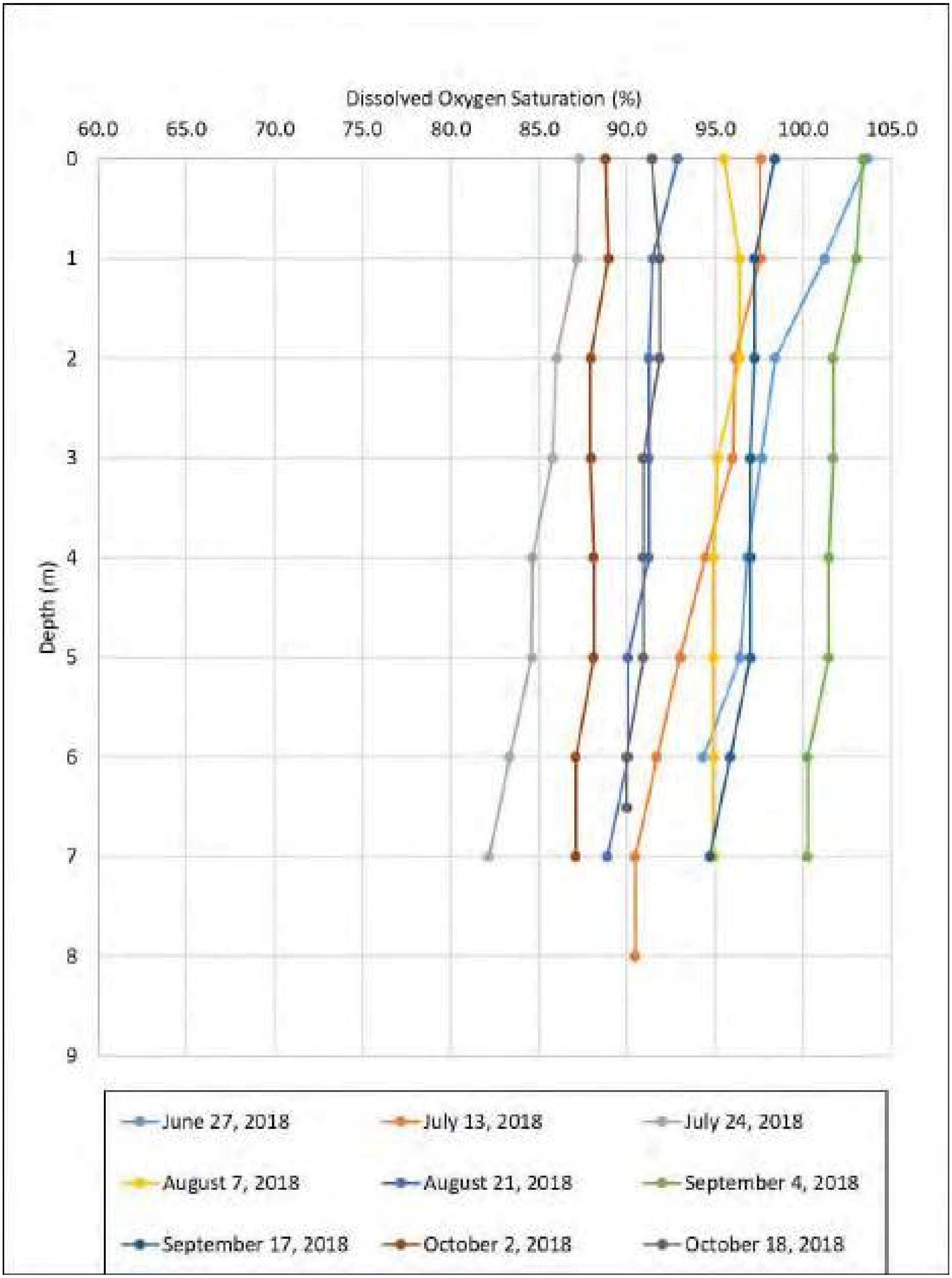


Figure 5.5.1-1: Continuous Water Temperature in the Project Tailwater, August 2 – October 2, 2018

Figure 5.5.2-1: Continuous Dissolved Oxygen in the Project Tailwater, August 2 – October 2, 2018

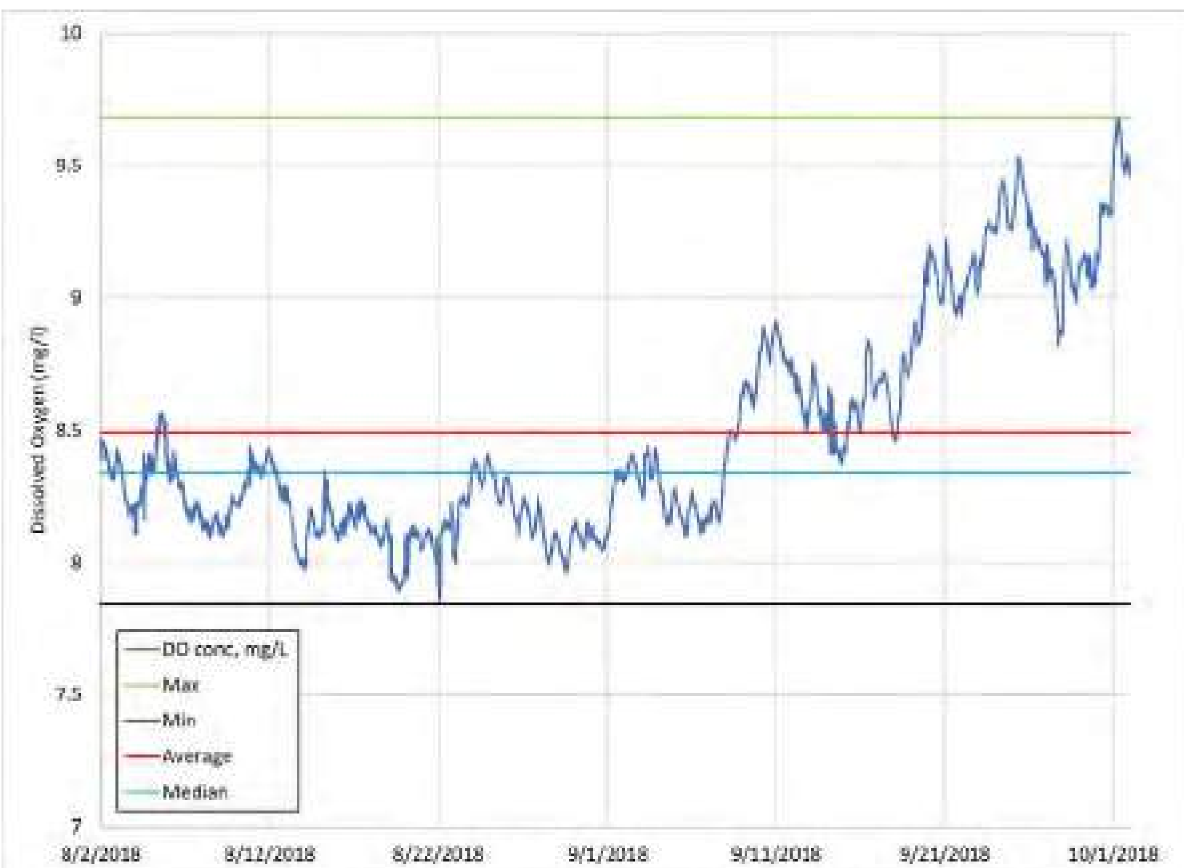


Figure 5.5.2-2: Continuous Dissolved Oxygen Percent Saturation in the Project Tailwater, August 2 – October 2, 2018

6.0 SUMMARY

The study results indicate that water quality at the Project was within the MDEP's state water quality standards. Water temperatures and dissolved oxygen were relatively uniform throughout the water column within the Project impoundment, which resulted in no summer stratification. Over the study period, water temperature within the Project impoundment ranged from 12.0 ºC (October) to 26.9 ºC (August).

Dissolved oxygen concentrations ranged from 7.0 mg/l (July) to 9.9 mg/l (October) and were above the minimum state standard for Class C waters (5.0 mg/l). The dissolved oxygen percent saturation in the Project impoundment ranged from 82.2 percent (July) to 103.6 (September) percent throughout the monitoring period. The dissolved oxygen percent saturation in the Project impoundment exceeded the established state standard of 60 percent saturation for Class C waters.

The water temperature in the Project tailwater ranged from 16.8 ℃ (October) to 27.3 ℃ (August) with an average of 23.5 ℃.

Dissolved oxygen concentrations in the Project tailwater ranged from 7.8 (August) to 9.7 mg/l (October) with an average of 8.5 mg/l. Observed concentrations were above the minimum state standard for Class C waters (5.0 mg/l). Dissolved oxygen percent saturation ranged from 94.3 to 106.2 percent with an average of 99.6 percent. These values were above the minimum state standard of 60 percent saturation for Class C waters.

The Project impoundment has relatively low levels of nutrients and does not support high densities of algal populations. Sampling data suggest that the Project impoundment is mesotrophic.

Impoundment & tailrace waters meet or exceed Class B DO standards. (FOMB comment).

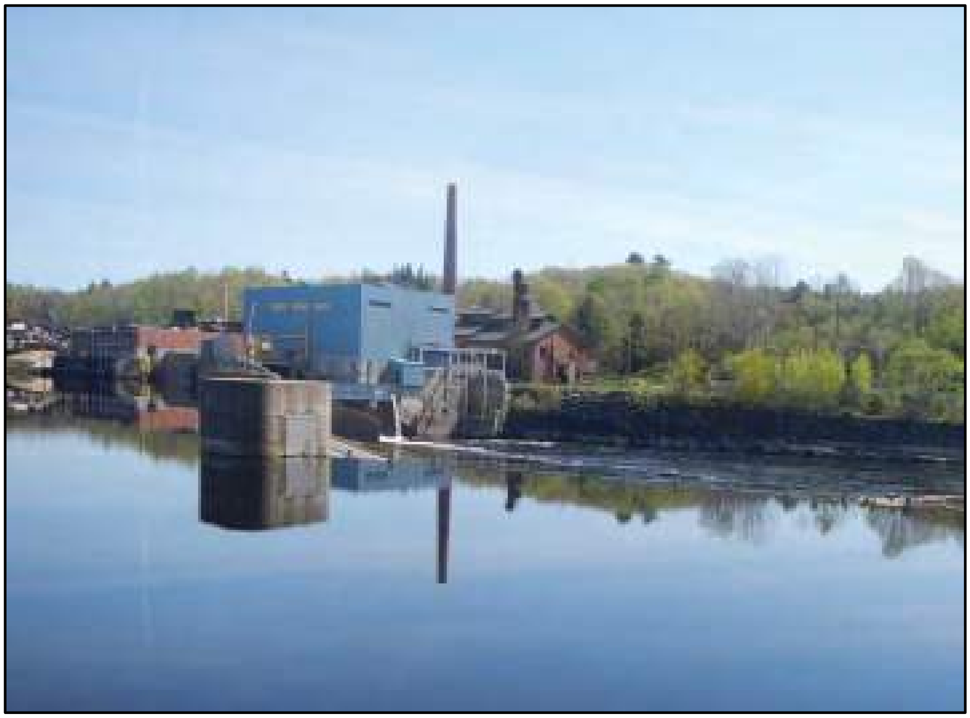
<u>Benthic Invertebrate Summary. Report Section Begins: Page 31</u>

The estimate for the Pejepscot macroinvertebrate community is supportive of a water quality rating of "very good" (Hilsenhoff 1987)…. Normandeau provided taxonomic and habitat information to the MDEP on November 28, 2018 and MDEP returned a Classification Attainment Report on November 30, 2018 (see full report in Appendix B). **The final determination indicated that the macroinvertebrate community sampled downstream of Pejepscot during August 2018 met Class A standards.**

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP

UPDATED DRAFT STUDY REPORTS

PEJEPSCOT HYDROELECTRIC PROJECT
(FERC No. 4784)



Submitted by:

Brookfield Renewable
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

April 2020

Brookfield

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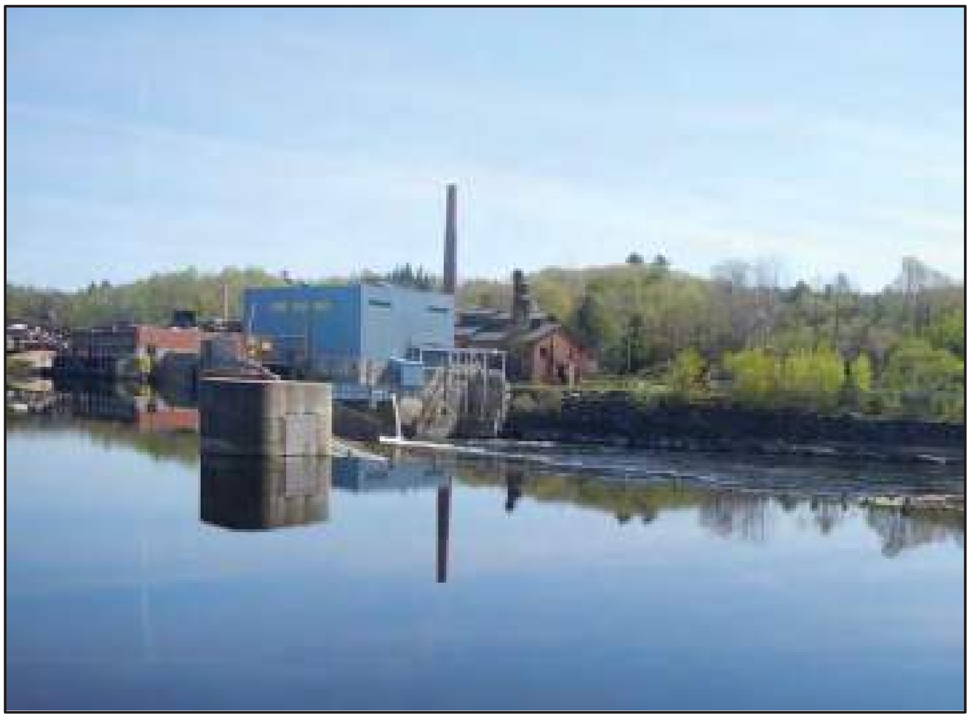
DRAFT UPDATED STUDY REPORT

WATER QUALITY STUDY

PEJEPSCOT HYDROELECTRIC PROJECT
(FERC No. 4784)



Submitted by:

Brookfield Renewable
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

April 2020

Brookfield

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APPELLANT EXHIBIT 5 P.9

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LIST OF ABBREVIATIONS AND DEFINITIONS

°C	Degrees Celsius
cfs	cubic feet per second
DO	Dissolved Oxygen
FERC	Federal Energy Regulatory Commission
HETL	Maine Health and Environmental Testing Laboratory
ILP	Integrated Licensing Process
m	meter
MDEP	Maine Department of Environmental Protection
ME	Maine
mg/L	Milligrams per liter
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
PAD	Pre-Application Document
Project	Pejepscot Hydroelectric Project (FERC No. 4784)
PCU	Platinum Cobalt Units
RSP	Revised Study Plan
SD1	Scoping Document 1
SPD	Study Plan Determination
Topsham Hydro	Topsham Hydro Limited Partnership, L.P.
TSI	Trophic State Index
µS/cm	microSiemens/centimeter
ug/l	Micrograms per liter
USGS	United States Geological Survey

1.0 INTRODUCTION

Topsham Hydro Partners Limited Partnership (L.P.) (Topsham Hydro), an indirect member of Brookfield Renewable, is in the process of relicensing the 13.88-megawatt Pejepscot Hydroelectric Project (Project) (FERC No. 4784) with the Federal Energy Regulatory Commission (FERC or Commission). The Project is located on the Androscoggin River in the village of Pejepscot and the Town of Topsham, Maine (ME) to the east, the Town of Lisbon to the north, and the Town of Durham and the Town of Brunswick, ME to the west. The Project straddles the border between Cumberland and Sagadahoc counties and extends into Androscoggin County. The original license was issued on September 16, 1982 and expires on August 31, 2022.

Topsham Hydro is using FERC's Integrated Licensing Process (ILP) as established in regulations issued by FERC July 23, 2003 (Final Rule, Order No. 2002) and found at Title 18 Code of Federal Regulations, Part 5. Topsham Hydro filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on August 31, 2017.

Topsham Hydro distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on October 30, 2017. FERC also held agency and public scoping meetings on November 28, 2017 and a site visit on November 29, 2017. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by December 29, 2017. FERC subsequently issued Scoping Document 2 on February 5, 2018. Topsham Hydro filed a Proposed Study Plan on February 12, 2018 and held a Study Plan Meeting on March 22, 2018. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on June 12, 2018. FERC issued a Study Plan Determination (SPD) on July 3, 2018.

In the RSP, Topsham Hydro proposed to conduct the following water quality assessments: 1) trophic state study of the Project impoundment, and 2) riverine water quality sampling of the Project tailwater.

2.0 GOALS AND OBJECTIVES

The goal of the water quality assessment is to update baseline information and document water quality conditions upstream and downstream of the Project dam. The study objectives are to: 1) collect periodic water quality data in the Project impoundment, and 2) collect continuous water temperature and dissolved oxygen data in the Androscoggin River downstream of the Project dam during low flow, warm water temperature conditions.

3.0 STATE WATER QUALITY STANDARDS

The Androscoggin River is classified by MDEP as Class C from its confluence with the Atlantic Ocean at Merrymeeting Bay, upstream, through Project waters, until its confluence with the Ellis River at Rumford Point in Maine about 75 miles upstream of the Project. Class C waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation (except as prohibited under Title 12, section 403), navigation, and as a habitat for fish and other aquatic life.

The dissolved oxygen content of Class C water may be no less than 5 mg/l or 60% of saturation, whichever is higher, except in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation, and survival of early life stages. Water quality in these areas must be sufficient for these purposes to be maintained.

Per the state standards, discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

4.0 METHODS

4.1 Impoundment Trophic Sampling

Trophic sampling was conducted in accordance with the Lake Trophic State Sampling Protocol for Hydropower Studies (MDEP, 2017), and was consistent with Maine Department of Environmental Protection (MDEP) protocols. Sampling personnel received MDEP certification to collect water quality data prior to performing the sampling activities.

4.1.1 Vertical Profiles

Vertical profiles were collected twice per month from June[1] through October 2018 at the deepest location of the impoundment (see AR-01[2], Figure 4.1-1). Topsham Hydro installed a temporary buoy to mark the sampling station for the open water sampling season.

Water temperature and dissolved oxygen profile data were collected at 1-meter intervals from the water surface to the bottom using a YSI ProDSS Multiparameter Water Quality Meter. The instrument was checked prior to each use and calibrated according to manufacturer specifications. One replicate profile measurement was made for every profile collected. Replicates were obtained outside of the metalimnion (if applicable) to avoid remeasuring parameters when they are in a transitional state. A profile was remeasured if replicate values were not within 0.3 mg/l and 0.3 °C, as stated in the Volunteer Lake Monitoring Program instructions or within water quality meter instrumentation error value.

4.1.2 Water Clarity

Water clarity was measured at the impoundment sampling location during each field visit using a Secchi disk and Aquascope. The depth at which the Secchi disk was no longer visible through

1 The study was not initiated until late June, therefore; Topsham Hydro was only able to conduct one trophic sampling event during the month of June, rather than two.
2 The buoy was initially installed on June 27, 2018; however, before the July 13, 2018 sampling event the location of the buoy was moved slightly south to an area of slightly deeper water (~1 meter).

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the Aquascope was recorded. At least two Secchi disk measurements were made during each field visit and the results were averaged.

4.1.3 Water Quality Sample Parameters

The water quality profile data and Secchi disk readings were used to determine the depth of the epilimnion and the associated core sampling depth. Water samples were collected each visit from the epilimnion using an integrated core sampler at a depth between the surface and two times the Secchi disk depth, or within 1 meter of the bottom, whichever was less, if the impoundment was unstratified.

Per MDEP protocols, all water samples were stored on ice and delivered within 24 hours to the state of Maine's Health and Environmental Testing Laboratory (HETL) in Augusta, ME for analysis of total alkalinity, color, pH, chlorophyll-a, and total phosphorus.

On August 23, 2018, Topsham Hydro collected and submitted additional water samples to HETL for analysis of nitrate and dissolved organic carbon. In addition, samples for chloride, sulfate, specific conductance, total calcium, total iron, total magnesium, total potassium, total silica[3], total sodium, and total dissolved aluminum were submitted to Eastern Analytical, Inc. in Concord, New Hampshire for analysis. The water column was not stratified during the August 23 sampling; thus, per MDEP protocols, an integrated epilimnetic core sample was collected at a depth between the surface and two times the Secchi disk depth, or within 1 meter of the bottom, whichever was less. The MDEP detection limits for all analytes are shown in Table 4.1-1.

4.2 Downstream Water Temperature and Dissolved Oxygen Monitoring

Topsham Hydro monitored water temperature and dissolved oxygen downstream of the Project dam in accordance with the MDEP Sampling Protocol for Hydropower Studies (MDEP, 2017). A location within the Project tailwater (see AR-02 in Figure 4.1-1) was monitored continuously from August 2 to October 2, 2018.

During deployment, dissolved oxygen measurements, using a YSI Handheld Optical Dissolved Oxygen Meter were initially made at AR-02 along a transect across the stream, at the first, second and third quarter points, to determine if there were significant differences (defined by MDEP as ±0.2 mg/l) in dissolved oxygen concentration (Table 4.2-1). There were no violations of dissolved oxygen criteria and no significant differences in concentrations among the quarter points, therefore, the water quality meter was deployed in the location of the main river flow, per MDEP protocols.

The water quality meter (HOBO U26 with temperature and optical dissolved oxygen sensor) was set to record temperature and dissolved oxygen in 15-minute increments continuously throughout the study period. The meter was deployed at approximately mid-depth within the water column.

[3] In an email received on June 30th, 2018, MDEP informed Topsham Hydro that it was making an adjustment to the MDEP Sampling Protocol for Hydropower Studies. Specifically, MDEP was no longer requiring a late summer sample for silica; as this parameter was being removed from the protocol. Since this particular study was already initiated, Topsham Hydro completed the sampling and testing of the silica parameter anyway.

The meter was cleaned, maintained, and offloaded per manufacturer recommendations regularly throughout the study period.

The dissolved oxygen percent saturation was calculated from measured dissolved oxygen concentration, barometric pressure, and measured water temperature using the U.S. Geological Survey (USGS) DOTABLES program. Barometric pressure was obtained from the Portland Jetport, ME National Oceanic and Atmospheric Administration (NOAA) climate station (NOAA, 2018).

4.3 Equipment Specifications

Vertical profile measurements, periodic spot checks, and discrete measurements were collected with a portable hand held multiparameter meter. The meter used for this study for dissolved oxygen and temperature was the YSI ProDSS multiparameter meter. The equipment performance specifications are shown in Table 4.3-1.

Continuous water temperature and dissolved oxygen measurements were collected with Onset HOBO Dissolved Oxygen Loggers (Model U26-001). The equipment performance specifications are shown in Table 4.3-2.

Table 4.1-1: Water Quality Parameter Detection Limits

Parameter	Detection Limit
Field Parameters	
Secchi disk transparency	0.1 m
Temperature	0.1°C
Dissolved Oxygen	0.1 mg/l
Twice Monthly Lab Analytes	
Total phosphorus	0.001 mg/l
Chlorophyll a	0.001 mg/l
Color	1.0 SPU
pH	0.1 SU
Total alkalinity	1.0 mg/l
One-Time Late Summer Sample Analytes	
Total phosphorus	0.001 mg/l
Chlorophyll a (uncorrected*)	0.002 mg/l
Color	1.0 SPU
pH	0.1 SU
Total alkalinity	1.0 mg/l
Nitrate	0.01 mg/l
Dissolved Organic Carbon	0.25 mg/l
Total iron	0.005 mg/l
Total and dissolved aluminum	0.010 mg/l
Total calcium	1.0 mg/l
Total magnesium	0.1 mg/l
Total sodium	0.05 mg/l
Total potassium	0.05 mg/l
Total silica	0.05 mg/l
Specific conductance	1 µS/cm
Chloride	1.0 mg/l
Sulfate	0.5 mg/l

* Chlorophyll a is not needed in stratification samples below the epilimnion. Uncorrected chlorophyll a will be tested via trichromatic determination

Source: MDEP, 2017

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Table 4.2-1: Initial Water Temperature and Dissolved Oxygen Measurements made at Deployment, August 2, 2018, Downstream of Pejepscot Dam.

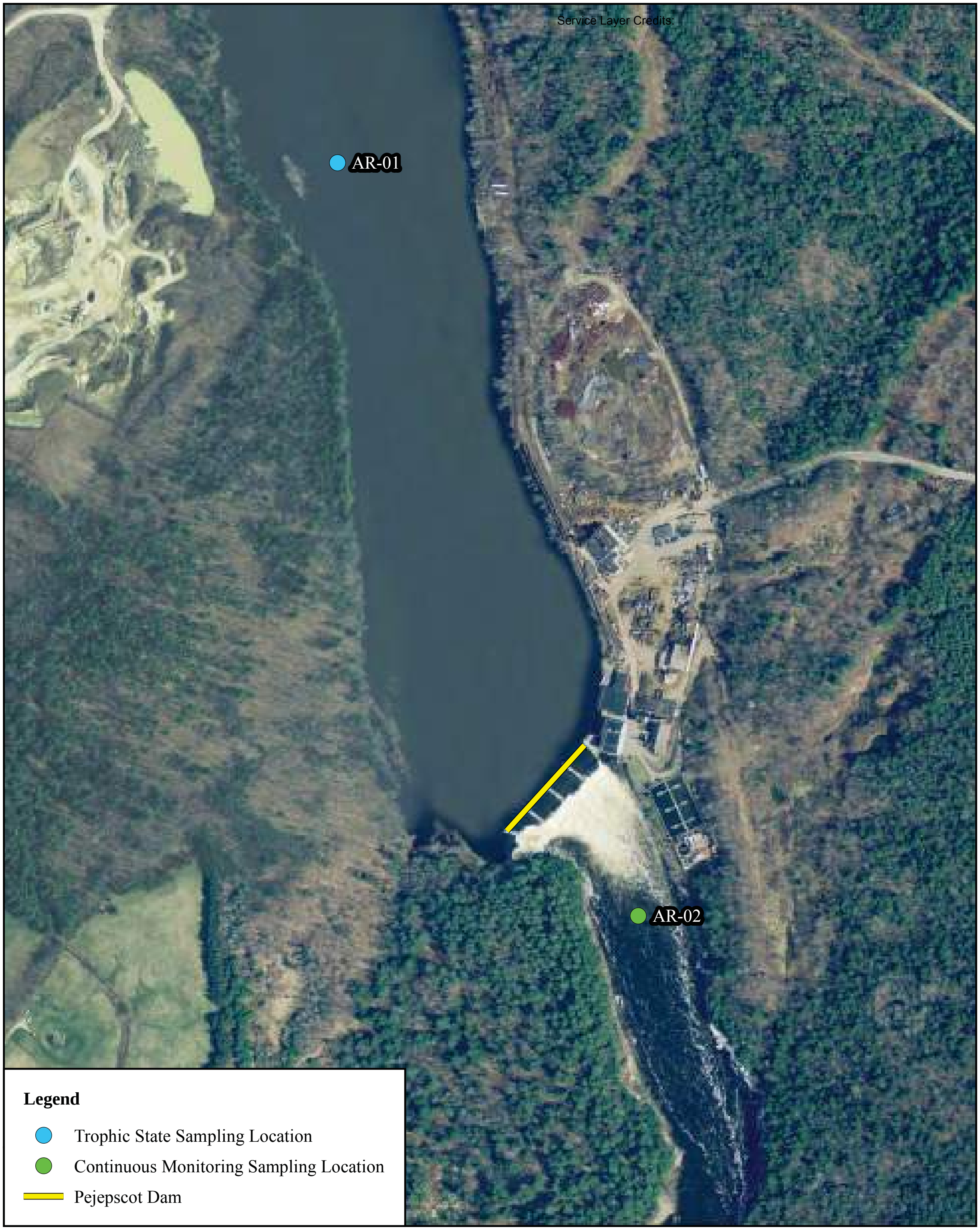
Point	Water Temperature (°C)	Dissolved Oxygen (mg/l)	Dissolved Oxygen Percent Saturation
River Right (25%)	26.1	8.23	101.6
Center (50%)	26.0	8.37	103.2
River Left (75%)	25.9	8.23	101.3

Table 4.3-1: YSI Hand Held Meter Specifications

Parameter	Range	Accuracy	Resolution
Dissolved Oxygen (YSI)	0 to 50 mg/l	0-20 mg/l: ± 0.1 mg/L 20-50 mg/l: ± 8% of the reading	0.01 mg/l
Temperature (YSI)	-5 to +70°C	±0.2°C	0.1°C

Table 4.3-2: HOBO U26-001 Dissolved Oxygen Logger Specifications

Parameter	Range	Accuracy	Resolution
Dissolved Oxygen	0 to 30 mg/l	0.2 mg/l up to 8 mg/l; 0.5 mg/l from 8 to 20 mg/l	0.02 mg/l
Temperature	-5 to +40°C	±0.2°C	0.02°C



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Pejepscot Hydroelectric Project
(FERC No. 4784)
Water Quality Study

0 125 250 500
Feet

Figure 4.1-1:
Water Quality Sampling Locations

5.0 RESULTS

5.1 Environmental Conditions

River flow ranged from a low of 1,876 cubic feet per second (cfs) on June 23, 2018 to a high of 6,718 cfs on August 6, 2018 during the study period (Figure 5.1-1). Throughout the majority of the study period, river flow was below the long-term median daily value (Figure 5.1-1).

Monthly air temperatures for the 2018 study period as recorded at the Durham, ME monitoring station are presented in Table 5.1-1 (NOAA, 2018). Monthly mean air temperatures during the study period were warmer than the historic period of 1994 to 2018 for the months of July, August, and September, whereas air temperatures in the months of June and October were cooler. Based on these circumstances, sampling conditions were suitable for monitoring in accordance with MDEP protocols (e.g., low flow, high temperature conditions).

5.2 Impoundment Sampling

5.2.1 Total Phosphorus

Phosphorus is one of the major nutrients needed for plant growth. Since it's natural occurrence in lakes is very low, phosphorus limits the growth of algae in lake ecosystems. Small increases in phosphorus in lake water can cause substantial increases in algal growth (MDEP, 2014). In the Project impoundment, total phosphorus ranged from 13 to 23 ug/l with an average 19 ug/l (Table 5.2-1). Total phosphorus levels were below the proposed state standard upper limit of 33 ug/l for Class C waters (MDEP, 2012).

5.2.2 Color

The amount of color in a lake refers to the concentration of natural dissolved organic acids such as tannins and lignins, which give the water a tea color. Water with a color value greater than 25 platinum cobalt units (PCU) is considered to be colored and may have a reduced Secchi disk transparency (MDEP, 2014). In the Project impoundment, color ranged from 28 to 46 PCU with an average of 35 PCU (Table 5.2-1) suggesting that the impoundment was slightly colored.

5.2.3 Chlorophyll-a

Chlorophyll-a is a measurement of the green pigment found in all plants including microscopic plants such as algae. It is used as an estimate of algal biomass, the higher the Chlorophyll-a number the higher the amount of algae in the lake. Large concentrations of chlorophyll-a can be an indication of eutrophication that can adversely affect lacustrine or riverine processes or dissolved oxygen concentrations (MDEP, 2014). Throughout the 2018 sampling, chlorophyll-a ranged from 0.001 mg/l to 0.004 mg/l with an average of 0.003 mg/l (Table 5.2-1). Chlorophyll-a was below the proposed state standard upper limit of 0.008 mg/l (MDEP, 2012).

5.2.4 Alkalinity

Alkalinity is a measure of the capacity of water to neutralize acids and is also known as the buffering capacity. It is due primarily to the presence of naturally available bicarbonate, carbonate, and hydroxide ions, with bicarbonate being the major form. Water bodies with alkalinity values less than 10 mg/l are considered poorly buffered (MDEP, 2014). Total alkalinity in the Project impoundment ranged from 14 mg/l to 22 mg/l with an average of 18 mg/l (Table 5.2-1).

5.2.5 pH

pH is a measure of the acidity of water and regulates the biological processes that may occur in a water body. pH ranged from 6.9 to 7.2 with an average of 7.1 (Table 5.2-1). All pH values were within the recommended range of 6.0 to 8.5 for Class C waters.

5.2.6 Secchi Disk

Secchi disk transparency is a measure of the water clarity, or transparency, of a waterbody. Factors which reduce clarity are algae, zooplankton, water color and silt. Since algae are generally the most abundant, measuring transparency indirectly measures the algal productivity (MDEP, 2014). In the Project impoundment, the Secchi disk transparency ranged from 2.42 to 4.66 meters with an average of 3.98 meters (Table 5.2-1). The Secchi disk transparency was above the proposed standard of 2.0 m throughout the sampling period (MDEP, 2012).

5.2.7 Trophic State

Total phosphorus, chlorophyll-a, and Secchi disk transparency are often used as indicators of trophic state, or the biological productivity in a water body, particularly a lake (MDEP, 2014). An oligotrophic lake is characterized as having low productivity, a mesotrophic lake has medium productivity, and a eutrophic lake is highly productive. Table 5.2-2 lists the criteria used to classify the trophic state of lakes in Maine (MDEP, 2014).

The Maine Trophic State Index (TSI) for lakes can be calculated as (MDEP, 1996):

$$TSI = 70*\log(\text{mean chlorophyll-a} + 0.7)$$

Using the average chlorophyll-a concentration for the entire sampling period (0.003 mg/l) (Table 5.2-1), the TSI for the Project impoundment is 36, which is categorized as mesotrophic. In addition, the range of chlorophyll-a and total phosphorus values measured in the Project impoundment are within the ranges for mesotrophic waters (Table 5.2-2).

5.3 Late Summer Sampling

5.3.1 Specific Conductance

Specific conductance is a measure of the ability of water to carry an electrical current and is directly related to the dissolved ions (charged particles) present in water. Specific conductance will increase if there is an increase of pollutants entering the lake or pond (MDEP, 2014). Specific conductance was measured for the August 21, 2018 lake trophic core sample. The value was 83 µS/cm.

5.3.2 Dissolved Metals and Nutrients

Table 5.3.2-1 lists the concentrations of metals and nutrients from the August 21, 2018 sampling event within the Project impoundment. Iron (0.27 mg/l) and chloride (9.1 mg/l) concentrations were below the established state standards, which are 1 mg/l and 230 mg/l, respectively. Aluminum (0.050 mg/l) was below the standard of 0.087 mg/l. All other parameters do not have an established standard.

5.4 Impoundment Water Temperature and Dissolved Oxygen Profiles

The water temperature at the lake trophic sample site ranged from 21.6ºC to 23.1ºC during the first profile (June 27) and then increased steadily until August 7, when the highest water temperatures occurred (26.6ºC to 26.9ºC) (Figure 5.4-1). The maximum water temperature during the study (26.9ºC) was measured on August 7 just below the surface; the next highest temperature (25.9ºC) was measured on July 13 just below the surface (Figure 5.4-1). The water temperature steadily decreased throughout late August, September, and October and ranged from 12.0 ºC to 12.2ºC during the last profile (collected on October 18) (Figure 5.4-1). The average water temperature throughout the water column at the lake trophic station ranged from 12.2 ºC on October 18th to 26.7 ºC on August 7.

Throughout the monitoring period, the dissolved oxygen concentration at the lake trophic station ranged from 7.0 mg/l to 9.9 mg/l (Figure 5.4-2). The minimum dissolved oxygen concentration was 7.0 mg/l at a depth of 7 meters on July 24 (Figure 5.4-2). The highest dissolved oxygen concentrations at the lake trophic station ranged from 9.7 mg/l to 9.9 mg/l on October 18. The average dissolved oxygen concentration throughout the water column ranged from 7.2 mg/l on July 24 to 9.8 mg/l on October 18. The dissolved oxygen concentration exceeded the established state standard of 5 mg/l for Class C waters.

The dissolved oxygen percent saturation ranged from 82.2 percent to 103.6 percent throughout the monitoring period (Figure 5.4-3). The highest dissolved oxygen percent saturation value was measured on June 27 (103.6 percent) at the surface (Figure 5.4-3). The average dissolved oxygen percent saturation throughout the water column ranged from 85.1 percent on July 27 to 101.6 percent on September 4. The dissolved oxygen percent saturation exceeded the established state standard of 60 percent saturation for Class C waters.

5.5 Riverine Sampling

5.5.1 Water Temperature

The water temperature in the Project tailwater ranged from 16.8ºC to 27.3ºC with an average of 23.5ºC throughout the sampling period (August 2 – October 2) (Figure 5.5.1-1). The minimum temperature in the Project tailwater was recorded on October 2 at 2:15 pm, and the highest temperature was observed on August 7 at 5:00pm.

5.5.2 Dissolved Oxygen

Hourly dissolved oxygen concentrations in the Project tailwater ranged from 7.8 to 9.7 mg/l with an average of 8.5 mg/l over the monitoring period (Figure 5.5.2-1). Dissolved oxygen percent saturation ranged from 94.3 to 106.2 percent with an average of 99.6 percent (Figure 5.5.2-2).

Table 5.1-1: 2018 and Historic Mean Monthly Air Temperature Recorded at the Durham, ME Monitoring Station

Temperature (°C)	June	July	August	September	October
2018	15.9	20.7	21.1	16.2	7.4
Mean (1994-2018)	17.0	20.1	19.3	15.2	8.7
Difference	-1.1	0.6	1.8	1.0	-1.3

Table 5.2-1: Epilimnetic Core Sample Results

Sample Date	Sample Time	Total Phosphorus (ug/l)	Chlorophyll-a (mg/l)	Total Alkalinity (mg/l)	Color (PCU)	pH	Secchi Disk (meters)
6/27/2018	11:50	19	0.004	18	28	7.1	3.91
7/13/2018	12:07	23	0.003	22	32	7.1	3.89
7/24/2018	13:55	19	0.003	20	32	7.0	4.11
8/7/2018	10:04	19	0.002	14	42	6.9	3.55
8/21/2018	10:27	20	0.002	14	46	6.9	4.30
9/4/2018	11:05	19	0.002	17	30	7.2	4.63
9/17/2018	11:11	13	0.001	18	29	7.2	4.66
10/2/2018	13:25	20	0.002	22	34	7.0	4.34
10/18/2018	12:25	21	0.004	17	40	7.1	2.42
	Average	**19**	**0.003**	**18**	**35**	**7.1**	**3.98**
	Median	**19**	**0.002**	**18**	**32**	**7.1**	**4.11**
	Minimum	**13**	**0.001**	**14**	**28**	**6.9**	**2.42**
	Maximum	**23**	**0.004**	**22**	**46**	**7.2**	**4.66**

Table 5.2-2: Criteria for Classifying the Trophic State of Lakes in Maine

Trophic State	Chlorophyll-a (mg/l)	Total Phosphorus (mg\l)	Secchi disk (m)
Oligotrophic	<0.0015	<0.0045	>8
Mesotrophic	0.0015-0.007	0.0045-0.02	4-8
Eutrophic	>0.007	>0.02	<4

Table 5.3.2-1: Late Summer Sampling Parameter Concentrations in the Project Impoundment, August 21, 2018.

Parameter	Units	Value
Nitrate	mg/l	0.14
Dissolved Organic Carbon	mg/l	7.1
Specific conductance	µS/cm	83
Chloride	mg/l	9.1
Sulfate	mg/l	7.6
Total dissolved aluminum	mg/l	0.05
Total Calcium	mg/l	4.6
Total Iron	mg/l	0.27
Total Magnesium	mg/l	0.87
Total Potassium	mg/l	1.0
Total Silica (calculated)	mg/l	4.8
Total Sodium	mg/l	9.8

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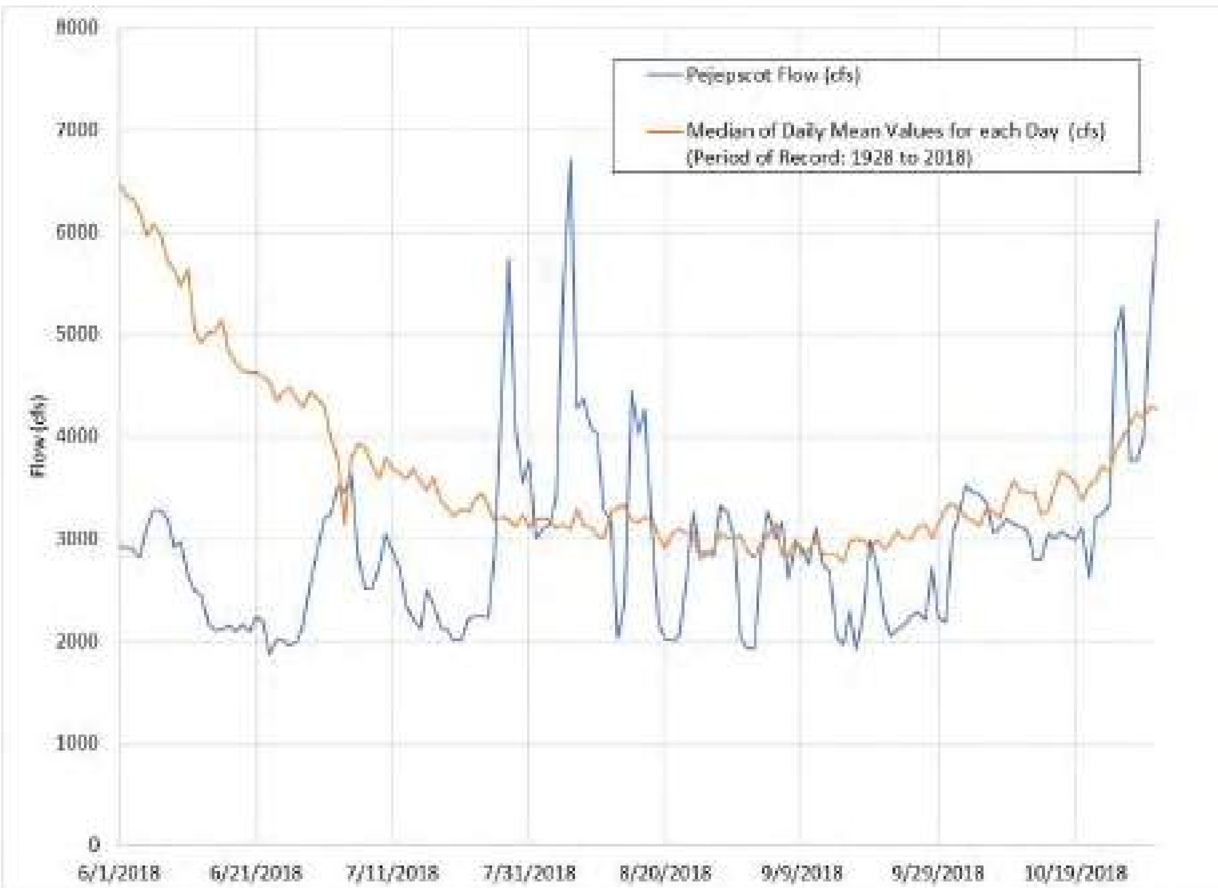
Table 5.4.1: Temperature and Dissolved Oxygen Profiles at Project Impoundment - Results

Depth (m)	6/27/2018		7/13/2018[4]		7/24/2018		8/7/2018		8/21/2018	
	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)
0	23.1	8.9	25.9	8.0	24.2	7.4	26.9	7.6	24.4	7.8
1	22.3	8.8	25.9	8.0	24.1	7.4	26.7	7.7	24.3	7.7
2	22.0	8.6	25.8	7.9	24.1	7.3	26.7	7.7	24.2	7.7
3	21.8	8.6	25.7	7.9	24.0	7.3	26.7	7.6	24.2	7.7
4	21.7	8.5	25.5	7.8	24.0	7.2	26.6	7.6	24.2	7.7
5	21.7	8.4	25.4	7.7	24.0	7.2	26.6	7.6	24.2	7.6
6	21.6	8.3	25.3	7.6	23.9	7.1	26.6	7.6	24.2	7.6
7			25.3	7.5	23.9	7.0	26.6	7.6	24.2	7.5
8			25.3	7.5						

Depth (m)	9/4/2018		9/17/2018		10/2/2018		10/18/2018	
	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)	Temp (°C)	DO (mg/l)
0	25.1	8.6	22.8	8.5	16.7	8.7	12.0	9.9
1	24.9	8.6	22.8	8.4	16.8	8.7	12.2	9.9
2	24.8	8.5	22.8	8.4	16.8	8.6	12.2	9.9
3	24.8	8.5	22.7	8.4	16.8	8.6	12.2	9.8
4	24.7	8.5	22.7	8.4	16.9	8.6	12.2	9.8
5	24.7	8.5	22.7	8.4	16.9	8.6	12.2	9.8
6	24.7	8.4	22.7	8.3	16.9	8.5	12.2	9.7
7	24.7	8.4	22.7	8.2	16.9	8.5	12.2	9.7

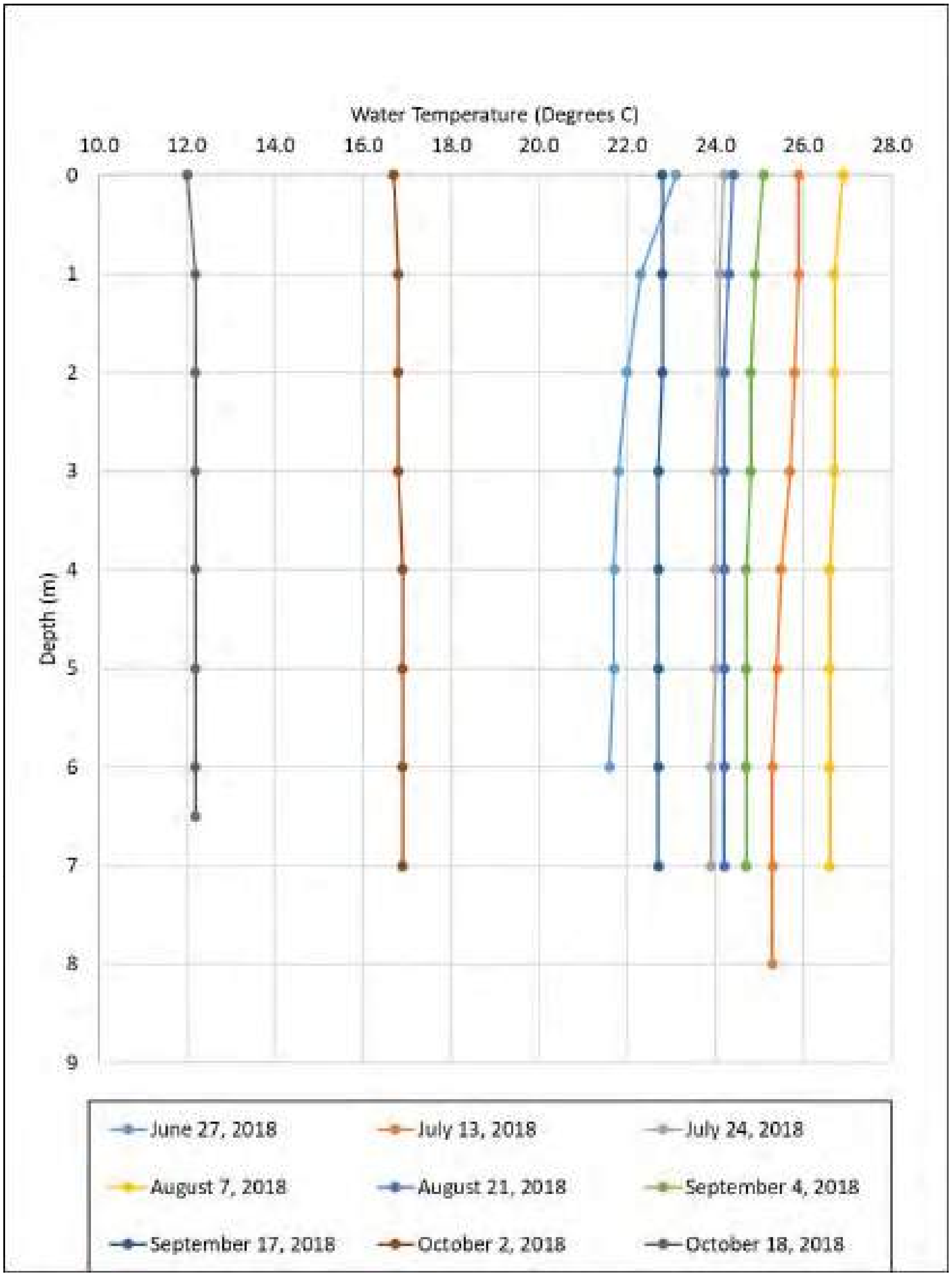
[4] The buoy was initially installed on June 27, 2018; however, before the July 13, 2018 sampling event the location of the buoy was moved slightly south to an area of slightly deeper water (~1 meter).

Figure 5.1-1: River Flow at USGS Gage No. 1059000 Androscoggin River near Auburn, ME prorated to the Project



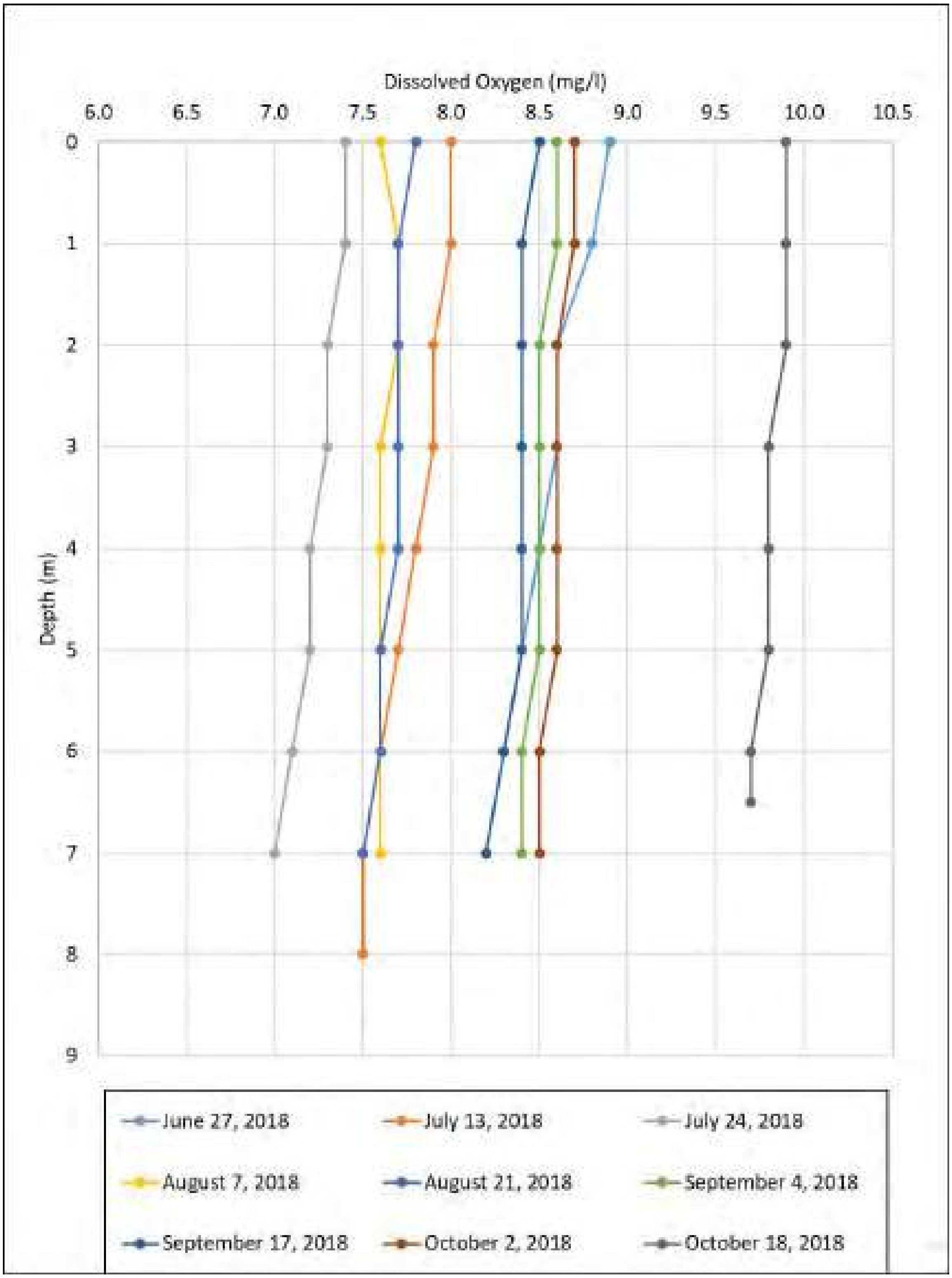
APPELLANT EXHIBIT 5 P.26

Figure 5.4-1: Water Temperature Profiles at the Project Impoundment, 2018



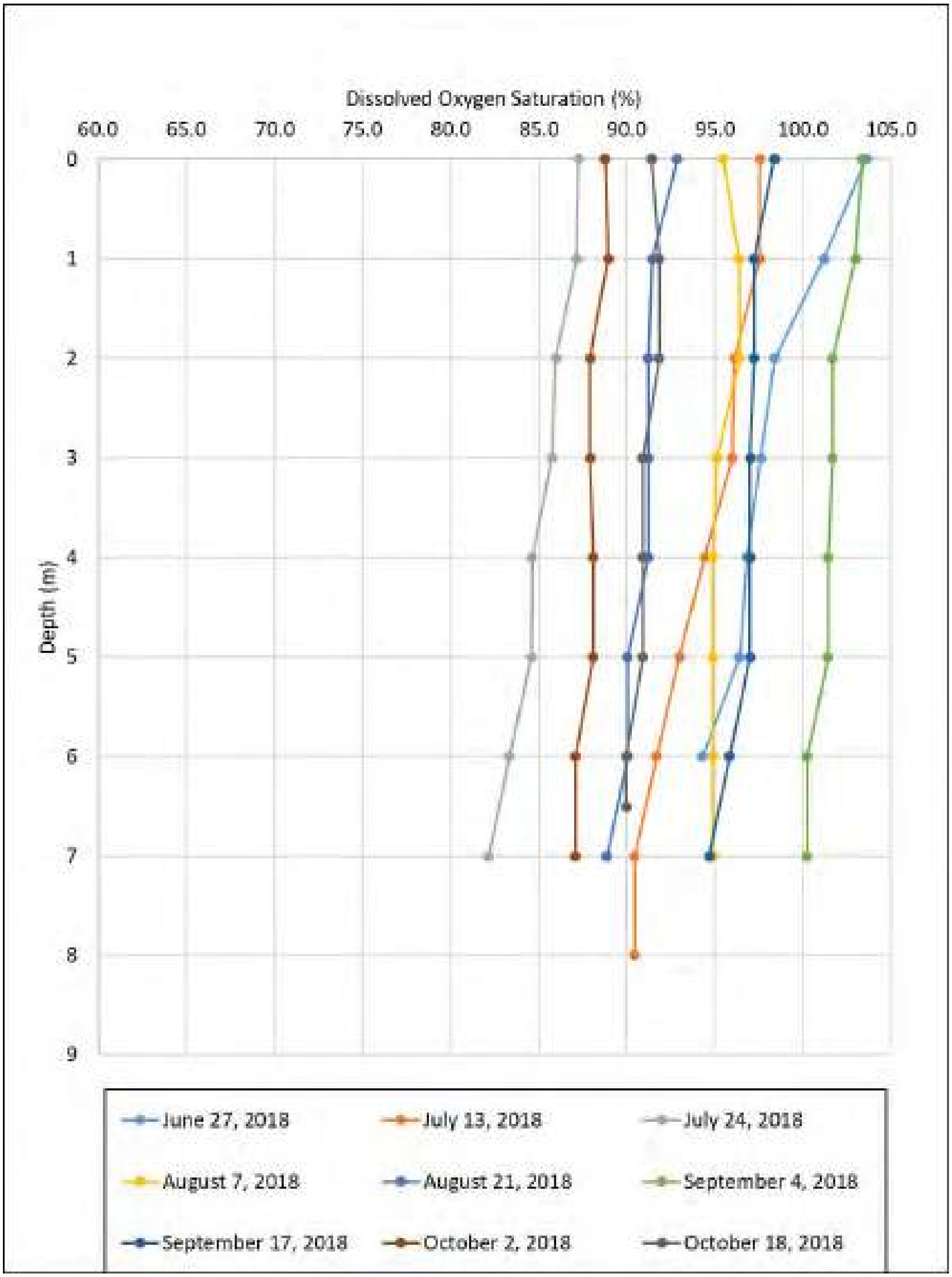
APPELLANT EXHIBIT 5 P.27

Figure 5.4-2: Dissolved Oxygen Profiles at the Project Impoundment, 2018



APPELLANT EXHIBIT 5 P.28

Figure 5.4-3: Dissolved Oxygen Percent Saturation Profiles at the Project Impoundment, 2018



APPELLANT EXHIBIT 5 P.29

Figure 5.5.1-1: Continuous Water Temperature in the Project Tailwater, August 2 – October 2, 2018

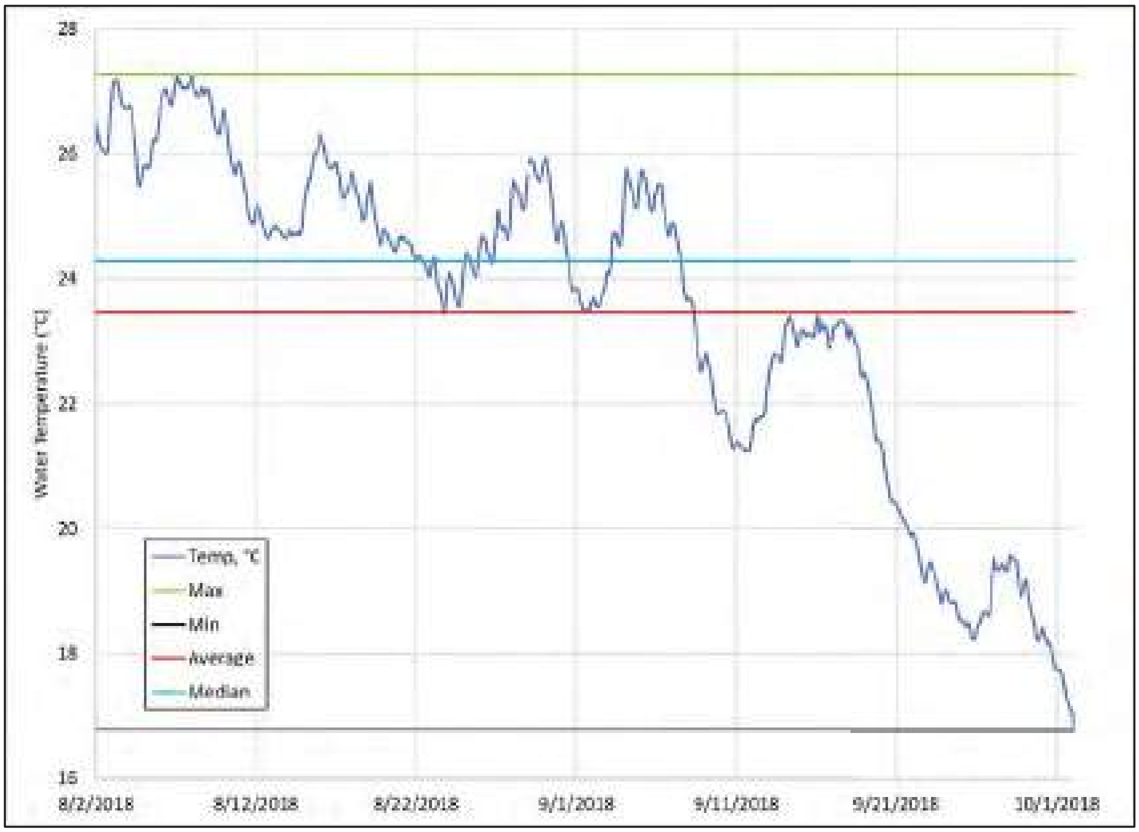
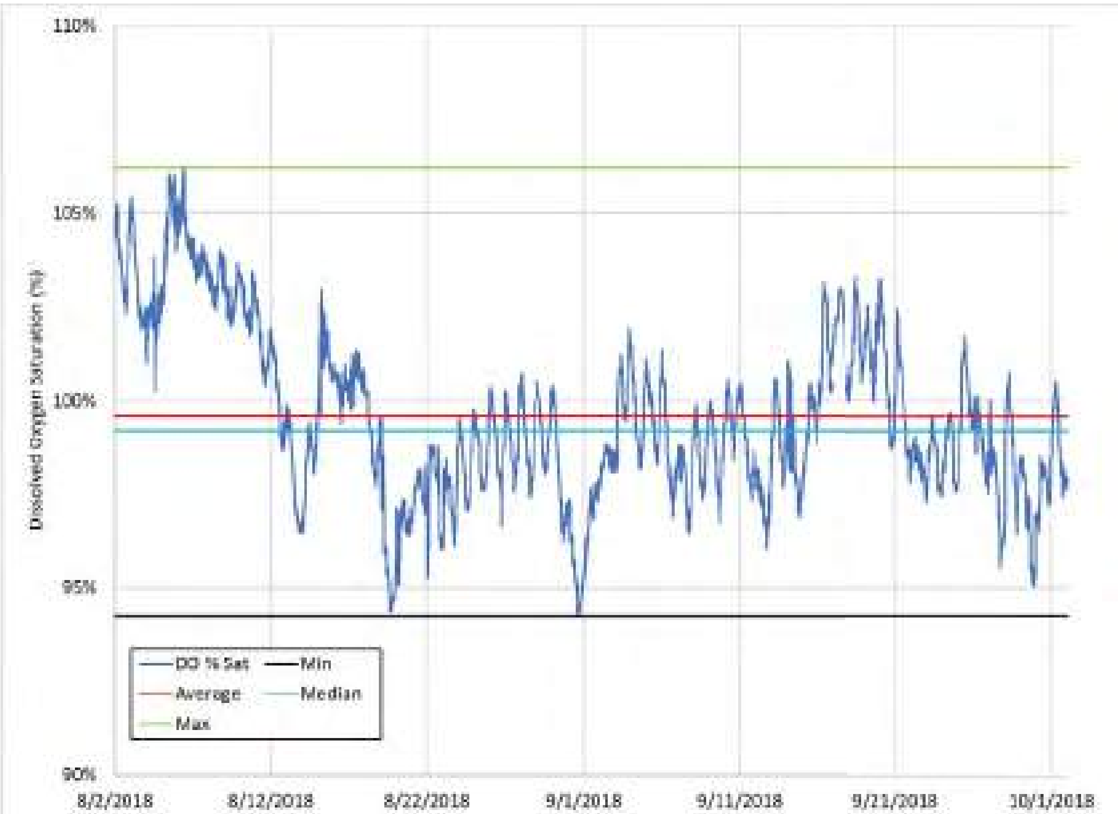


Figure 5.5.2-1: Continuous Dissolved Oxygen in the Project Tailwater, August 2 – October 2, 2018

Figure 5.5.2-2: Continuous Dissolved Oxygen Percent Saturation in the Project Tailwater, August 2 – October 2, 2018



6.0 SUMMARY

The study results indicate that water quality at the Project was within the MDEP's state water quality standards. Water temperatures and dissolved oxygen were relatively uniform throughout the water column within the Project impoundment, which resulted in no summer stratification. Over the study period, water temperature within the Project impoundment ranged from 12.0 ºC (October) to 26.9 ºC (August). Dissolved oxygen concentrations ranged from 7.0 mg/l (July) to 9.9 mg/l (October) and were above the minimum state standard for Class C waters (5.0 mg/l). The dissolved oxygen percent saturation in the Project impoundment ranged from 82.2 percent (July) to 103.6 (September) percent throughout the monitoring period. The dissolved oxygen percent saturation in the Project impoundment exceeded the established state standard of 60 percent saturation for Class C waters.

The water temperature in the Project tailwater ranged from 16.8 ºC (October) to 27.3 ºC (August) with an average of 23.5 ºC. Dissolved oxygen concentrations in the Project tailwater ranged from 7.8 (August) to 9.7 mg/l (October) with an average of 8.5 mg/l. Observed concentrations were above the minimum state standard for Class C waters (5.0 mg/l). Dissolved oxygen percent saturation ranged from 94.3 to 106.2 percent with an average of 99.6 percent. These values were above the minimum state standard of 60 percent saturation for Class C waters.

The Project impoundment has relatively low levels of nutrients and does not support high densities of algal populations. Sampling data suggest that the Project impoundment is mesotrophic.

7.0 VARIANCES FROM THE FERC APPROVED STUDY PLAN

The study was not initiated until late June. Therefore, Topsham Hydro was only able to conduct one trophic sampling event during the month of June, rather than two. In addition, Unit 1 was offline for the duration of the study while undergoing maintenance. Inflow was passed over the spillway during this time.

8.0 REFERENCES

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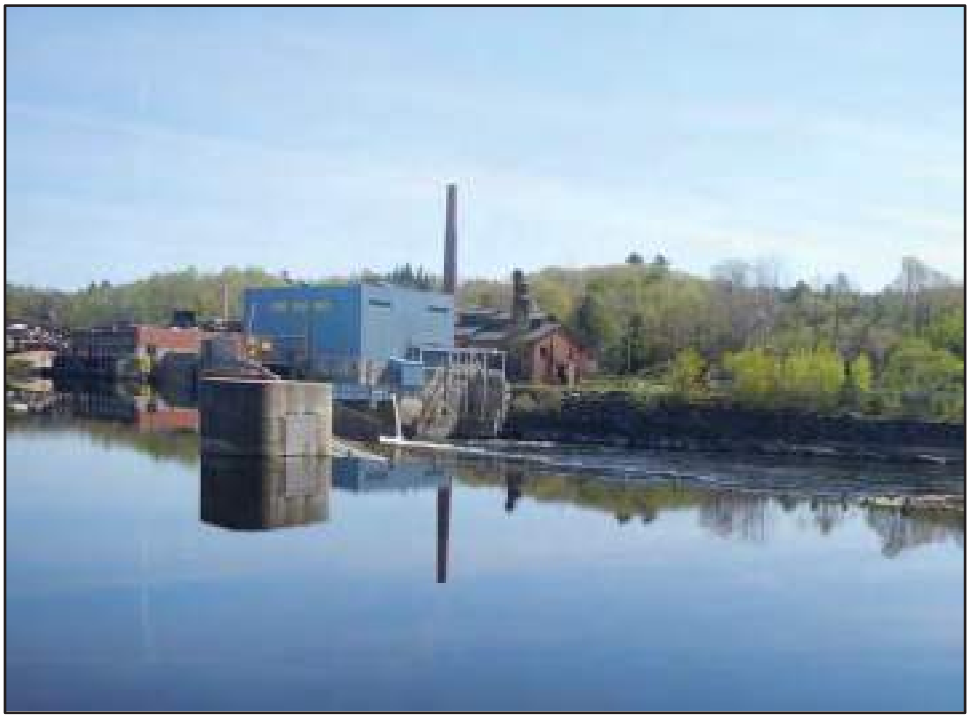
DRAFT UPDATED STUDY REPORT

TAILWATER BENTHIC MACROINVERTEBRATE SURVEY

PEJEPSCOT HYDROELECTRIC PROJECT
(FERC No. 4784)



Submitted by:

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Lewiston, ME 04240

Prepared by:

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

April 2020

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

EPT	Ephemeroptera, Plecoptera, and Trichoptera
FERC	Federal Energy Regulatory Commission
HBI	Hilsenhoff Biotic Index
MDEP	Maine Department of Environmental Protection
ME	Maine
mg/L	Milligrams per liter
Normandeau	Normandeau Associates, Inc.
Project	Pejepscot Hydroelectric Project (FERC No. 4784)
RSP	Revised Study Plan

1.0 INTRODUCTION

A survey of benthic macroinvertebrates was conducted in support of the relicensing of the Pejepscot Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 4784, as identified in the Revised Study Plan (RSP) submitted by Topsham Hydro Partners Limited Partnership (Topsham) on June 12, 2018 and approved by the FERC in its Study Plan Determination letter dated July 3, 2018. This is a report for the 2018 study efforts of the Tailwater Benthic Macroinvertebrate Survey. The majority of work for this study was conducted by Normandeau Associates, Inc. (Normandeau). The Maine Department of Environmental Protection (MDEP) was provided with a listing of observed taxonomic classifications and abundance (data listing provided in Appendix A) in order to aid them in their determination of water classification standards for the Project tailrace.

2.0 OBJECTIVES

The goal of this study was to determine if the attainment of Class C habitat and aquatic life criteria is being met in the river reach below the Project dam. The study objective was to determine the composition of the benthic macroinvertebrate community within the tailrace reach of the dam in accordance with the most recent MDEP protocol for macroinvertebrate sampling.

3.0 STUDY AREA

The study area included the section of the Androscoggin River located approximately 600-700 feet downstream of the Project. As specified in the RSP, a single sampling station was established within representative habitat downstream of the Project facilities (Figure 3-1).

Pejepscot Hydroelectric Project
(FERC No. 4784)
Tailwater Benthic Macroinvertebrate Survey

0 100 200 400 Feet

N

Figure 3-1:
Location of Benthic Macroinvertebrate Sampling Station Downstream of Pejepscot Dam
August, 2018

4.0 METHODS

Benthic macroinvertebrate community sampling downstream of the Project was conducted following the MDEP's Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (Davies and Tsomides 2014) which presents the standard practices and procedures that have been adopted by MDEP to acquire benthic macroinvertebrate data for purposes of aquatic life classification attainment evaluation. As described in the RSP, a set of three rock baskets were deployed at a sampling location downstream of the power station and within representative benthic macroinvertebrate habitat. Samplers were filled with 7.25 ± 0.5 kg of clean, washed cobble graded to a uniform diameter range of 3.8-7.6 cm. Pejepscot samplers were deployed during the late summer low-flow period from July 1 to September 30 specified in the MDEP protocol and remained in the river for the required 28 days (± 4 days). At the time of deployment, baskets were oriented parallel to stream flow and were placed at locations where there was a high degree of certainty that they would remain watered for the duration of the study period and were outside of any potential bank effects.

At the completion of the exposure period, samplers were approached from the downstream side and collected by carefully lifting them into an aquatic sampling net. Following collection, samplers were washed through a 600 micron sieve bucket. Each rock was visually inspected, and the surface was rinsed through the bucket. Contents of the sieve bucket were placed in double-labeled jars and preserved with a 70% solution of ethyl alcohol. Habitat and water quality measurements were collected at the time of deployment and retrieval at both sampling locations. Habitat parameters evaluated were those shown on the physical habitat data sheet included in the MDEP protocol. These included substrate composition, canopy coverage, land use, and terrain characteristics. Water quality measurements included velocity, temperature, specific conductance, dissolved oxygen, pH, and total dissolved solids. Also noted were the dates of exposure.

The benthos samples were sent to Normandeau's benthic taxonomy laboratory located in Stowe, Pennsylvania. Taxonomists there sorted, identified and enumerated the full contents of the three rock basket samplers. Samples were analyzed using stereo-zoom and compound microscopes. Organisms were identified and enumerated to the lowest practical taxon, generally genus and species, dependent on their age and condition using published taxonomic keys. Chironomidae (midges) larvae were slide mounted after being prepared in a clearing solution and identified using a compound microscope. Worms were also slide mounted and identified using a compound microscope.

The following metrics were evaluated for the macroinvertebrate samples collected downstream of Pejepscot:

- **Total Number of Taxa**: The number of genera identified.

- **Number of EPT Taxa**: Number of genera in the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), collectively referred to as the "EPT" taxa. These three groups of benthic insects are considered particularly sensitive to pollution.

- **Number of Ephemeroptera Taxa**: The number genera classified as mayflies.
- **Number of Plecoptera Taxa**: The number genera classified as stoneflies.
- **Number of Trichoptera Taxa**: The number genera classified as caddisflies.
- **Percent EPT**: The percentage of the total number of specimens in a sample representing individuals classified as mayflies, stoneflies or caddisflies.
- **Percent Ephemeroptera**: The percentage of the total number of specimens that are mayfly nymphs.
- **Number of Intolerant Taxa**: The number of genera considered to be sensitive to environmental perturbation (tolerance values = 0 – 3).
- **Percent Tolerant Organisms**: The percent of macroinvertebrate specimens considered tolerant to environmental perturbations (tolerance values = 7 – 10).
- **Percent Dominant Taxon**: The percent abundance of the single most abundant taxon.
- **Hilsenhoff Biotic Index (HBI)**: A weighted average of the tolerance values of all taxa present. Organisms are assigned a tolerance value from 0 to 10 indicating their sensitivity to organic pollutants (0 being most sensitive, 10 being most tolerant). HBI is calculated as:
    - HBI= (Σn_i x a_i)/N
        - Where:
            - n = number of specimens in taxa i
            - a = tolerance value of taxa i
            - N = total number of specimens in sample
- **Shannon Diversity Index (base e)**: This metric compares the distribution of individuals among all taxa present in a sample. Shannon Diversity (H') is calculated as H' = Σ pi ln pi, where pi is the proportion of the total number of individuals occurring in taxon i. Maximum diversity is obtained when the numbers of individuals are equally distributed among taxa. A value near zero indicates community dominance by a small number of taxa. Higher values indicate that the numbers of individuals are evenly distributed.

5.0 RESULTS

5.1 Habitat and Macroinvertebrate Collections

Macroinvertebrate samplers were installed at the sampling location downstream of Pejepscot on August 2, 2018 and were retrieved 27 days later on August 29, 2018. Recorded physical habitat parameters at the time of deployment and retrieval are summarized in Table 5-1. In general, aquatic habitat in the area approximately 660 feet downstream of the Project was primarily a mix of boulder (<10 inch) and rubble (3-10 inch) substrates. Areas of filamentous algae were present on the substrate at the sampling location during both deployment and retrieval of the samplers.

A total of 1,707 individuals representing 43 taxonomic classifications were collected from the three samplers deployed downstream of Pejepscot (Table 5-2). Caddisfly species (genus *Hydropsyche*) and the black fly (genus *Simulium*) were the two most dominant members of the benthic macroinvertebrate community and combined to make up approximately 50% of the total number of specimens.

Metrics evaluating community tolerance/intolerance revealed that sensitive genera comprised a measurable proportion of the macroinvertebrate community downstream of Pejepscot. Members of the orders Ephemeroptera, Plecoptera, and Trichoptera are considered particularly sensitive to pollution and can provide information important to the condition of the benthic macroinvertebrate community. Individuals from the EPT assemblage were present at the downstream sampling location, comprising 66.3% of the total number of specimens collected.

In addition to evaluation of the EPT contribution to the community, each taxonomic group was assigned a value of tolerance using classifications provided by MDEP. Tolerance values (range = 0-10) were further classified as Intolerant (i.e., sensitive to water quality; values = 0-3), Semi-tolerant (i.e., intermediate in their tolerance to water quality; values = 4-6) or Tolerant (i.e., low sensitivity to water quality; values 7-10). Genera classified as Intolerant to poor water quality comprised 27% of the total number of genera observed at the downstream sampling location (replicates 1-3, combined). Individuals belonging to taxonomic groups considered to be tolerant of low water quality represented only 2.6% of all specimens enumerated at from the samplers located downstream of Pejepscot.

The Hilsenhoff Biotic Index rating provides an estimate of the overall tolerance of the community in the sample area. For the sampling location downstream of Pejepscot this value were estimated at 4.19. Values for the HBI index range from 0 to 10 with lower values reflecting a higher abundance of sensitive groups. The estimate for the Pejepscot macroinvertebrate community is supportive of a water quality rating of "very good" (Hilsenhoff 1987).

5.2 Water Quality Classification Standards

A full listing of taxonomic classifications and abundance values for each of the three replicates from the downstream sampling location as well as all the physical data collected during deployment and retrieval of the samplers were provided to MDEP for their determination as to whether or not the macroinvertebrate community sampled downstream of Pejepscot meets the aquatic life criteria for that section of the Androscoggin River. The statutory class of the Androscoggin River downstream of Pejepscot is Class C. MDEP characterizes Class C waters as being of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The dissolved oxygen content of Class C water may be not less than 5 parts per million or 60% of saturation, whichever is higher.

Normandeau provided taxonomic and habitat information to the MDEP on November 28, 2018 and MDEP returned a Classification Attainment Report on November 30, 2018 (see full report in Appendix B). The final determination indicated that the macroinvertebrate community sampled downstream of Pejepscot during August 2018 met Class A standards.

Table 5-1: Summary of Macroinvertebrate Sampling Location Habitat and Conditions Downstream of Pejepscot Dam, August 2018

Parameter	Sample Location	
	Deployment	**Retrieval**
Date-Time	8/2/18-13:10	8/29/18-10:56
No. Samplers	3	3
Coordinates	N43.95536 W70.02387	
Land Use (500 m radius US)	upland conifer, upland hardwood	
Terrain (500 m radius US)	Flat, rolling	
Canopy Cover (upstream view)	Open (0-25% shaded)	
Physical Bottom Characteristics	Boulders (<10") - 50% Rubble (3"-10") - 40% Sand (<1/8") - 10%	
Channel Width (m)	~80 m	
Site Depth (cm)	97	97
Flow (cm/s)	37.9	45.4
Dissolved O_2 (mg/L)	8.21	7.97
Temperature (°C)	25.9	25.2
pH	7.09	6.95
SPC (µS/cm)	106	93
Observations		
Fish	juvenile YOY smallmouth bass observed	
Algae/Macrophytes	Present in mats on bottom substrate	
Habitat Quality	Good in appearance	
Dams/Impoundments	Pejepscot - US ~660 ft	
Discharges	Powerhouse	
Nonpoint stressors	None observed	

Table 5–2: Summary of Macroinvertebrate Metrics for Replicates Collected Downstream of Pejepscot, August 2018

Metric	Sample Location 1			
	Rep. 1	Rep. 2	Rep. 3	All
Total Number of Individuals	576	191	940	**1,707**
Total Number of Taxa	29	29	35	**43**
Number of EPT Taxa	16	20	20	**22**
Number of Ephemeroptera Taxa	5	7	8	**9**
Number of Plecoptera Taxa	1	2	2	**2**
Number of Trichoptera Taxa	10	11	10	**11**
Percent EPT	73.4%	85.3%	58.1%	**66.3%**
Percent Ephemeroptera	24.0%	30.9%	10.5%	**17.3%**
Number of Intolerant Taxa	7	10	10	**12**
Percent Tolerant Organisms	3.7%	3.1%	1.9%	**2.6%**
Percent Dominant Taxon	30.9%	23.6%	31.8%	**30.6%**
Hilsefhoff Biotic Index (HBI)	4.24	4.25	4.14	**4.19**
HBI Water Quality Rating	Very Good	Very Good	Very Good	**Very Good**
Shannon Diversity (base e)	2.58	2.71	2.29	**2.55**

6.0 SUMMARY

The macroinvertebrate community was sampled approximately 660 feet downstream of Pejepscot following approved MDEP field and laboratory methods during August 2018. Macroinvertebrate samples collected at the downstream location yielded adequate numbers of sensitive taxa indicating that under the current operational regime there are no detrimental impacts to the macroinvertebrate community.

7.0 VARIANCES FROM FERC-APPROVED STUDY PLAN

There was no variance from the methodologies and schedule as described in the FERC-approved study plan.

8.0 REFERENCES

Davies, S.P., and L. Tsomides. 2014. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. DEP LW0387-C2014.

Hilsenhoff, W.L. 1987. An improved biotic index of stream pollution. The Great Lakes Entomologist 20: 31-36.

APPENDIX A. TAXONOMIC LISTING FOR MACROINVERTEBRATE SAMPLES COLLECTED DOWNSTREAM OF PEJEPSCOT DAM DURING AUGUST 2018

MDEP Taxonomic Code	Taxon Name	No. Identified		
		Rep 1	Rep 2	Rep 3
09020401008	*Acentrella*		1	1
09020401007011	*Acerpenna pygmaea*	44	17	11
09020209042	*Acroneuria*	4	3	1
10010104013	*Amnicola*	5	3	8
09020309048	*Argia*			1
09020401001	*Baetis*	31	11	31
09020301004012	*Boyeria vinosa*		2	
09020618072	*Ceraclea*	8	7	2
09020604015	*Cheumatopsyche*	36	15	21
09020601003	*Chimarra*	16	7	49
09021011037	*Cricotopus*	16	3	15
09021011024	*Diamesa*	1		
09021011085	*Dicrotendipes*			1
03010102	*Dugesiidae*	11	1	13
09020401005	*Heterocloeon*	9	3	3
09010203006011	*Hyalella azteca*	1		
09030101	*Hydrachnidia*			1
09020604016030	*Hydropsyche morosa*	6		9
09020604016047	*Hydropsyche phalerata*	172	45	290
09020604016	*Hydropsyche*	5	3	5
09020607026	*Hydroptila*	9	1	3
09020404018	*Isonychia*	16	1	18
09020402011	*Leucrocuta*			1
09020402015046	*Maccaffertium exiguum*	4		1
09020402015	*Maccaffertium*	34	25	32
09020604018	*Macrostemum*	17	4	49
09020618074	*Nectopsyche*	1	1	
05	*Nematoda*	1		
09021011012	*Nilotanypus*			5
09020603009	*Nyctiophylax*		1	1
09020618078	*Oecetis*	3	3	1
09020209049151	*Paragnetina media*		1	8
09020401012	*Plauditus*			1
09020603010	*Polycentropus*	8	13	8
09021011102182	*Polypedilum flavum*	1	1	8
09021011102185	*Polypedilum illinoense group*	2	3	
09021011026045	*Potthastia gaedii*			2
09021011072127	*Rheotanytarsus exiguus group*	4	2	3

MDEP Taxonomic Code	Taxon Name	No. Identified		
		Rep 1	Rep 2	Rep 3
09021011072128	*Rheotanytarsus pellucidus*	5		3
09021012047	*Simulium*	89	11	241
09021113070055	*Stenelmis crenata*	1		
08020202014001	*Stylaria fossularis*	1		
09021011076	*Tanytarsus*			1
09021011062	*Thienemanniella*	10	1	82
09021011020041	*Thienemannimyia group*			1
09020411038	*Tricorythodes*		1	
09021011065113	*Tvetenia vitracies*	5	1	9

APPENDIX B. MDEP CLASSIFICATION ATTAINMENT REPORT FOR SAMPLE LOCATION DOWNSTREAM OF PEJEPSCOT DAM DURING AUGUST 2016

Maine Department of Environmental Protection
Biological Monitoring Program
Aquatic Life Classification Attainment Report

Station Information

Station Number: S-954
Waterbody: Androscoggin River - Station 954
Town: Brunswick
Directions: BELOW PEJEPSCOT DAM; UP RIVER RD FROM BRUNSWICK TO PUBLIC FISHING PARK ACCESS AND CANOE PORTAGE

River Basin: Androscoggin
HUC8 Name: Lower Androscoggin
Latitude: 43 57 19.82 N
Longitude: 70 1 26.95 W
Stream Order: 5

Sample Information

Log Number: 2716
Subsample Factor: X1
Type of Sample: ROCK BASKET
Replicates: 3
Date Deployed: 8/2/2018
Date Retrieved: 8/29/2018

Classification Attainment

Statutory Class: C
Model Result with P≥0.6: A
Date Last Calculated: 11/29/2018
Final Determination: A
Reason for Determination: Model
Comments:
Date: 11/30/2018

Model Probabilities

First Stage Model

Class A	0.49	Class C	0.02
Class B	0.48	NA	0.00

C or Better Model

Class A, B, or C	1.00
Non-Attainment	0.00

B or Better Model

Class A or B	1.00
Class C or Non-Attainment	0.00

A Model

Class A	0.75
Class B or C or Non-Attainment	0.25

Model Variables

01 Total Mean Abundance	569.00
02 Generic Richness	42.00
03 Plecoptera Mean Abundance	5.67
04 Ephemeroptera Mean Abundance	98.67
05 Shannon-Wiener Generic Diversity	3.53
06 Hilsenhoff Biotic Index	4.15
07 Relative Abundance - Chironomidae	0.11
08 Relative Generic Richness Diptera	0.29
09 *Hydropsyche* Abundance	178.33
11 *Cheumatopsyche* Abundance	24.00
12 EPT Generic Richness/ Diptera Generic Richness	1.75
13 Relative Abundance - Oligochaeta	0.00
15 Perlidae Mean Abundance (Family Functional Group)	5.67
16 Tanypodinae Mean Abundance (Family Functional Group)	2.00
17 Chironomini Abundance (Family Functional Group)	5.33
18 Relative Abundance Ephemeroptera	0.17
19 EPT Generic Richness	21.00
21 Sum of Abundances: *Dicrotendipes, Micropsectra, Parachironomus, Helobdella*	0.33
23 Relative Generic Richness- Plecoptera	0.05
25 Sum of Abundances: *Cheumatopsyche, Cricotopus, Tanytarsus, Ablabesmyia*	35.67
26 Sum of Abundances: *Acroneuria, Maccaffertium, Stenonema*	34.67
28 EP Generic Richness/14	0.79
30 Presence of Class A Indicator Taxa/7	0.29

Five Most Dominant Taxa

Rank	Taxon Name	Percent
1	*Hydropsyche*	31.34
2	*Simulium*	19.98
3	*Maccaffertium*	5.62
4	*Thienemanniella*	5.45
5	*Baetis*	4.28

Maine Department of Environmental Protection
Biological Monitoring Program
Aquatic Life Classification Attainment Report

Station Number: S-954	Town: Brunswick		Date Deployed: 8/2/2018
Log Number: 2716	Waterbody: Androscoggin River - Station 954		Date Retrieved: 8/29/2018

Sample Collection and Processing Information

Sampling Organization: NORMANDEAU ASSOCIATES   Taxonomist: NORMANDEAU ASSOCIATES

Waterbody Information - Deployment		Waterbody Information - Retrieval	
Temperature:	25.9 deg C	Temperature:	25.2 deg C
Dissolved Oxygen:	8.21 mg/l	Dissolved Oxygen:	7.97 mg/l
Dissolved Oxygen Saturation:	101.3 %	Dissolved Oxygen Saturation:	96.9 %
Specific Conductance:	106 uS/cm	Specific Conductance:	93 uS/cm
Velocity:	37.9 cm/s	Velocity:	45.4 cm/s
pH:	7.09	pH:	6.95
Wetted Width:	81.1 m	Wetted Width:	80.8 m
Bankfull Width:	90.5 m	Bankfull Width:	88.4 m
Depth:	97 cm	Depth:	97 cm

Water Chemistry

Summary of Habitat Characteristics

Landuse Name	Canopy Cover	Terrain	
Upland Conifer	Open	Flat	
Upland Hardwood			

Potential Stressor	Location	Substrate	
Regulated Flows	Below Dam	Boulder	50 %
	Main Stem	Rubble/Cobble	40 %
		Sand	10 %

Landcover Summary - 2004 Data

Sample Comments

Maine Department of Environmental Protection
Biological Monitoring Program
Aquatic Life Taxonomic Inventory Report

Station Number: S-954 Waterbody: Androscoggin River - Station 954 Town: Brunswick

Log Number: 2716 Subsample Factor: X1 Replicates: 3 Calculated: 11/29/2018

Taxon	Maine Taxonomic Code	Count (Mean of Samplers) Actual	Adjusted	Hilsenhoff Biotic Index	Functional Feeding Group	Relative Abundance % Actual	Adjusted
Dugesiidae	03010102	8.33	8.33		--	1.5	1.5
Nematoda	05	0.33	0.33		--	0.1	0.1
Stylaria	08020202014		0.33		CG		0.1
Stylaria fossularis	08020202014001	0.33			--	0.1	
Hyalella	09010203006		0.33	8	CG		0.1
Hyalella azteca	09010203006011	0.33			--	0.1	
Acroneuria	09020209042	2.67	2.67	0	PR	0.5	0.5
Paragnetina	09020209049		3.00	1	PR		0.5
Paragnetina media	09020209049151	3.00			--	0.5	
Boyeria	09020301004		0.67	2	PR		0.1
Boyeria vinosa	09020301004012	0.67			--	0.1	
Argia	09020309048	0.33	0.33	7	PR	0.1	0.1
Baetis	09020401001	24.33	24.33	4	CG	4.3	4.3
Heterocloeon	09020401005	5.00	5.00	2	SC	0.9	0.9
Acerpenna	09020401007		24.00	5	CG		4.2
Acerpenna pygmaea	09020401007011	24.00			--	4.2	
Acentrella	09020401008	0.67	0.67	3	CG	0.1	0.1
Plauditus	09020401012	0.33	0.33		CG	0.1	0.1
Leucrocuta	09020402011	0.33	0.33	1	SC	0.1	0.1
Maccaffertium	09020402015	30.33	32.00	4	SC	5.3	5.6
Maccaffertium exiguum	09020402015046	1.67			--	0.3	
Isonychia	09020404018	11.67	11.67	2	CF	2.1	2.1
Tricorythodes	09020411038	0.33	0.33	4	CG	0.1	0.1
Chimarra	09020601003	24.00	24.00	2	CF	4.2	4.2
Nyctiophylax	09020603009	0.67	0.67	5	PR	0.1	0.1
Polycentropus	09020603010	9.67	9.67	6	PR	1.7	1.7
Cheumatopsyche	09020604015	24.00	24.00	5	CF	4.2	4.2
Hydropsyche	09020604016	4.33	178.33	4	CF	0.8	31.3
Hydropsyche morosa	09020604016030	5.00			--	0.9	
Hydropsyche phalerata	09020604016047	169.00			--	29.7	
Macrostemum	09020604018	23.33	23.33	3	CF	4.1	4.1
Hydroptila	09020607026	4.33	4.33	6	P	0.8	0.8
Ceraclea	09020618072	5.67	5.67	3	CG	1.0	1.0
Nectopsyche	09020618074	0.67	0.67	3	SH	0.1	0.1
Oecetis	09020618078	2.33	2.33	8	PR	0.4	0.4
Nilotanypus	09021011012	1.67	1.67	6	PR	0.3	0.3
Thienemannimyia	09021011020		0.33	3	PR		0.1

Maine Department of Environmental Protection
Biological Monitoring Program
Aquatic Life Taxonomic Inventory Report

Station Number: S-954 Waterbody: Androscoggin River - Station 954 Town: Brunswick

Log Number: 2716 Subsample Factor: X1 Replicates: 3 Calculated: 11/29/2018

Taxon	Maine Taxonomic Code	Count (Mean of Samplers) Actual	Count (Mean of Samplers) Adjusted	Hilsenhoff Biotic Index	Functional Feeding Group	Relative Abundance % Actual	Relative Abundance % Adjusted
Thienemannimyia group	09021011020041	0.33			--	0.1	
Diamesa	09021011024	0.33	0.33	5	CG	0.1	0.1
Potthastia	09021011026		0.67	2	CG		0.1
Potthastia gaedii	09021011026045	0.67			--	0.1	
Cricotopus	09021011037	11.33	11.33	7	SH	2.0	2.0
Thienemanniella	09021011062	31.00	31.00	6	CG	5.4	5.4
Tvetenia	09021011065		5.00	5	CG		0.9
Tvetenia vitracies	09021011065113	5.00			--	0.9	
Rheotanytarsus	09021011072		5.67	6	CF		1.0
Rheotanytarsus exiguus group	09021011072127	3.00			CF	0.5	
Rheotanytarsus pellucidus	09021011072128	2.67			CF	0.5	
Tanytarsus	09021011076	0.33	0.33	6	CF	0.1	0.1
Dicrotendipes	09021011085	0.33	0.33	8	CG	0.1	0.1
Polypedilum	09021011102		5.00	6	SH		0.9
Polypedilum flavum	09021011102182	3.33			--	0.6	
Polypedilum illinoense group	09021011102185	1.67			--	0.3	
Simulium	09021012047	113.67	113.67	4	CF	20.0	20.0
Stenelmis	09021113070		0.33	5	SC		0.1
Stenelmis crenata	09021113070055	0.33			--	0.1	
Hydrachnidia	09030101	0.33	0.33		--	0.1	0.1
Amnicola	10010104013	5.33	5.33		SC	0.9	0.9

2014). Downstream of the project, the Androscoggin River from Pejepscot Dam to Brunswick Dam is listed as Category 4-B due to dioxins, Category 5-D for legacy PCBs, and Category 4-C for aquatic life impairment due to inadequate fish passage for American shad at Brunswick Dam.

2018 Water Quality Monitoring

In 2018, Topsham Hydro collected periodic water quality data in the project impoundment, and continuous water temperature and DO data in the Androscoggin River downstream of the dam during low flow, warm water temperature conditions. The results of the 2018 study are summarized below and indicate that water quality at the project meets Maine DEP's state water quality standards.

Impoundment Sampling

Water temperatures and DO were relatively uniform throughout the water column, which resulted in no summer stratification. Over the study period, water temperatures ranged from 12.0ºC in October to 26.9ºC in August. DO concentrations ranged from 7.0 mg/L in July to 9.9 mg/L in October and were above the minimum state standard for Class C waters (5.0 mg/L). Similarly, DO percent saturation ranged from 82.2 percent in July to 103.6 percent in September, which exceeds the state standard of 60 percent saturation for Class C waters.

All pH values were within the recommended range of 6.0 to 8.5 for Class C waters. Secchi disk transparency ranged from 2.42 to 4.66 meters, with an average of 3.98 meters. The secchi disk transparency was above the proposed standards of 2.0 meters throughout the sampling period. The impoundment has relatively low levels of nutrients and does not support high densities of algal populations.

Riverine Sampling

Water temperatures in the project tailwater ranged from 16.8ºC in October to 27.3ºC in August with an average of 23.5ºC. DO concentrations in the tailwater ranged from 7.8 mg/L in August to 9.7 mg/L in October with an average of 8.5 mg/L. Observed concentrations were above the minimum state standard for Class C waters (5.0 mg/L). DO percent saturation ranged from 94.3% to 106.2% with an average of 99.6%. These values were above the minimum state standard of 60 percent saturation for Class C waters.

Fisheries Resources

Resident Fish Community

Yoder et al. (2006) performed electrofishing surveys along 1.0 km of shoreline at three sites in the vicinity of the project in July 2003. As shown in table 2, 16 species were captured in the river between Worumbo and Pejepscot Dams. The catch was dominated by minnows and sunfish. The highest abundance was observed in the impoundment, primarily due to large numbers of spottail shiner. All alewife captured in the surveys were young-of-the-year.

June 7, 2022

Mr. Kyle Olcott
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333

Re: Pejepscot Hydroelectric Project Draft Water Quality Certification

Dear Mr. Olcott:

The Atlantic Salmon Federation (ASF) respectfully submits the following comments on the Maine Department of Environmental Protection's (MDEP) Draft Water Quality Certification (WQC) for the Pejepscot Hydroelectric Project. ASF is concerned with two issues. The first is related to fish passage and impacts of the Project on the diadromous fish community, and the second is whether MDEP applies Class C or Class B water quality standards to the Project.

In addition, ASF would also like to ask MDEP to establish a clearer process for public review and comment of Draft WQCs. As you are aware, I had been checking the MDEP Website for the Draft WQC periodically this spring and it was not until reaching out late last week that I found out that the Draft had been issued. It seems that many of the other organizations that have been involved in issues around water quality or diadromous fish in the Androscoggin were also unaware of the Draft WQC. This left many of us scrambling to understand what was happening and we only had about a day to review and develop comments.

Water Quality Classification

ASF is one of many conservation and environmental organizations that supported the reclassification of the lower Androscoggin River from Class C to Class B. This reclassification was approved by the Maine Legislature and signed into law earlier this spring by the Governor. We believe that Class B standards should apply to section of the lower Androscoggin affected by the Pejepscot. We understand that the reclassification will not legally take effect until later this summer, but given the clear intent of the Legislature, Governor, and the Maine Board of Environmental Protection, and the fact that the applicant's own studies have shown that Class B standards are being achieved, we feel strongly that Class B standards should be incorporated into the final WQC.

Diadromous Fish Species and Fish Passage

ASF is concerned that the proposals from the applicant incorporated in the Draft WQC are insufficient with respect to minimizing the Pejepscot Project's impacts on diadromous species and to guaranteeing safe, timely, and effective upstream and downstream fish passage at the Project. The Settlement Agreements (SA) between the applicant and the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service outline the actions that the applicant will take regarding diadromous species at the Project. Specifically, the SAs discuss performance standards and establish an iterative process for studying and implementing changes to the Project to address impacts on diadromous species. There is great merit to this, however, the specific language in the SA with NMFS around performance standards, schedule, and process provides no certainty that meaningful restoration of diadromous fish species above the Pejepscot Project will happen in the immediate future. For example, with respect to performance standards for alosines (American shad, alewife, and blueback herring), the NMFS SA only mentions "anticipated performance standards" that "may be similar to those required on other river systems."[1]

The upstream passage studies completed at Pejepscot found that the existing fish lift is an almost complete failure at passing American shad and alewife, with estimated passage effectiveness of 0% and 19.8% for the two species, respectively. This is a situation that calls for immediate and significant action. Instead of following the uncertain language within the SA, which is also reflected in FERC's Draft Environmental Assessment (EA), MDEP should establish clear, immediate, and binding performance standards for alosines and Atlantic salmon in the WQC. For alosines, the applicant has already agreed to meet an upstream passage effectiveness standard of 70% passing within 48 hours and a downstream standard of 95%, so these standards should be required within the WQC. Standards for Atlantic salmon are to be determined by NMFS, but these are likely to be 95% or greater for both upstream and downstream passage.[2]

In addition, the Draft WQC only requires that MDMR be consulted by the applicant when setting the annual fish lift operating schedule and lift frequency. ASF believes that MDMR (and/or MDEP) needs to have greater authority in all facets of the decision-making process related to fish passage. Strengthening the language around this in the final WQC will help ensure that the ambiguity within the SA with NMFS and the FERC Draft EA does not lead to lengthy delays or stalemating. One only needs to look at the situation with the Brunswick Hydroelectric Project, located four miles downriver from Pejepscot, to understand our concern. Per MDEP's 2018 / 2020 / 2022 Integrated Water Quality Monitoring and Assessment Report (May 25, 2022):

> The segment of the lower Androscoggin River between the Pejepscot Dam and the Brunswick Dam is listed in Category 4-C (impaired by non-pollutant) based on information from DMR that this segment fails to support an indigenous species of fish, the American shad, as required by statute. The dam at Brunswick and the associated fish passage device fail to allow passage of a sufficient number of shad to establish a

[1] "Settlement Agreement for Modified Prescription for Fishways Between Topsham Hydro Limited Partnership and the United States Department of Commerce National Marine Fisheries Service" as found in the Draft Environmental Assessment for Hydropower License for the Pejepscot Hydroelectric Project. FERC. June 2022. B-7.

[2] Ibid, 43.

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Atlantic Salmon Federation Fédération du Saumon Atlantique

sustainable population in the river above the dam. This facility is licensed by the Federal Energy Regulatory Commission (FERC) and has a requirement for fish passage as part of a State-adopted restoration plan for this species. The FERC license for the Brunswick Dam is due for renewal in 2029 and it is expected that DMR and other fisheries agencies will require improved fish passage.

Any fixes to the long standing fish passage problem at the Brunswick Project will not occur until the early 2030s, a half-century after the construction of the existing fish ladder at the dam. It is completely unacceptable that this impact on a public resource will be allowed to continue for fifty years. But absent a stronger WQC for the Project, the mechanisms for the State or the public to remedy the situation are limited to petitioning FERC to re-open their license for the Project, which is far from an easy task.

The State of Maine needs to avoid having another Brunswick Dam situation on its hands. To minimize that risk, the final WQC for the Pejepscot Project should set clear standards and a clear schedule for meeting those standards. The WQC also needs to ensure that the State has the ability to require and enforce fish passage so that the biological integrity of Maine's waters is maintained and restored.

Thank you again for the opportunity to comment on the Draft WQC. I very much appreciate your responsiveness on this issue. If you have any questions, please feel free to contact me at jburrows@asfmaine.org or at (207) 415-6637.

Sincerely,

John Burrows

John R.J. Burrows
Executive Director, U.S. Operations
Atlantic Salmon Federation

IN THE MATTER OF

Maine DEP Water Quality Certification,)
Pejepscot Hydroelectric Project)
#L007867-33-S-N (FERC Project No. P-4784))
Appeal by Friends of Merrymeetng Bay, et. al)

EXHIBIT 1 (SUPPLEMENTAL)

AFFIDAVIT OF ED FRIEDMAN

I, Ed Friedman, hereby declare the following statements are true and accurate to the best of my knowledge, information and belief:

1. My name is Ed Friedman. I am the Chairman of Friends of Merrymeeting Bay with approximately 30 years of experience in water quality matters and 20 years specifically with the Maine Department of Environmental Protection's (DEP) Triennial Review process where during the course of that time I advocated, collected data and coordinated technical analysis demonstrating the Lower Androscoggin met and continues to meet Class B water quality standards. I also participated on behalf of FOMB as an interested person in the above referenced Water Quality Certification (WQC) for the Pejepscot Hydroelectric Project also located on the Lower Androscoggin River.

2. During the course of this time I became familiar with the legislative process and its documentation related to the proposed re-classification of the Lower Androscoggin from Class C to Class B and its subsequent enactment into law, as well as the events of DEP's WQC review.

3. Based on this experience and my direct knowledge, I prepared the attached Exhibit 1, a summary timeline of certain events that transpired and it reflects the actual facts of both processes to the best of my knowledge.

EXHIBIT 1 TO AFFIDAVIT OF ED FRIEDMAN

Timeline of Certain Events – DEP Triennial Review and Pejepscot WQC

January 9, 2020:DEP announces Triennial Review (TR) and RFP's due March 31, 2020.

March 31, 2020: Grow L+A/FOMB Andro Upgrade proposal submitted to DEP.

June 9, 2021 (WQC): Topsham Hydro applied to the DEP for Water Quality Certification.

August 5, 2021: DEP TR Proposal Summary and Response to TR Public Comments.

August 19, 2021: DEP TR recommendations to BEP.

October 7, 2021: BEP public hearings on TR proposals--FOMB presentation-Lower Andro.

Oct 25, 2021: BEP Comment deadline on TR proposals -FOMB Lower Andro Upgrade Comments.

December, 2, 2021: BEP holds first meeting to consider TR recommendations. FOMB and others testify.

December 16, 2021: BEP holds second meeting-DEP submits final recommendations [draft pending Board approval]. BEP amends DEP recommendations to include Lower Andro upgrade to Worumbo.

January 2022: BEP TR recommendations sent to Legislature through ENR Committee.

February 10, 2022: BEP TR recommendation Referred to ENR Committee as LD 1964.

February 28, 2022: Public Hearing. Overwhelming support for LD 1964 as amended by the BEP, now including the DEP [Brian Kavanah].

March 2, 2022: LD 1964 Work Session.

March 17, 2022: LD 1964 reported out committee, Unanimous Ought to Pass.

March 22, 2022: LD 1964 Final engrossment by House and Senate.

March 24, 2022: LD 1964 Passed in the House-Roll Call 483 (Yeas 129 - Nays 0 - Absent 19 - Excused 0 - Vacant 3)

March 29, 2022: LD 1964 Passed in the Senate-Roll Call 654 (Yeas 33 - Nays 0 - Excused 1 - Absent 0)

March 31, 2022: LD 1964 Signed by Governor

May 9, 2022: Legislature adjourned sine die. Pursuant to the Constitution of Maine, Article IV, Part Third, Section 16, the general effective date for nonemergency laws passed in the Second Regular Session of the 130th Legislature is established as Monday, August 8, 2022.

May 27, 2022 (WQC): DEP issues draft WQC to Topsham Hydro, DMR & IF&W.

June 3, 2022 (WQC): FOMB [EF] emails DEP (Hydropower Coordinator Mr. Kyle Olcott) making sure he knows of upgrade and that it will be a part of Brunswick, Pejepscot and Worumbo WQC's. FOMB does not know and is not informed at this time a Draft WQC has been issued. At this point DEP's Mr. Olcott knows FOMB is an interested party but does not send Draft WQC. Mr. Olcott affirms he is aware of reclassification but will not apply it to Pejepscot. I respond with comments suggesting DEP has the flexibility to do this and avoid Class C carve out. No indication from Mr. Olcott that a draft has been issued or what the deadline for comments is.

June 6, 202212:28 am (WQC): FOMB submits first round of comments not having seen the WQC draft.

June 6, 2022 5 pm (WQC): Deadline for comments.

June 7, 2022 2:53 am (WQC): FOMB submits second set of comments now having received draft WQC earlier that evening [June 6] from Atlantic Salmon Foundation who got it from MDMR.

June 7 & 8, 2022 (WQC): Further email correspondence between KO and EF including copies of final and draft WQC and Mr. Olcott saying he has no control over Classification status.

June 8, 2022 (WQC): DEP sends official Stamped WQC Copy to BEP.

July 8, 2022 (WQC): Appeal deadline.

Signed at Bowdoinham Maine, this 8th day of July 2022.

Ed Friedman

STATE OF MAINE

July 8, 2022

Personally appeared the above-named Ed Friedman, and made oath that the statements made by him in the above Affidavit are true and accurate and made on his personal knowledge, unless stated upon information and belief, in which case he believes them to be true.

Tina Louise Magno

Notary Public My Commission Expires:

TINA LOUISE MAGNO
Notary Public, State of Maine
My Commission Expires June 16, 2026

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.

APPELLANT SUPP EX. 2 P.4

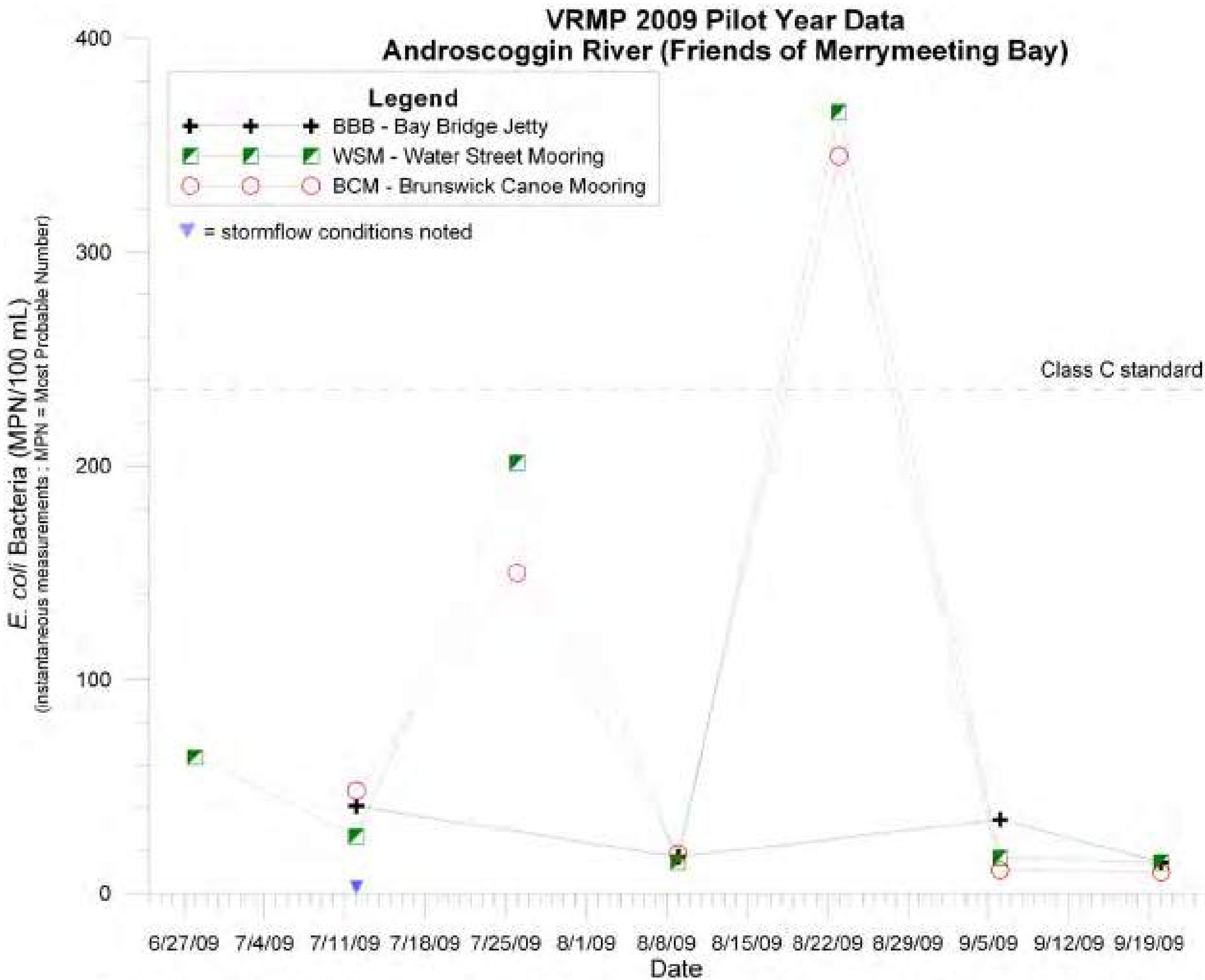


Figure 3-2-1. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

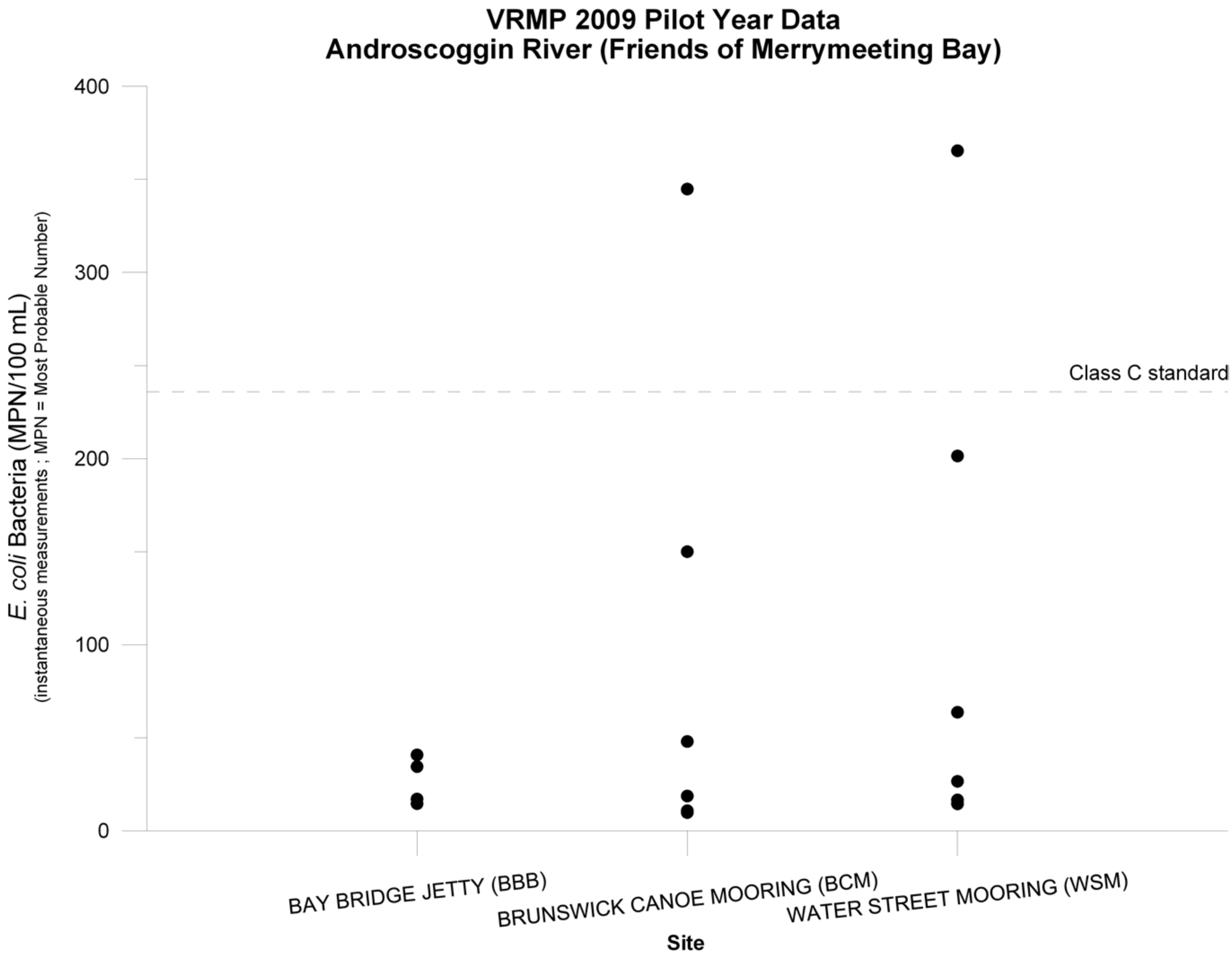


Figure 3-2-2. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

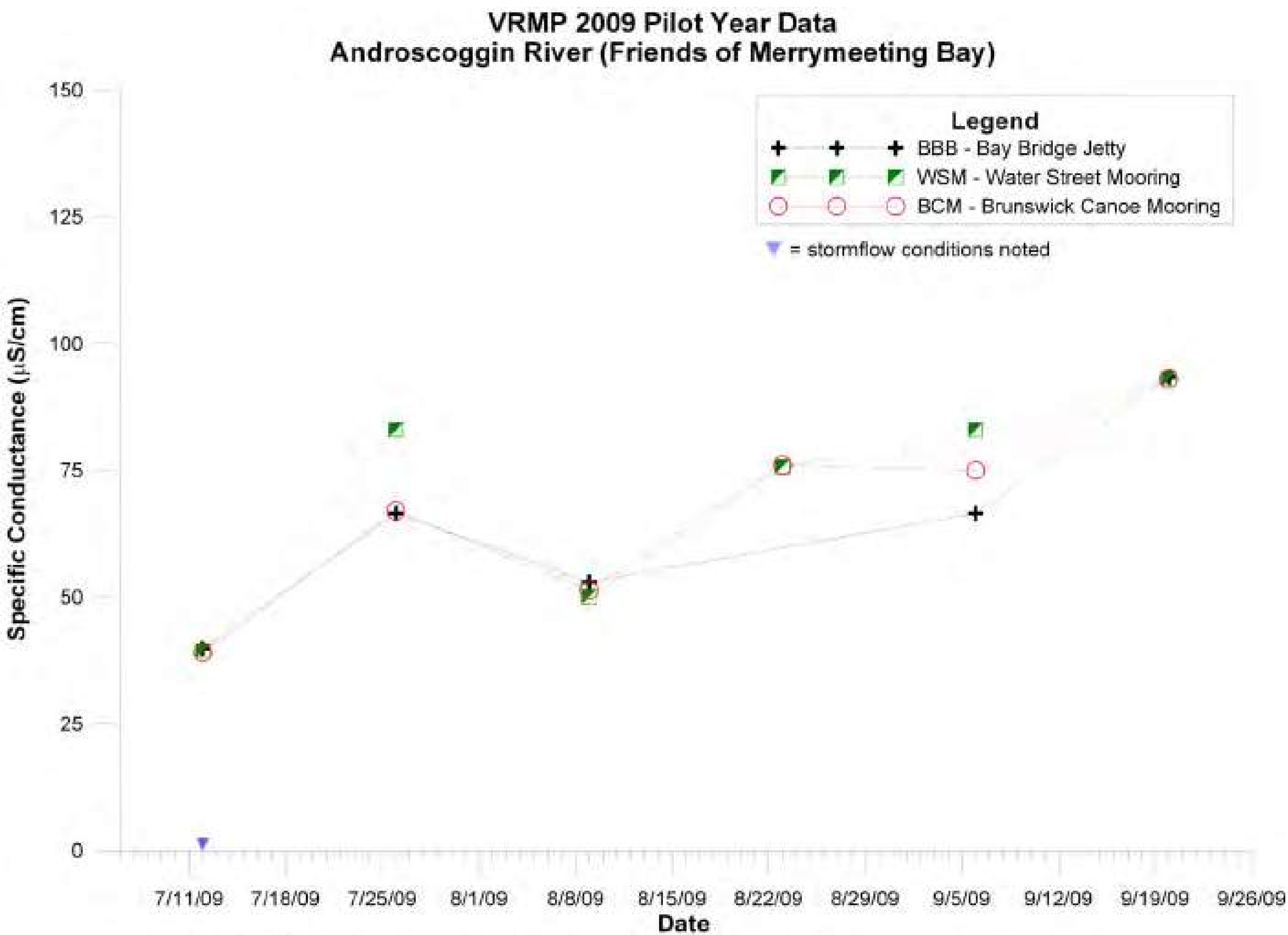


Figure 3-2-3. Specific conductance at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

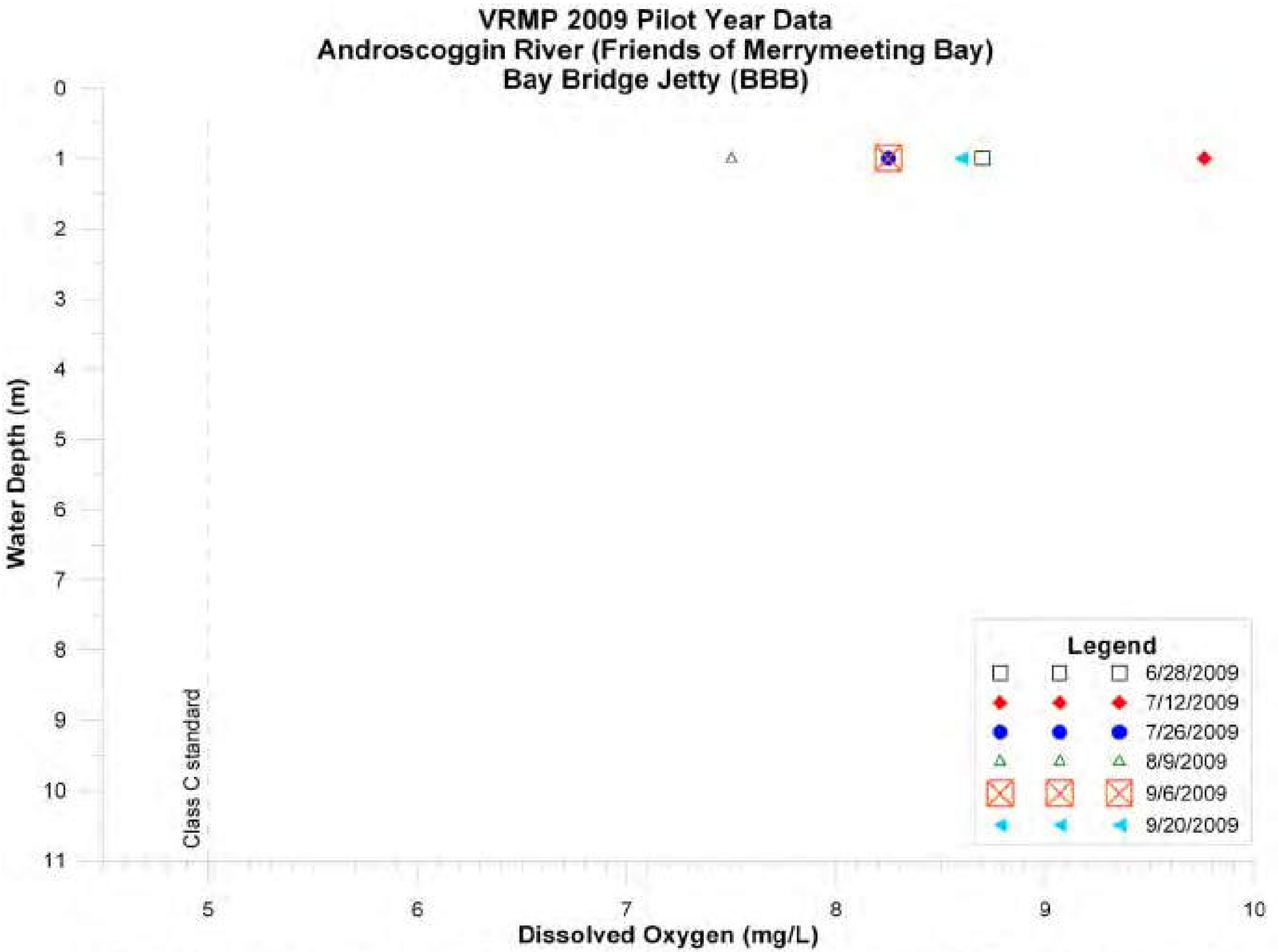


Figure 3-2-4. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "BBB" on the Androscoggin River.

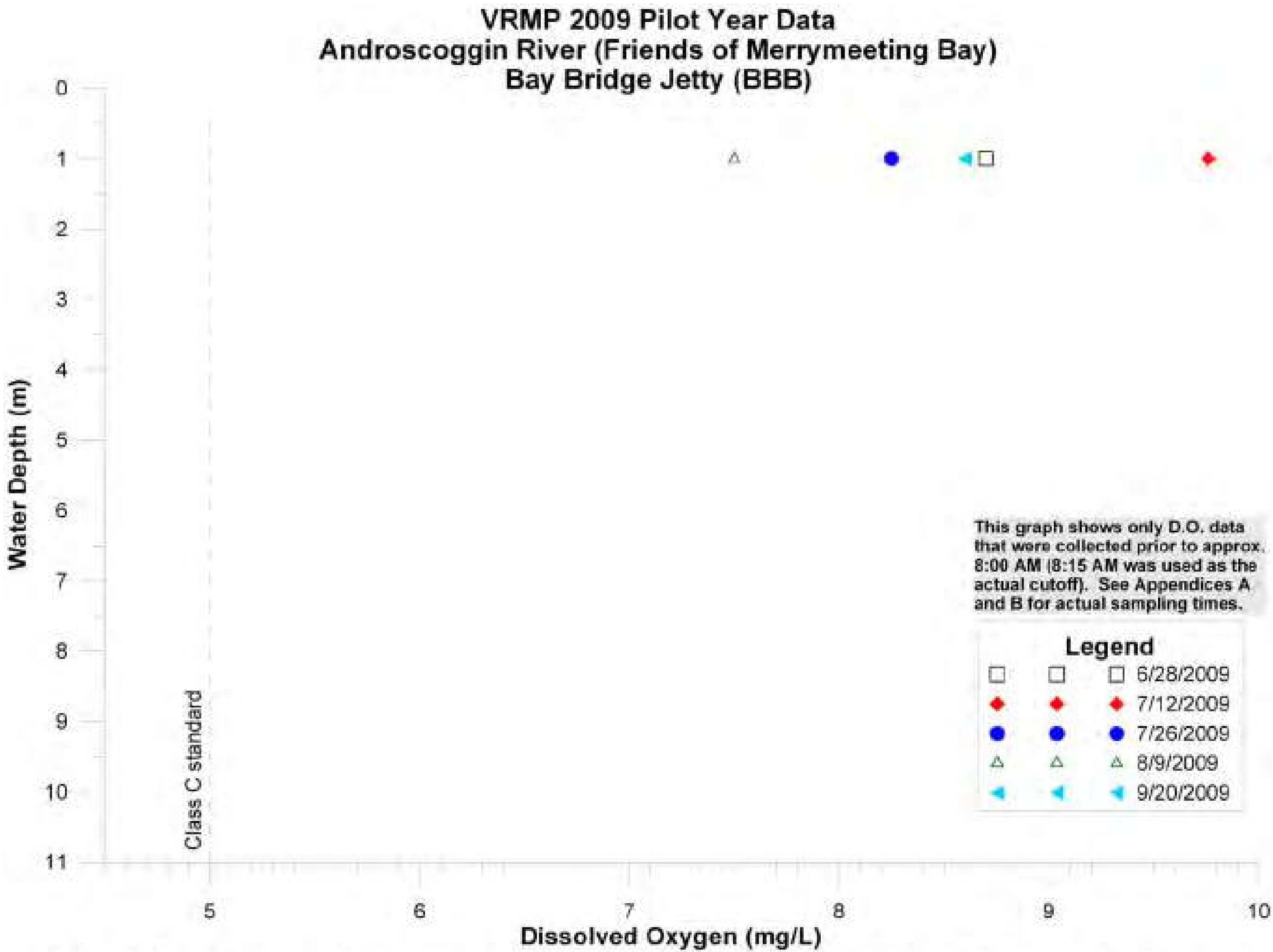


Figure 3-2-5. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "BBB" on the Androscoggin River.

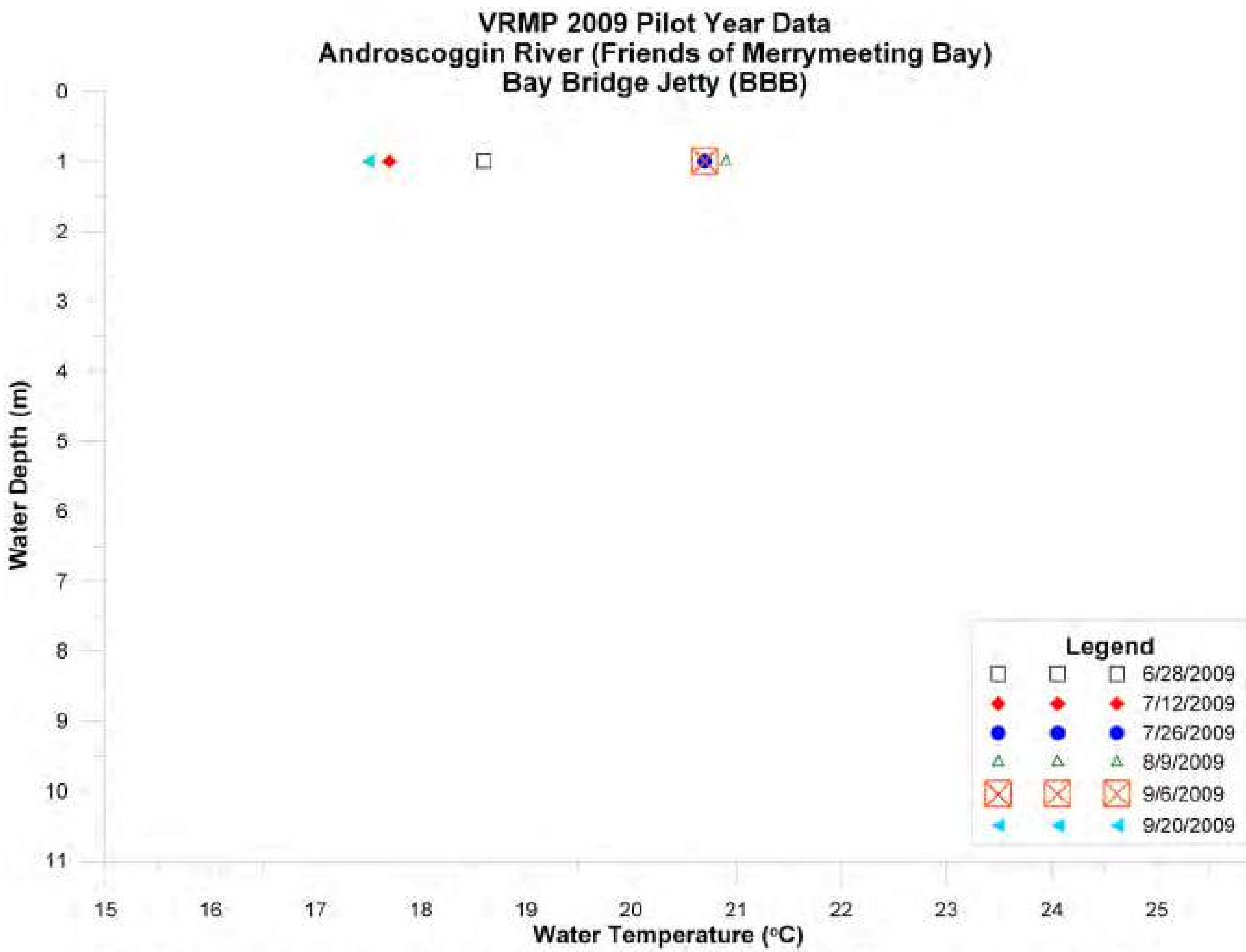


Figure 3-2-6. Water temperatures at Friends of Merrymeeting Bay monitoring site "BBB" on the Androscoggin River.

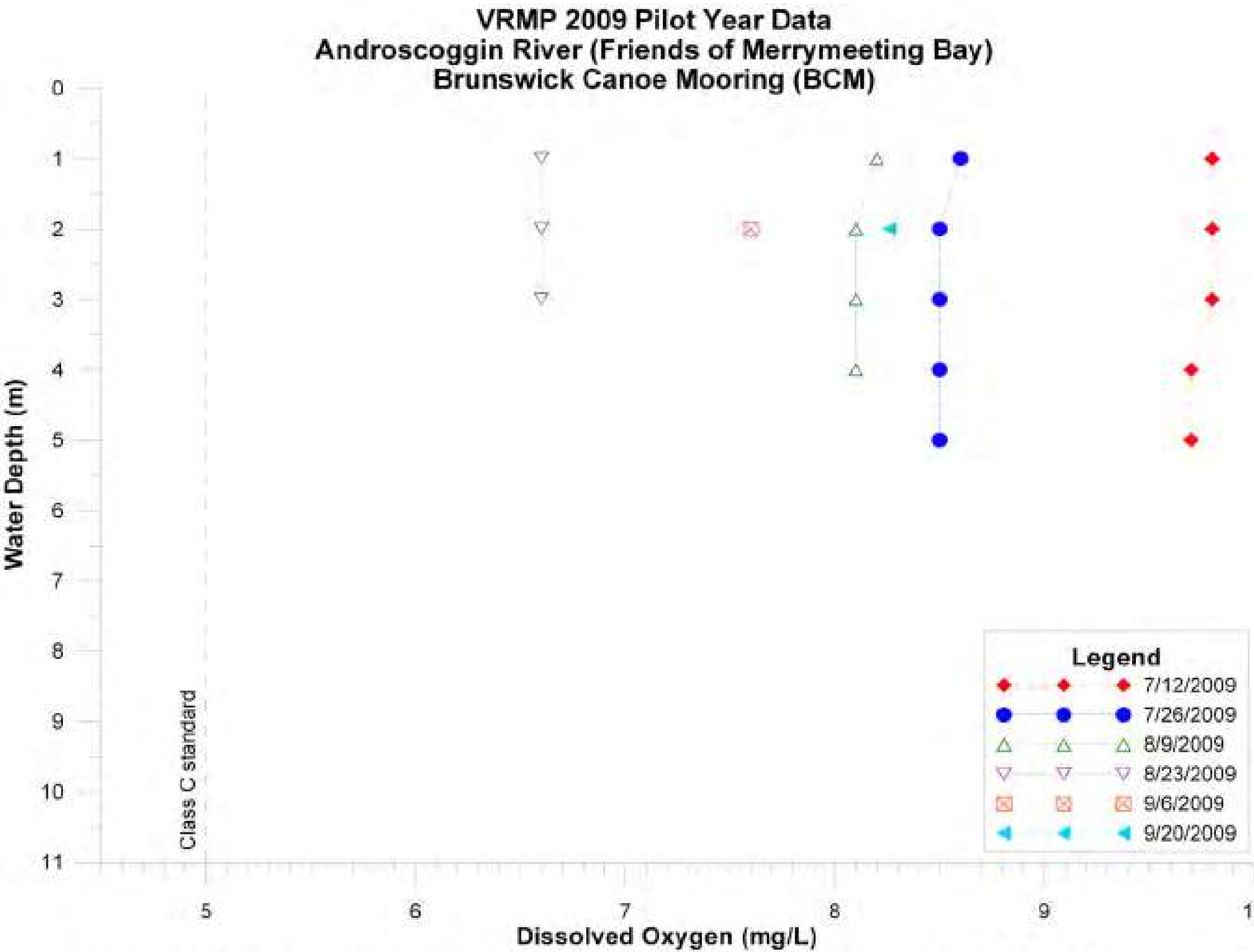


Figure 3-2-7. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "BCM" on the Androscoggin River.

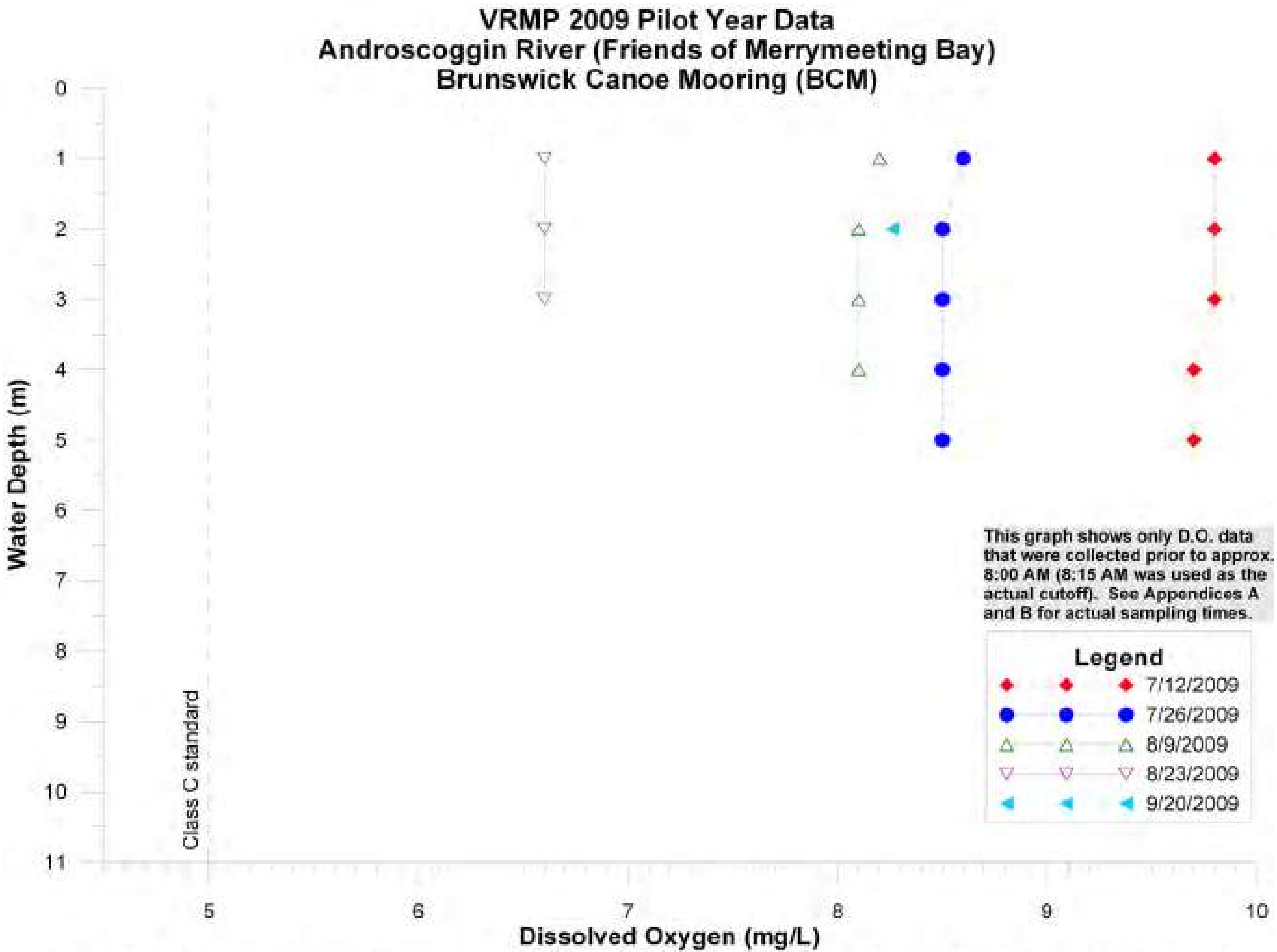


Figure 3-2-8. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "BCM" on the Androscoggin River.

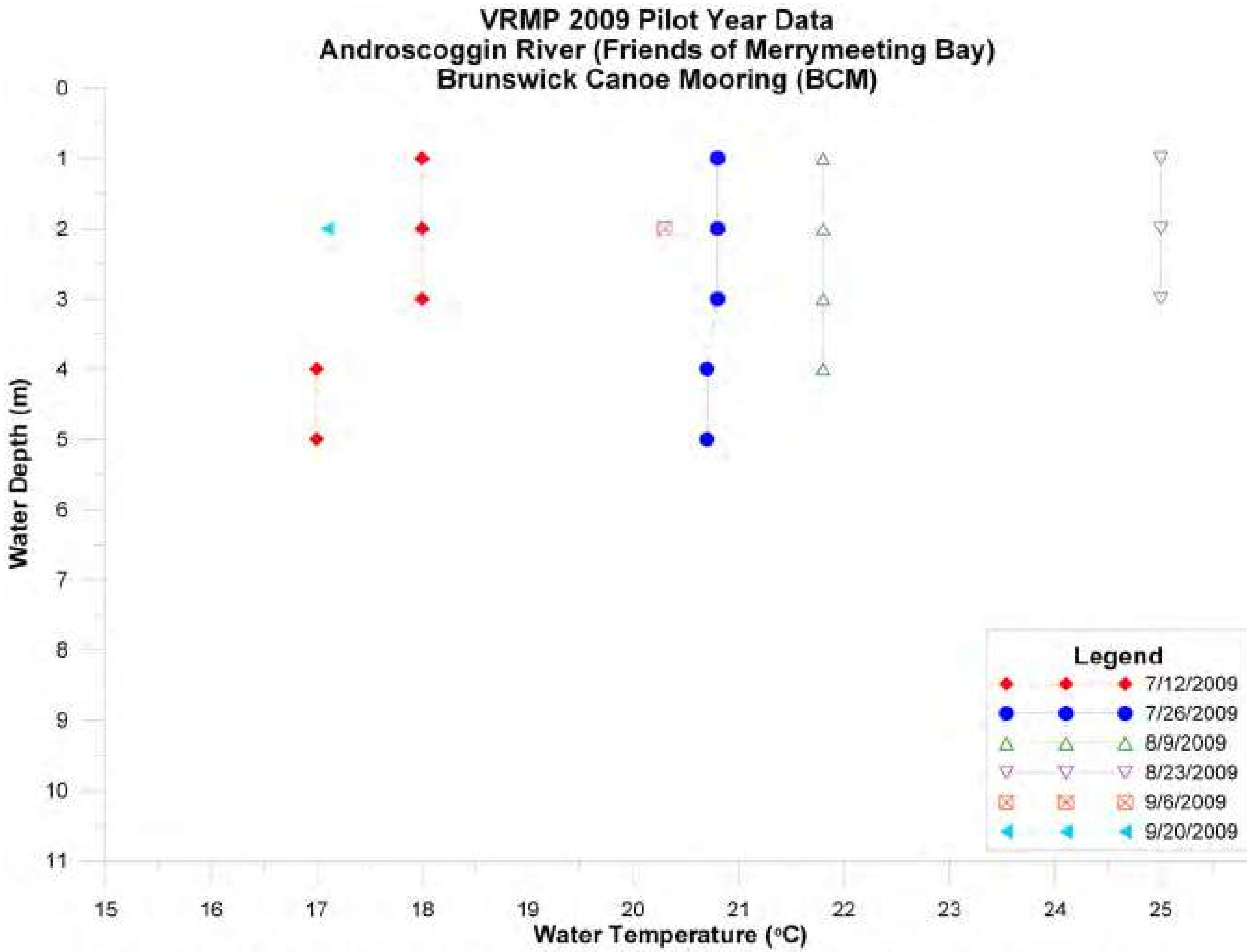


Figure 3-2-9. Water temperatures at Friends of Merrymeeting Bay monitoring site "BCM" on the Androscoggin River.

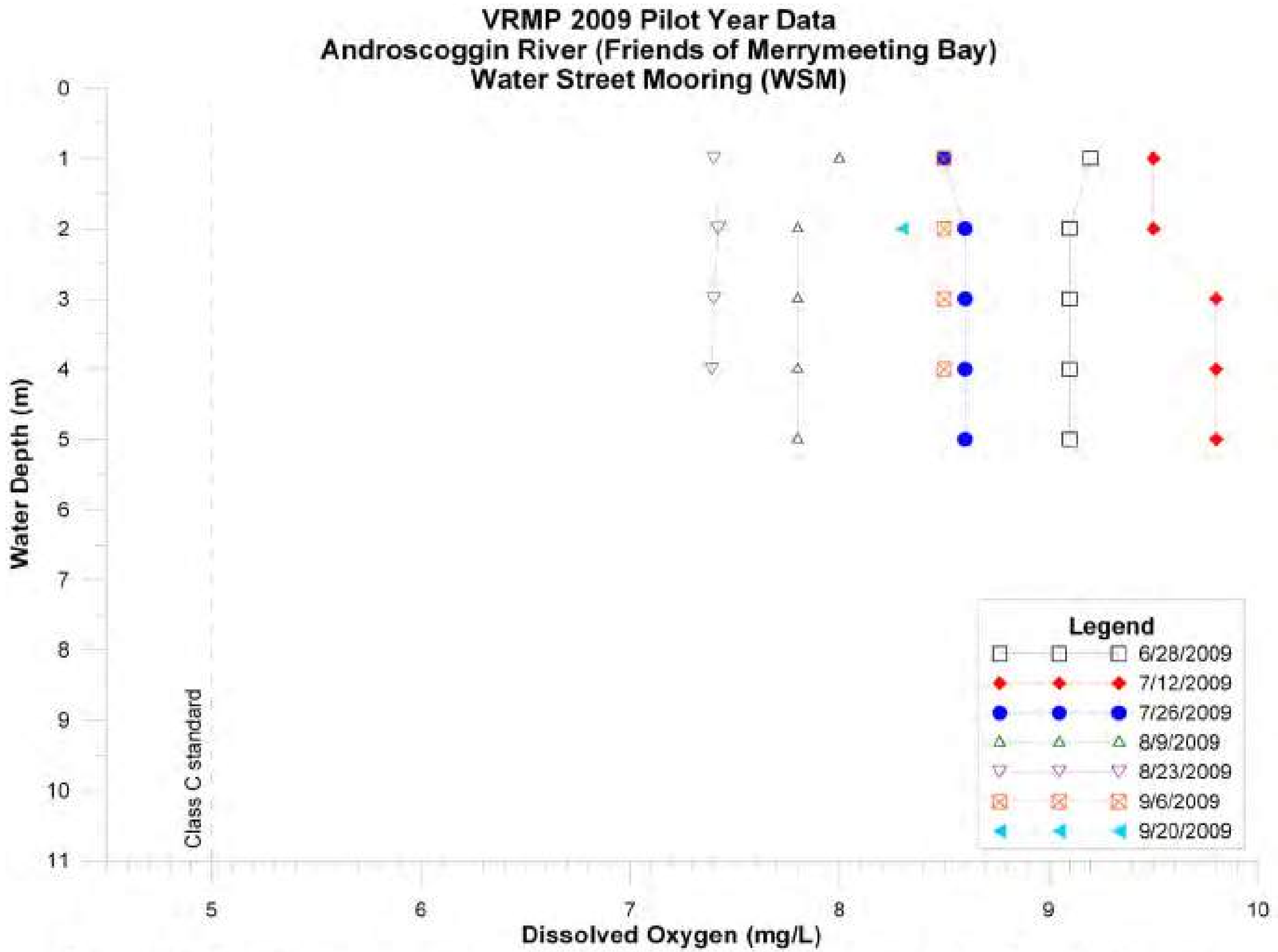


Figure 3-2-10. Dissolved oxygen concentrations at Friends of Merrymeeting Bay monitoring site "WSM" on the Androscoggin River.

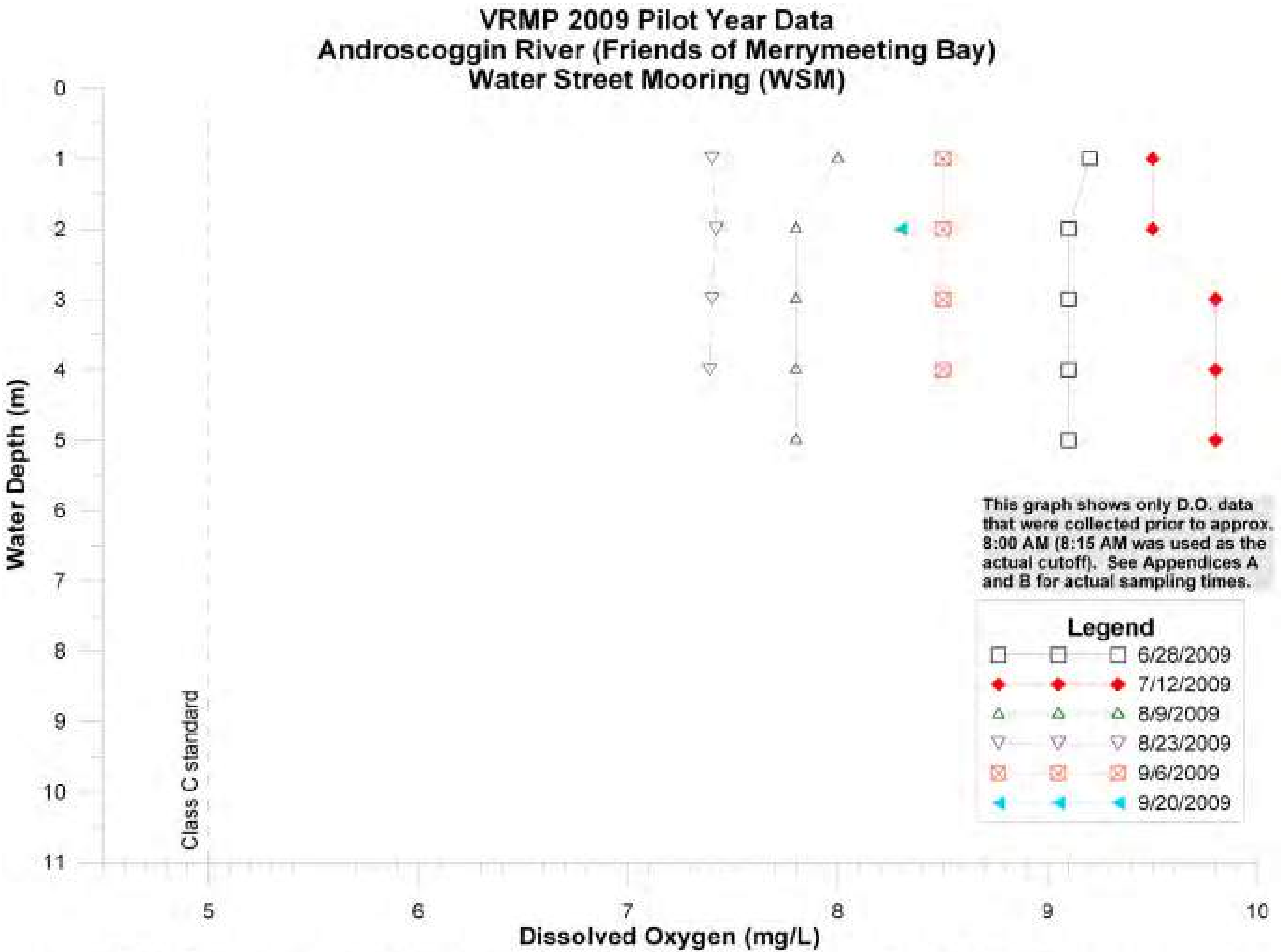


Figure 3-2-11. Early morning dissolved oxygen concentrations at Friends of Merrymeeting Bay site "WSM" on the Androscoggin River.

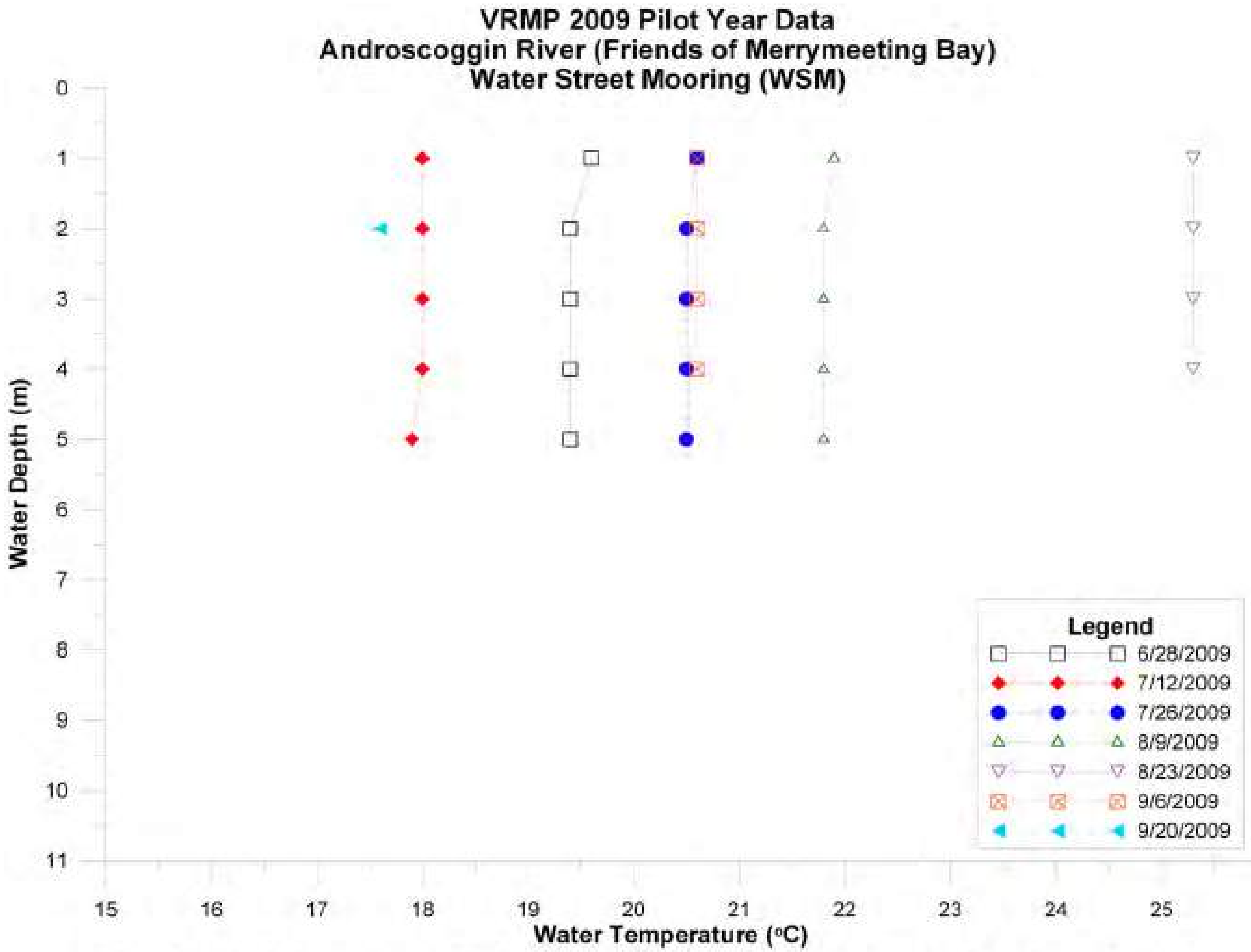


Figure 3-2-12. Water temperatures at Friends of Merrymeeting Bay monitoring site "WSM" on the Androscoggin River.

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

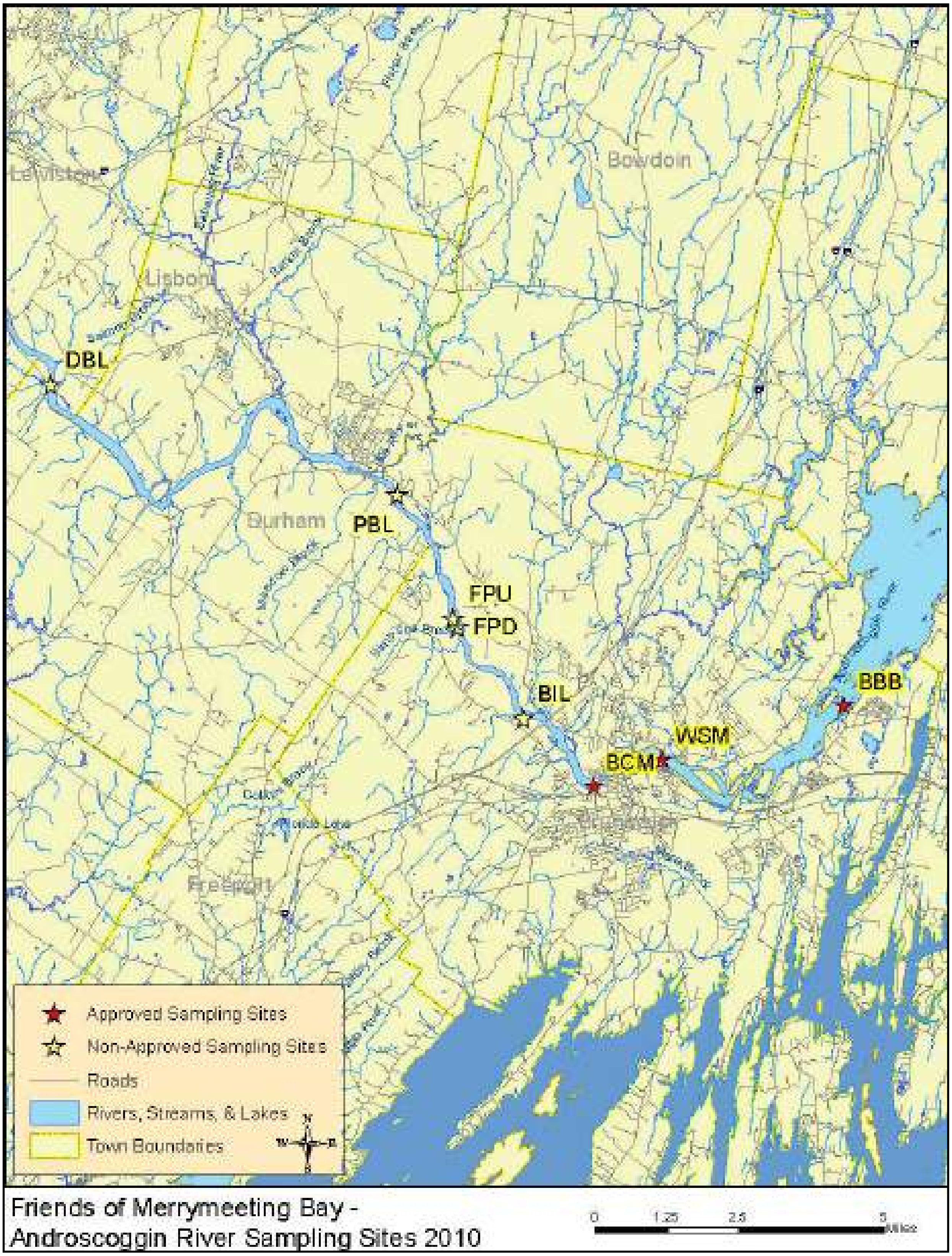


Figure 1B: Map of Approved Sampling Sites

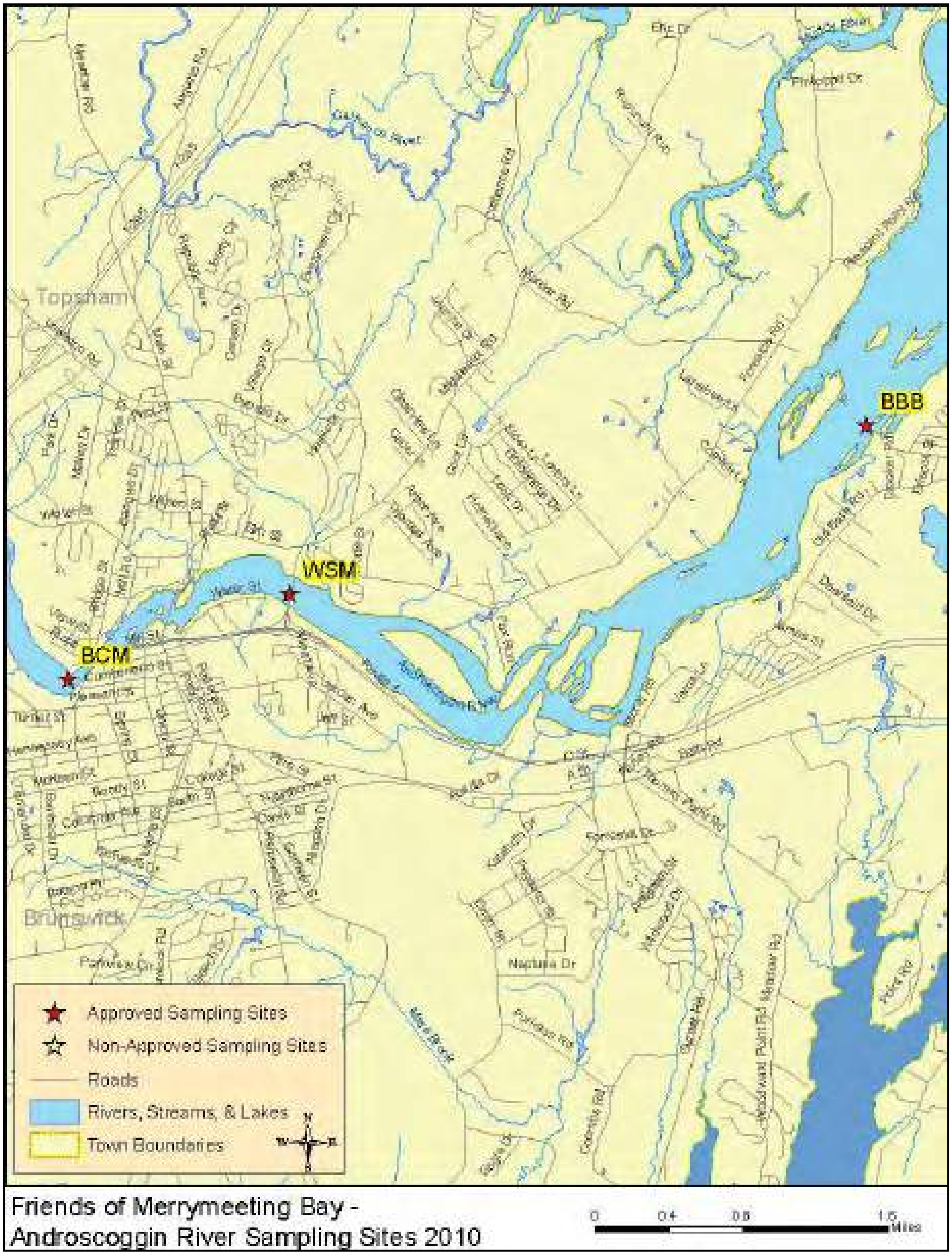
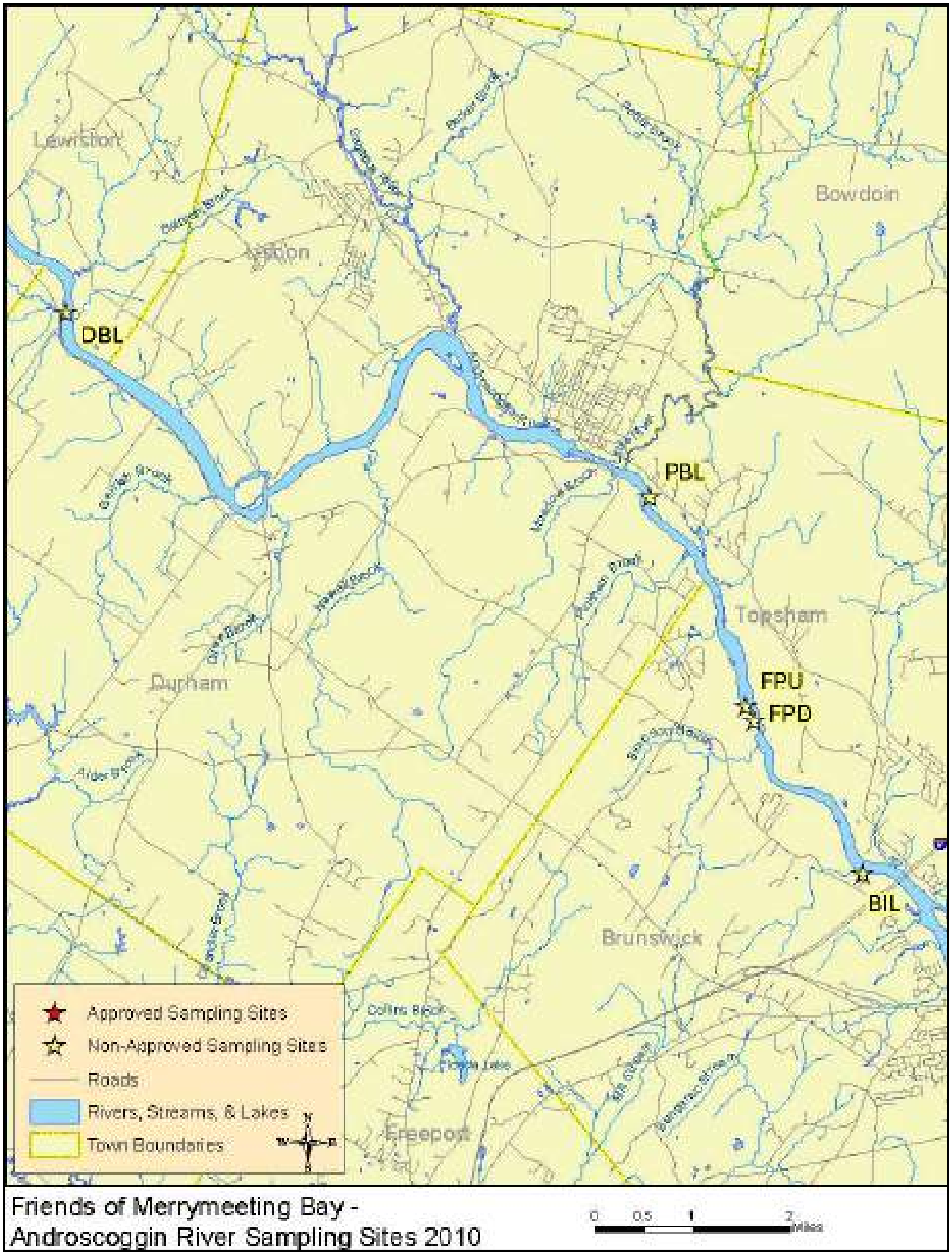


Figure 1C: Map of Non-Approved Sampling Sites



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 - VRMF	5/15/2010	8:00 AM	N	2.0	M	12.7	99.5	10.66				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	6/13/2010	7:15 AM	N						84.9			110.6
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	6/13/2010	7:15 AM	N	1.0	M	18.7	87.8	8.23				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	6/13/2010	7:15 AM	D									69.7
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	7/11/2010	7:00 AM	N						95			72.4
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	7/11/2010	7:00 AM	N	2.0	M	25.1	77.9	6.45				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	8/14/2010	7:10 AM	N									8.4
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	8/14/2010	7:10 AM	N	1.0	M	23.8	85	7.2				
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	9/19/2010	7:55 AM	N						114.6			17.5
BAY BRIDGE JE	ANDROSCOGGIN RIVER - A231 - VRMF	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 STREET	ANDROSCOGGIN RIVER - A281 - VRMF	5/15/2010	7:20 AM	N	1.0	M	12.2	102.7	11				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	5/15/2010	7:20 AM	N	2.0	M	12.3	102.7	11				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	5/15/2010	7:20 AM	N	3.0	M	12.2	102.5	11.01				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	5/15/2010	7:20 AM	N	4.0	M	12.2	102.5	11.03				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N						79.8			28.8
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N	.0	M	19	100.1	9.3				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N	1.0	M	18.9	100.1	9.3				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N	2.0	M	18.9	100.1	9.3				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N	3.0	M	18.9	100.1	9.3				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	6/13/2010	8:00 AM	N	4.0	M	18.9	100.1	9.28				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	7/11/2010	8:00 AM	N						93.4			52.9
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	7/11/2010	8:00 AM	N	.0	M	25.3	87	7.2				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	7/11/2010	8:00 AM	N	1.0	M	25.3	87.3	7.17				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	7/11/2010	8:00 AM	N	2.0	M	25.3	87	7.19				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	7/11/2010	8:00 AM	N	3.0	M	25.3	87	7.2				
WATER STREET	ANDROSCOGGIN RIVER - A281 - VRMF	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 - FOMB	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 JI	ANDROSCOGGIN RIV	5/15/2010	8:00 AM	N	BASEF	MEDIUM		BRIDGE	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	N			18.3	WADING	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	N				WADING	CLOUDY	CALM	PARTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	6/13/2010	7:15 AM	D				WADING							WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N	BASEFLOW		22.7	WADING	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	7/11/2010	7:00 AM	N	BASEFLOW			WADING	CLOUDY	BREEZE	MOSTLY CLOUDY	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	8/14/2010	7:10 AM	N	BASEFLOW		18.2	WADING	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	8/14/2010	7:10 AM	N	BASEFLOW			WADING	CLEAR	STRONG	CLEAR	RUN		MEDIUM	NON-WADEABLE/MID-DEPTH
BAY BRIDGE JI	ANDROSCOGGIN RIV	9/19/2010	7:55 AM	N			13.1	WADING	LIGHT RAI	CALM	LIGHT RAIN	RUN		MEDIUM	WADEABLE/MID-DEPTH
BAY BRIDGE JI	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

APPELLANT SUPP EX. 2 P.32

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, I	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, I	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, I	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, I	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

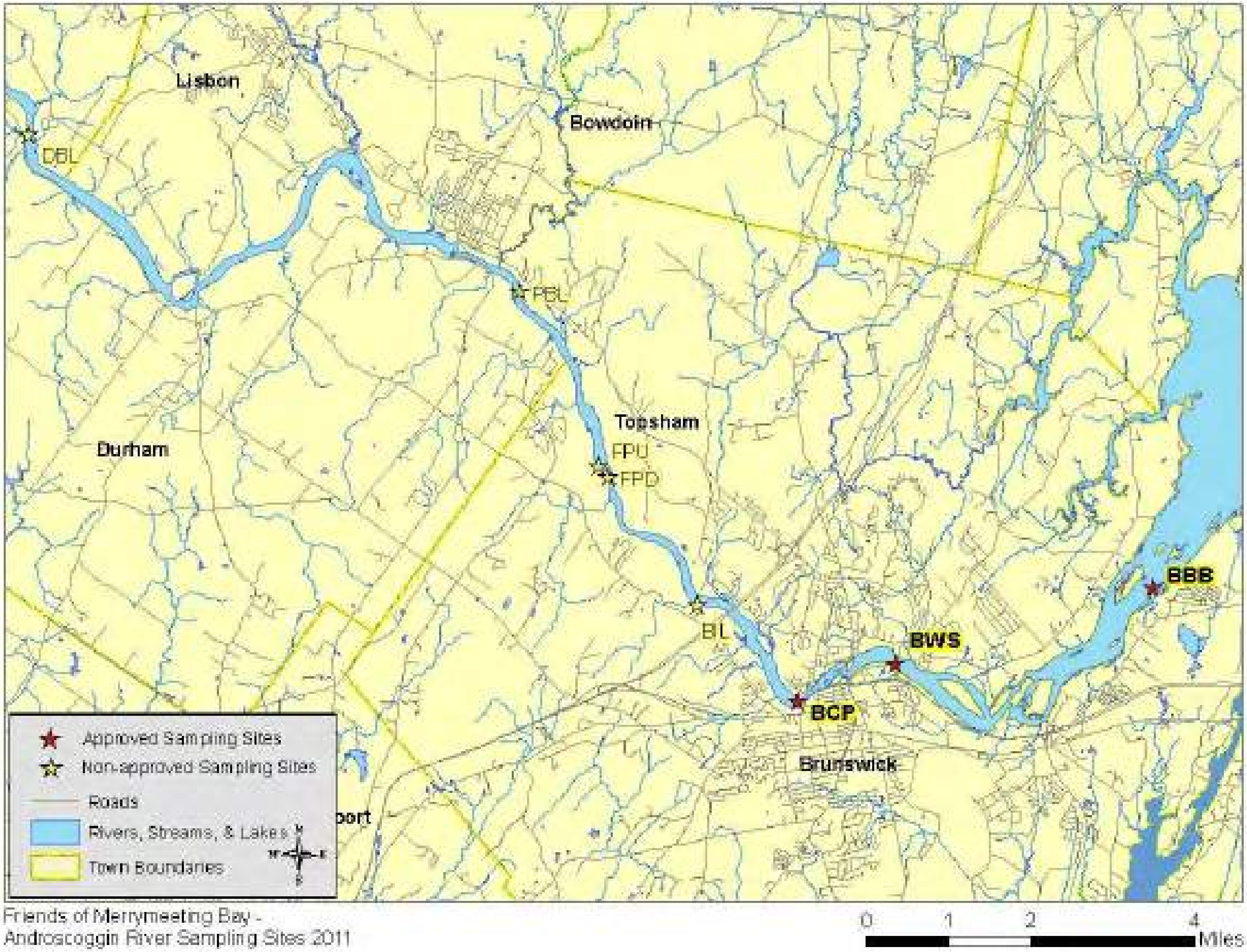


Figure 5-1-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

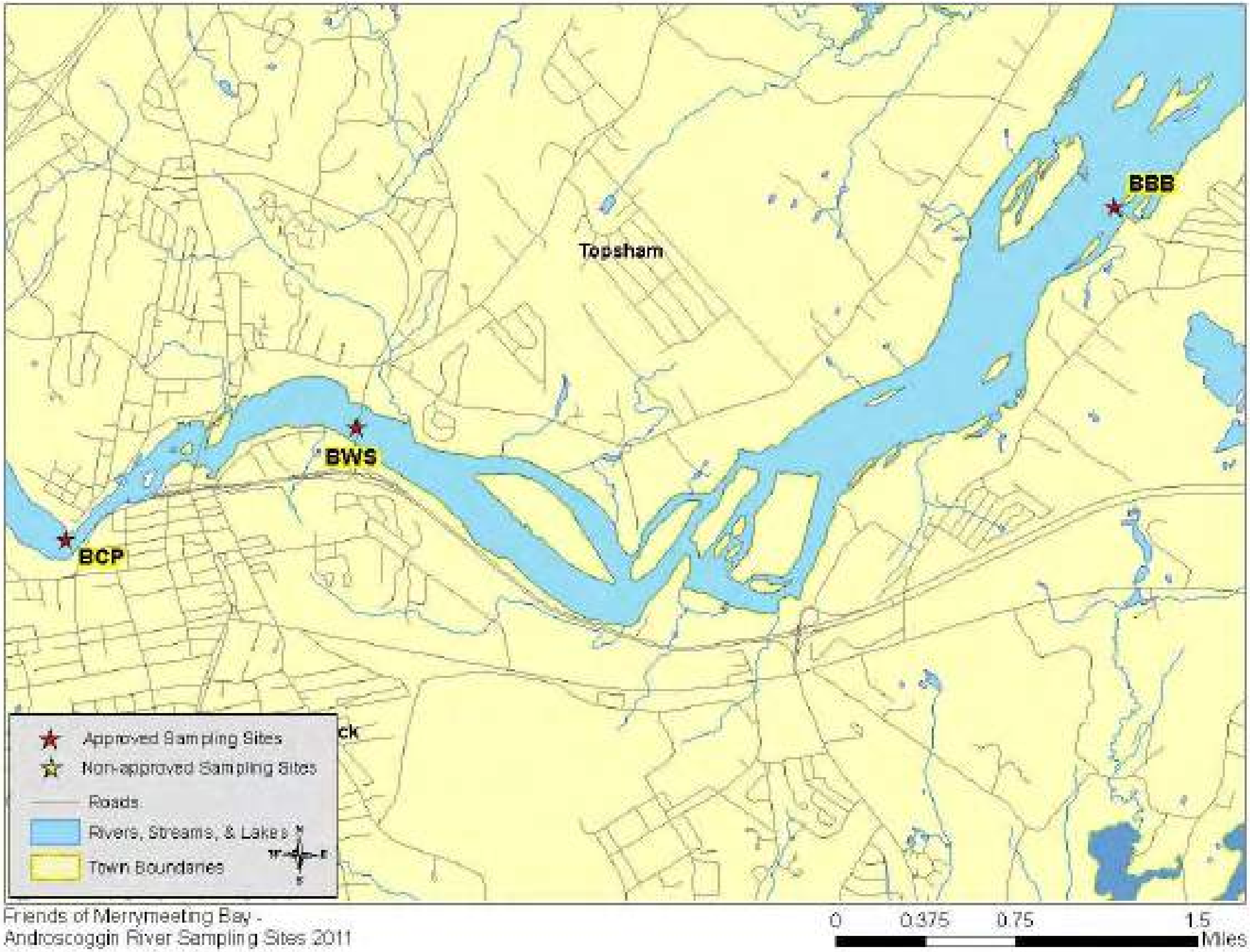


Figure 5-1-2: Map of approved Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

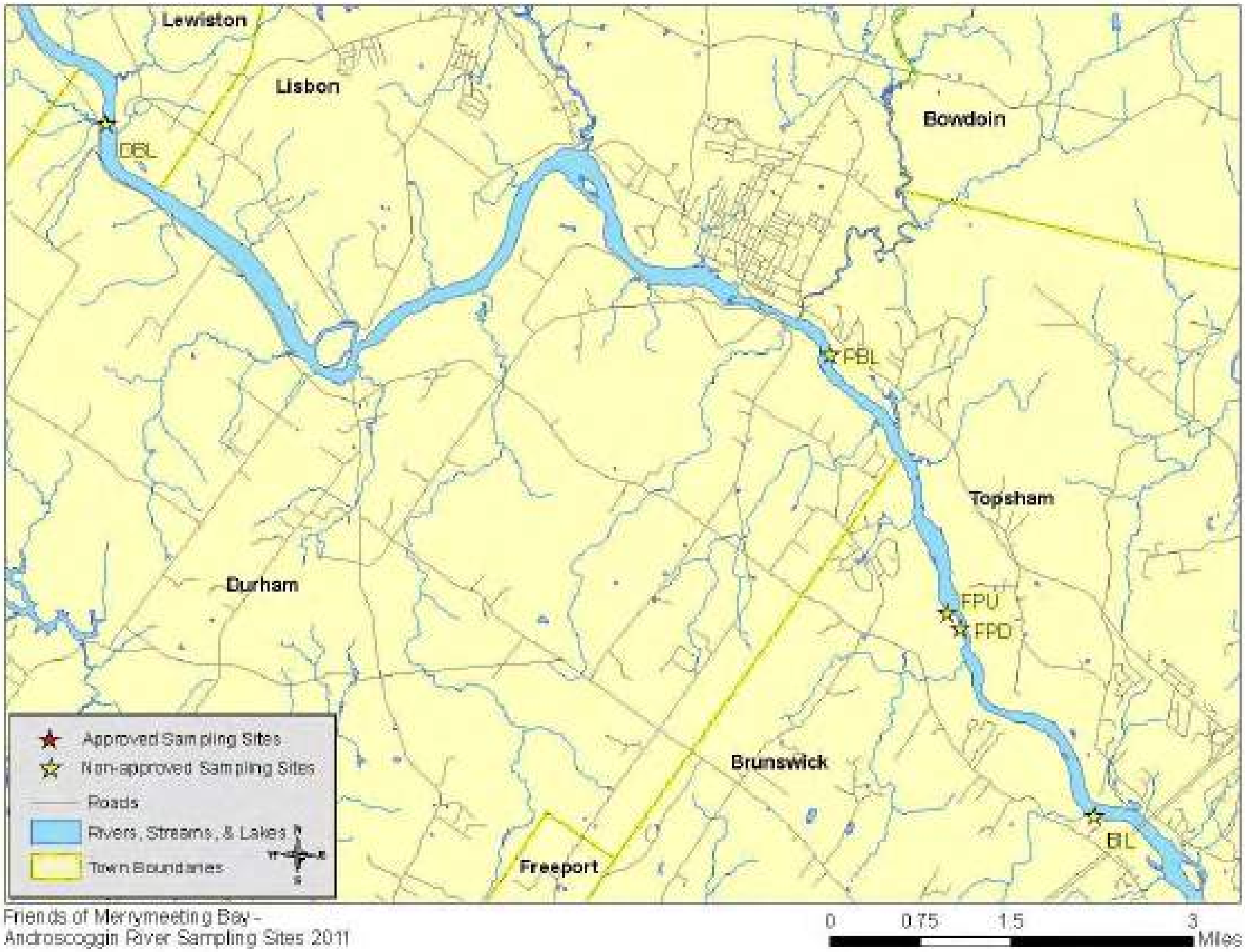


Figure 5-1-3: Map of non-approved Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

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.

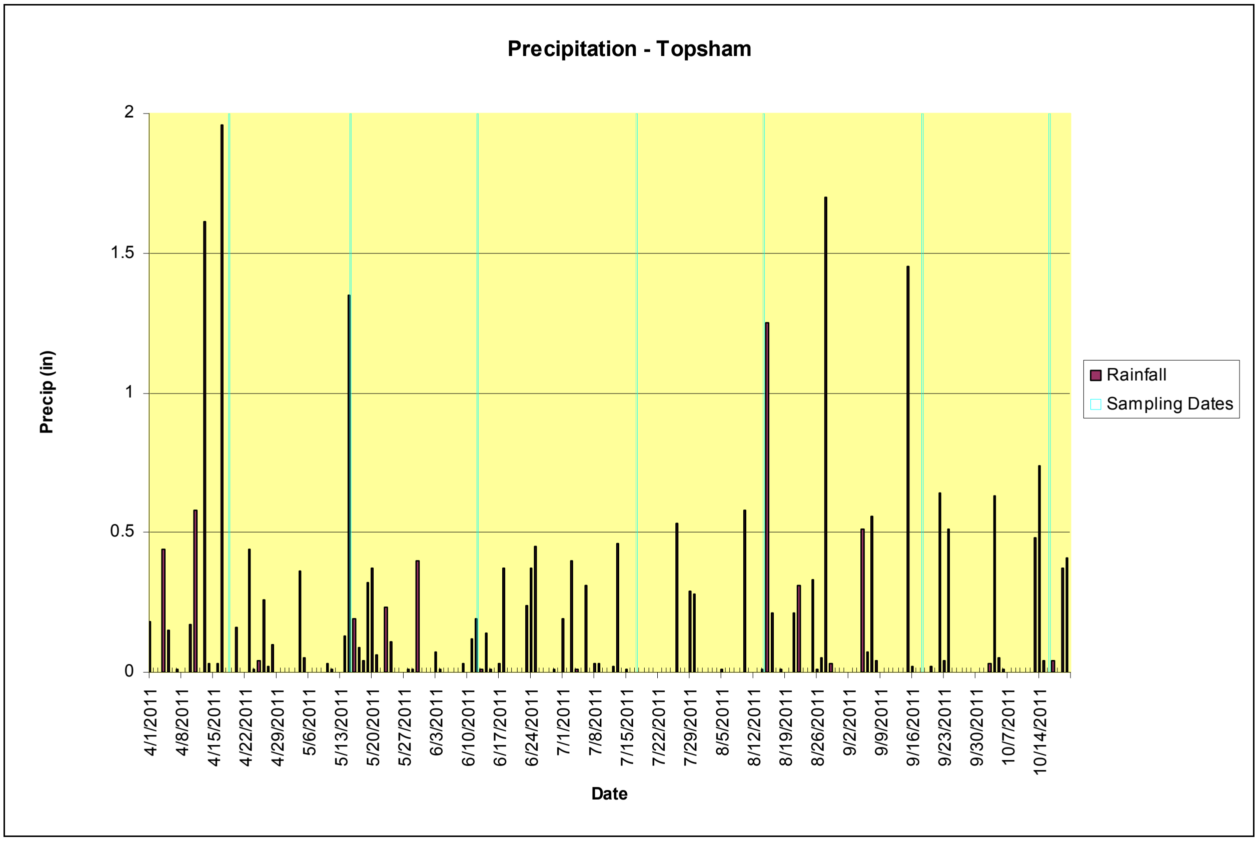


Figure 5-1-4: Seasonal precipitation measured at Highland Green, Topsham.

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.

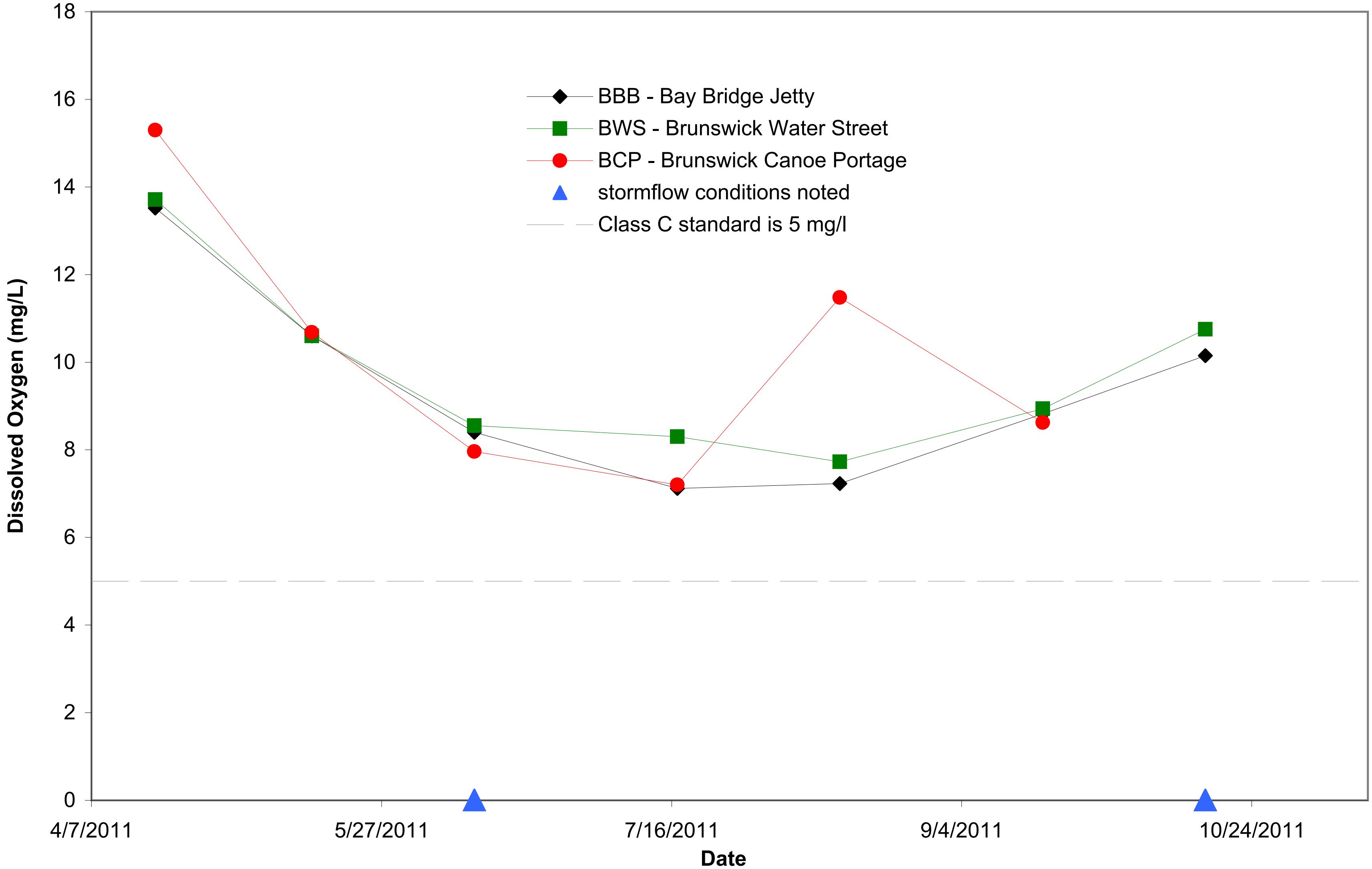


Figure 5-1-5. Dissolved oxygen concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

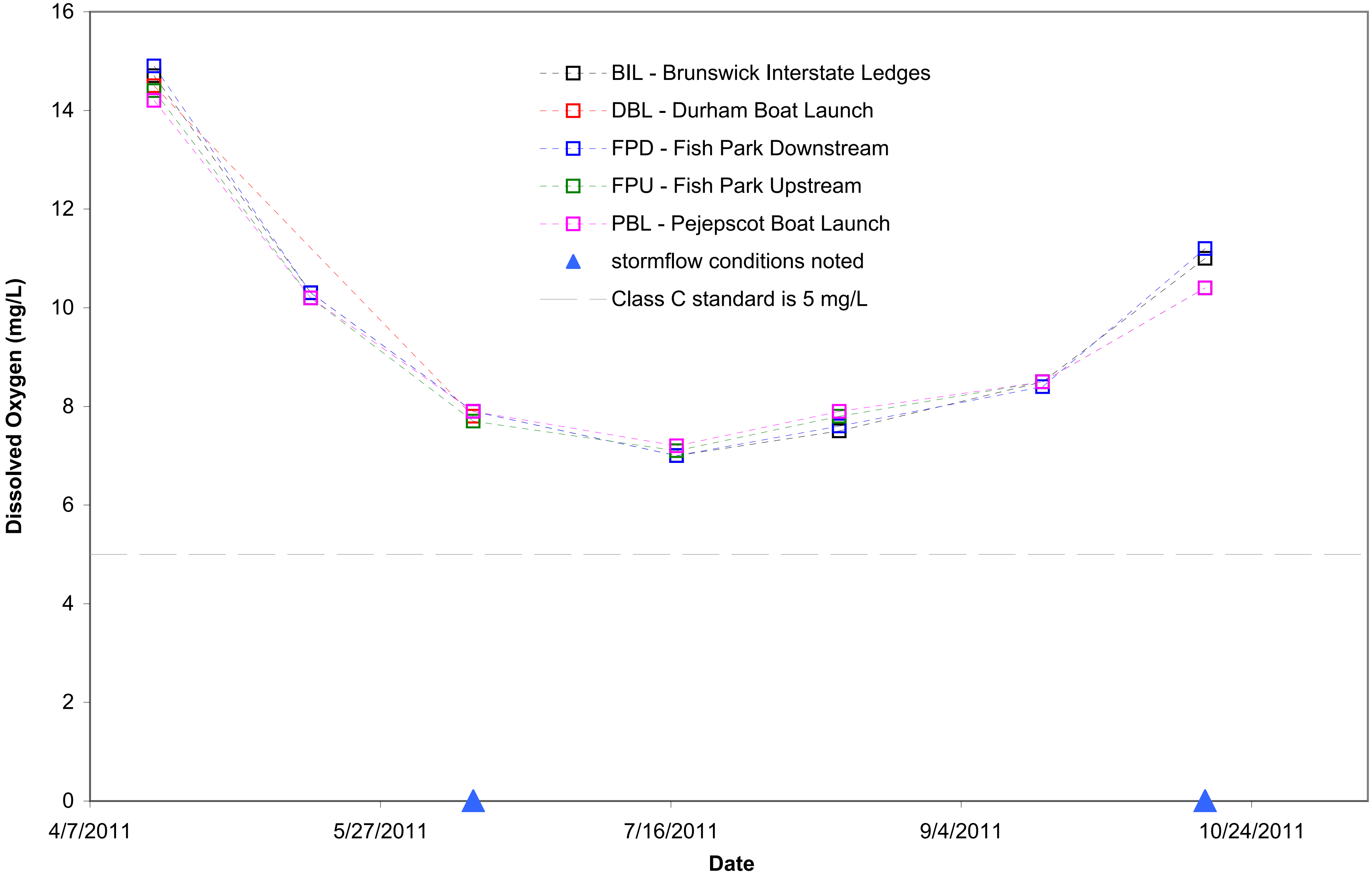


Figure 5-1-6. Dissolved oxygen concentrations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

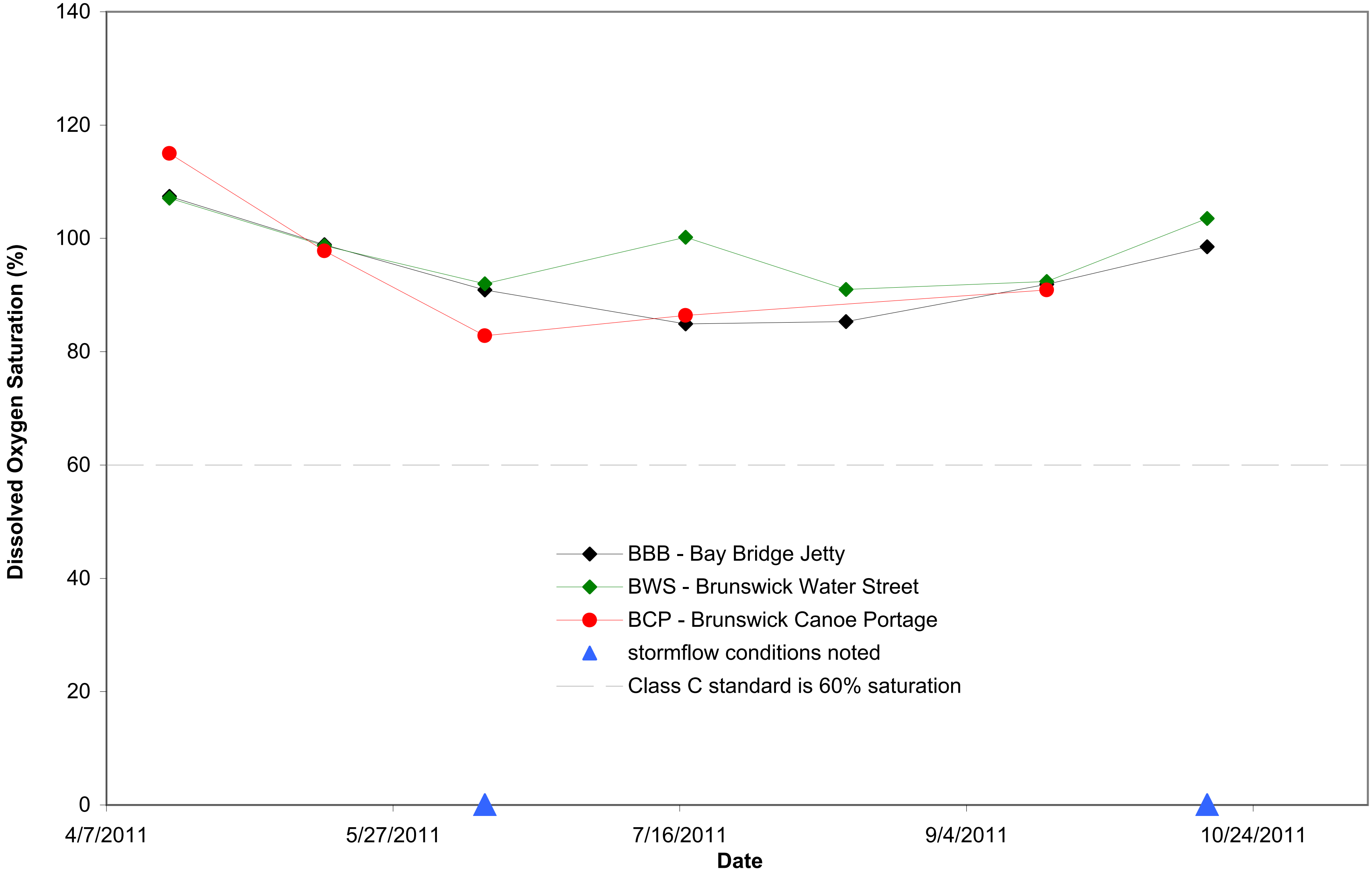


Figure 5-1-7. Dissolved oxygen % saturations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

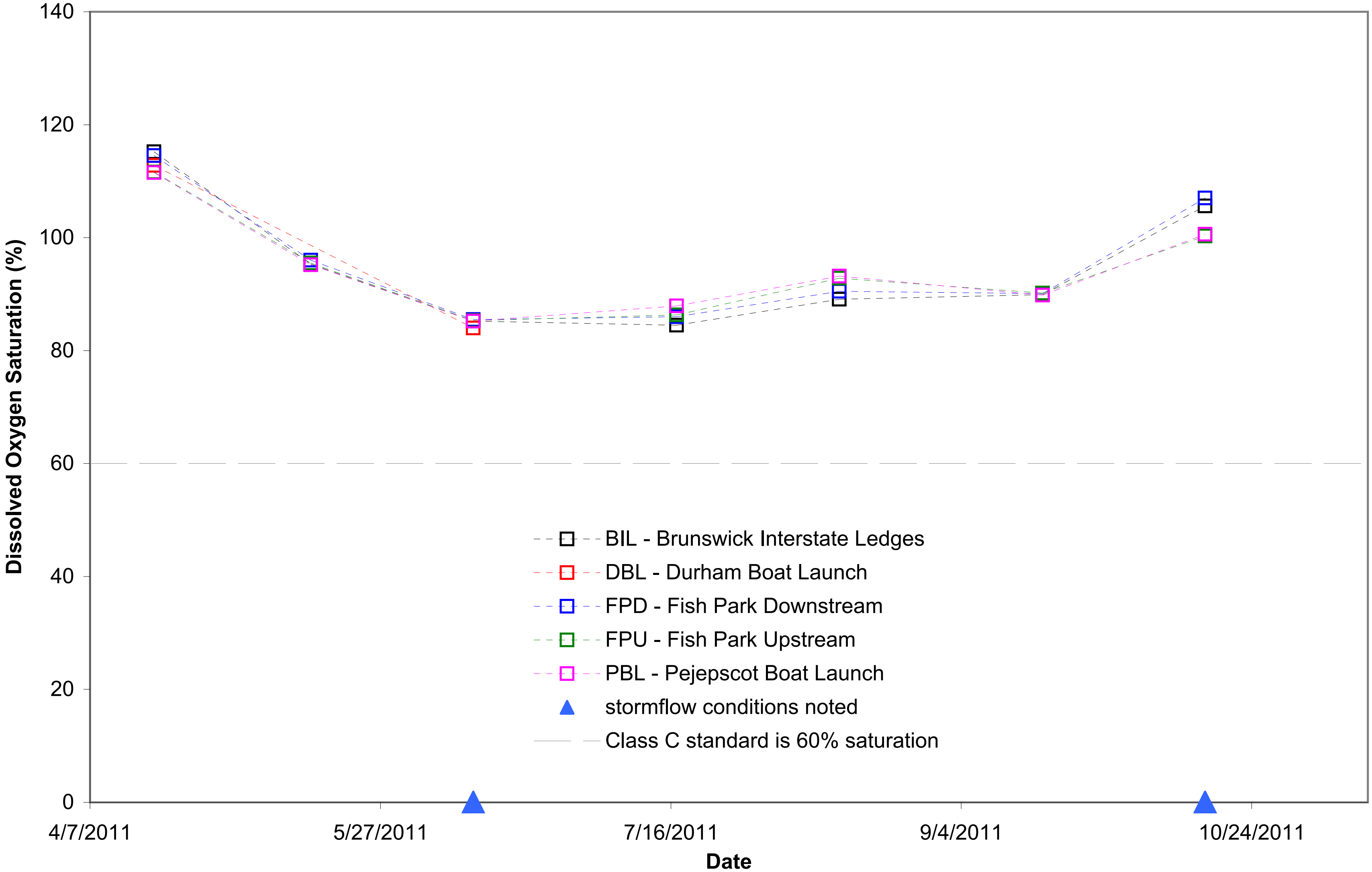


Figure 5-1-8. Dissolved oxygen % saturations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

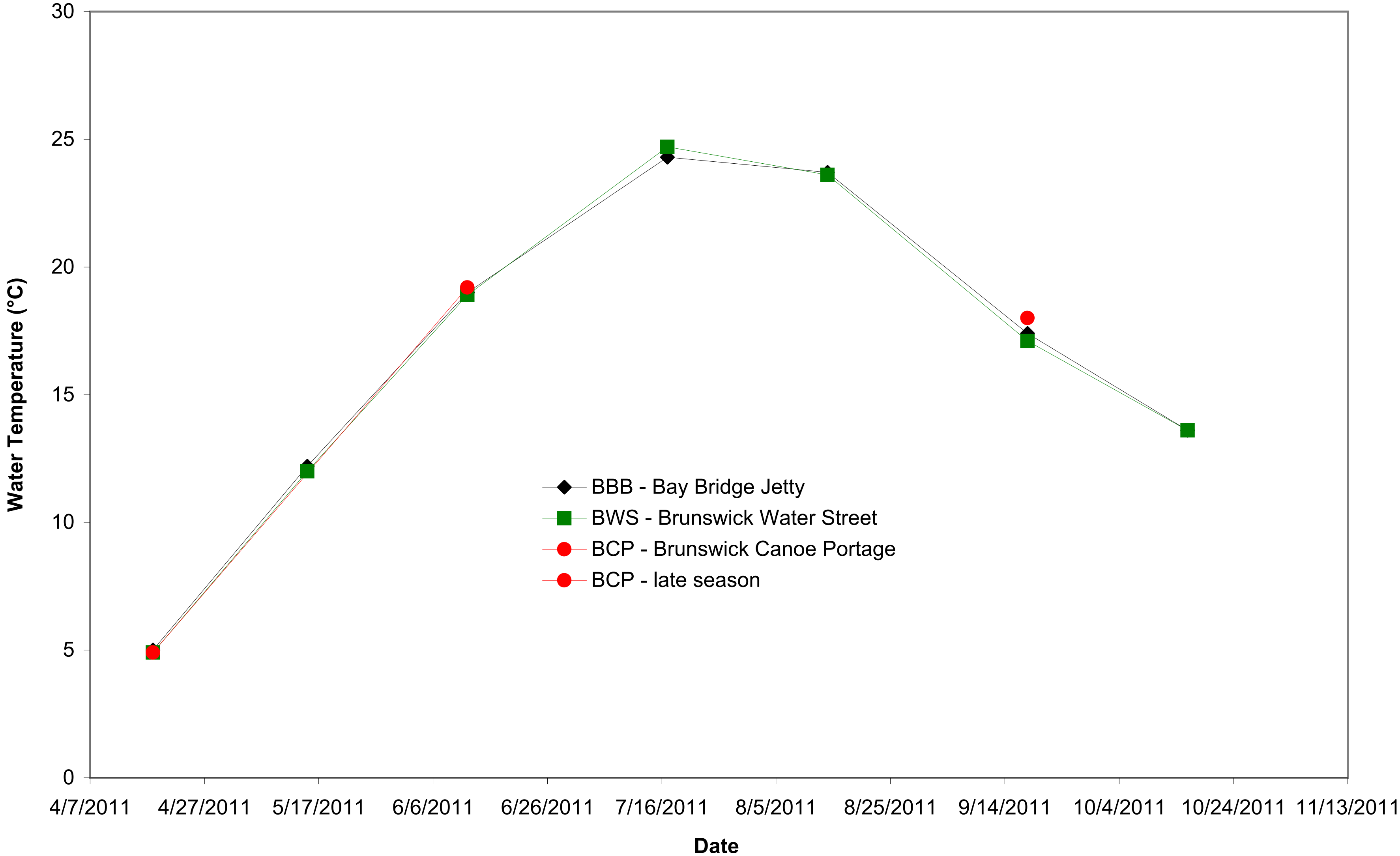


Figure 5-1-9. Water temperatures at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

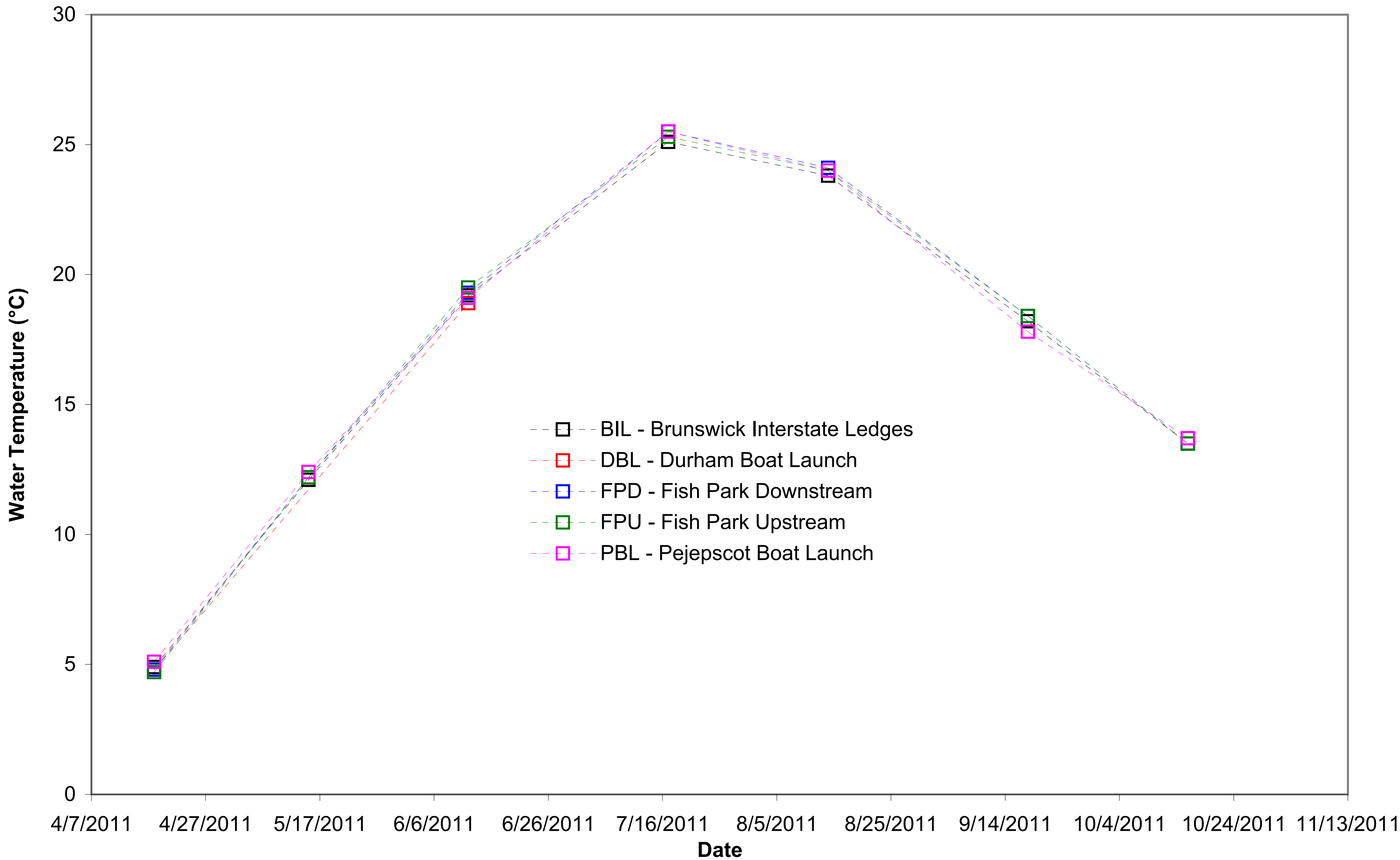


Figure 5-1-10. Water temperatures at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

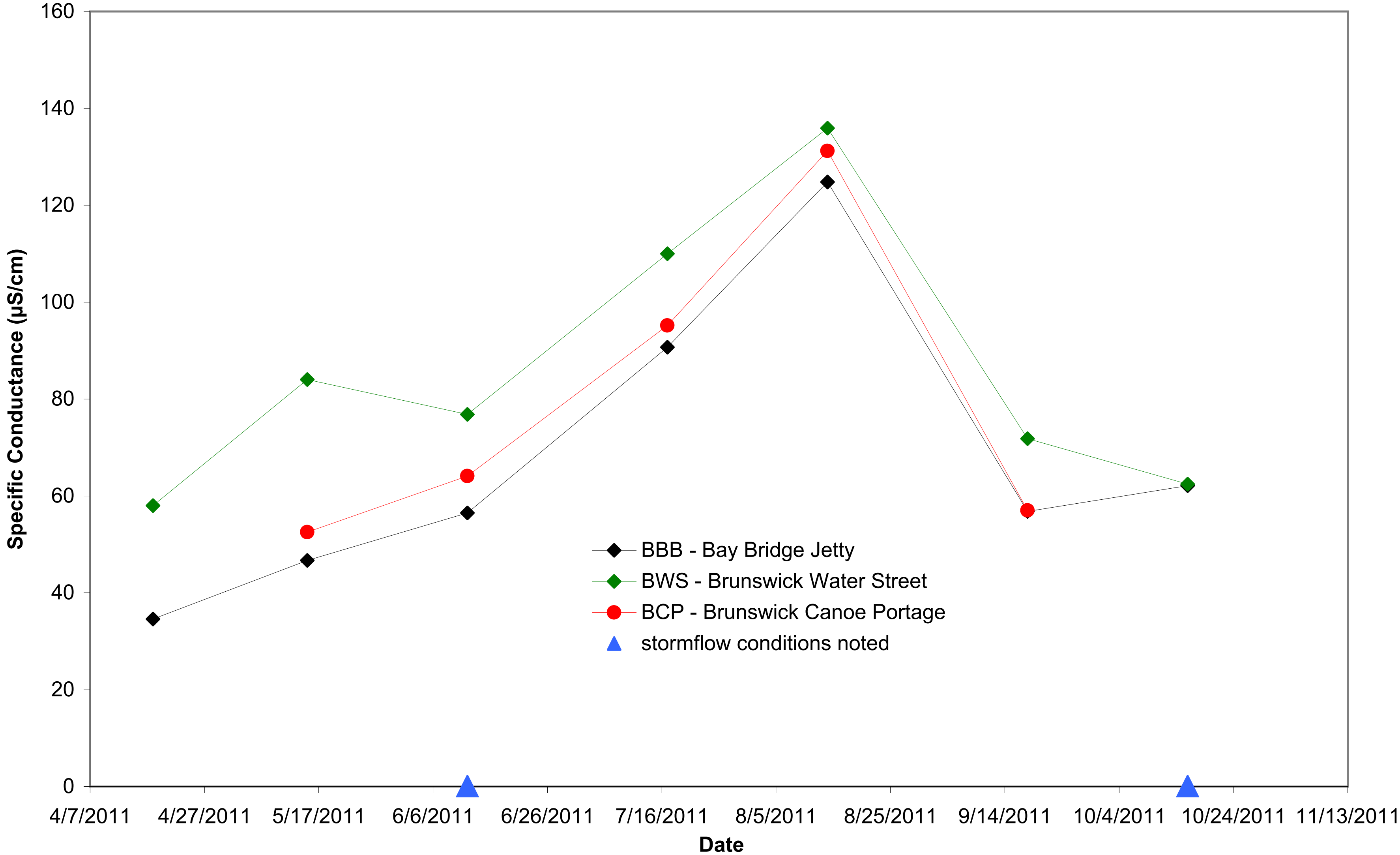


Figure 5-1-11. Specific conductance at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

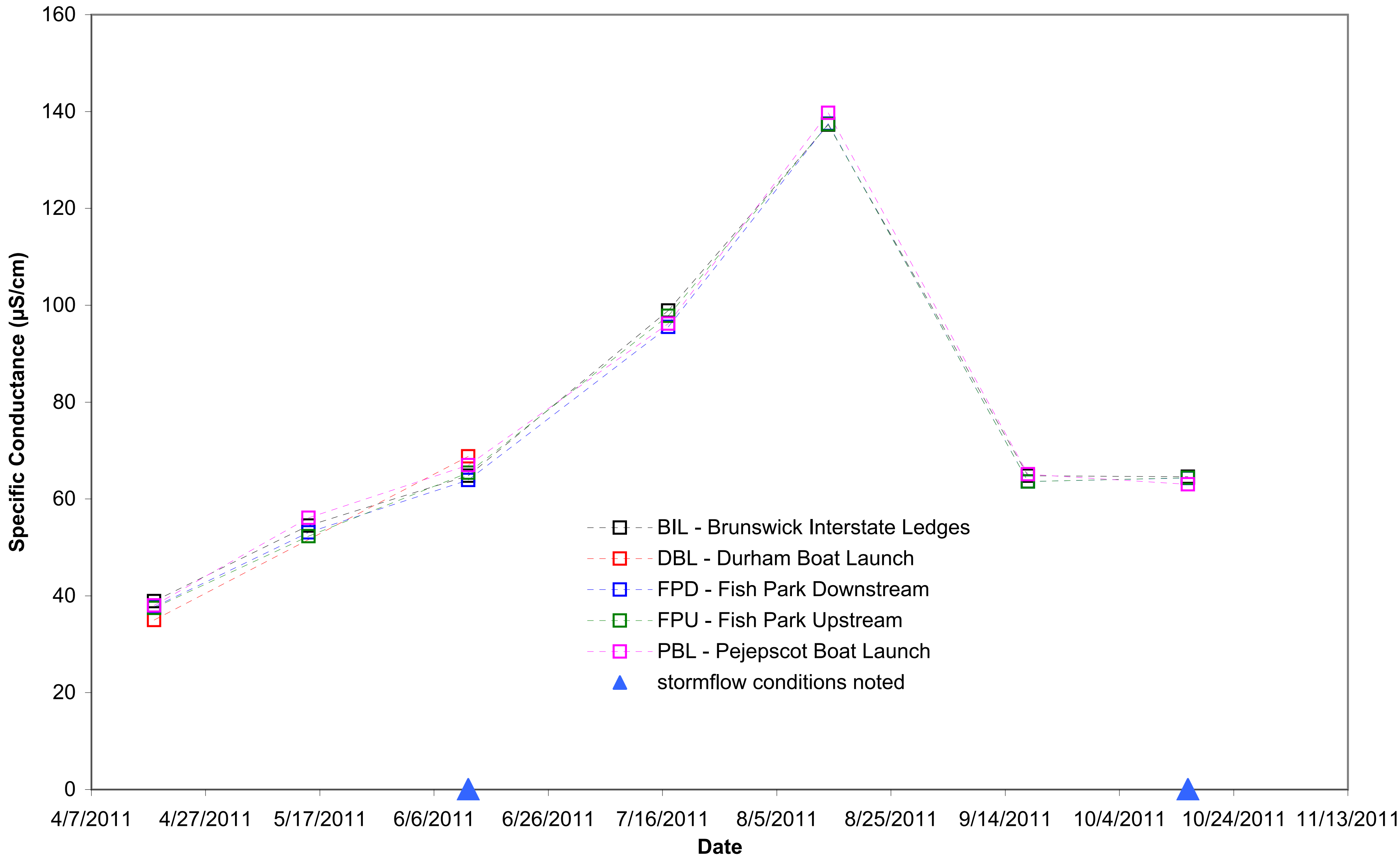


Figure 5-1-12. Specific conductance at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

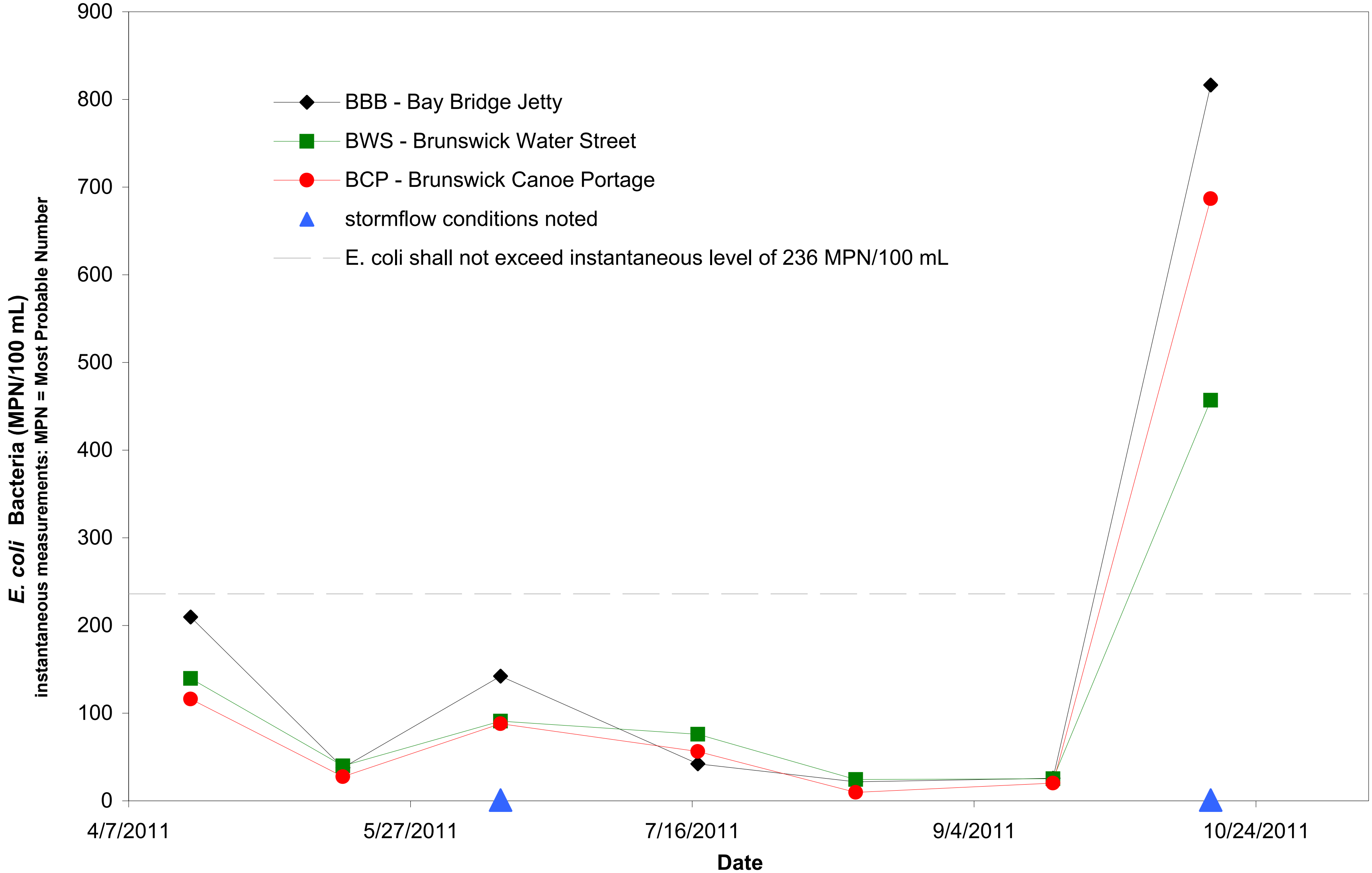


Figure 5-1-13. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

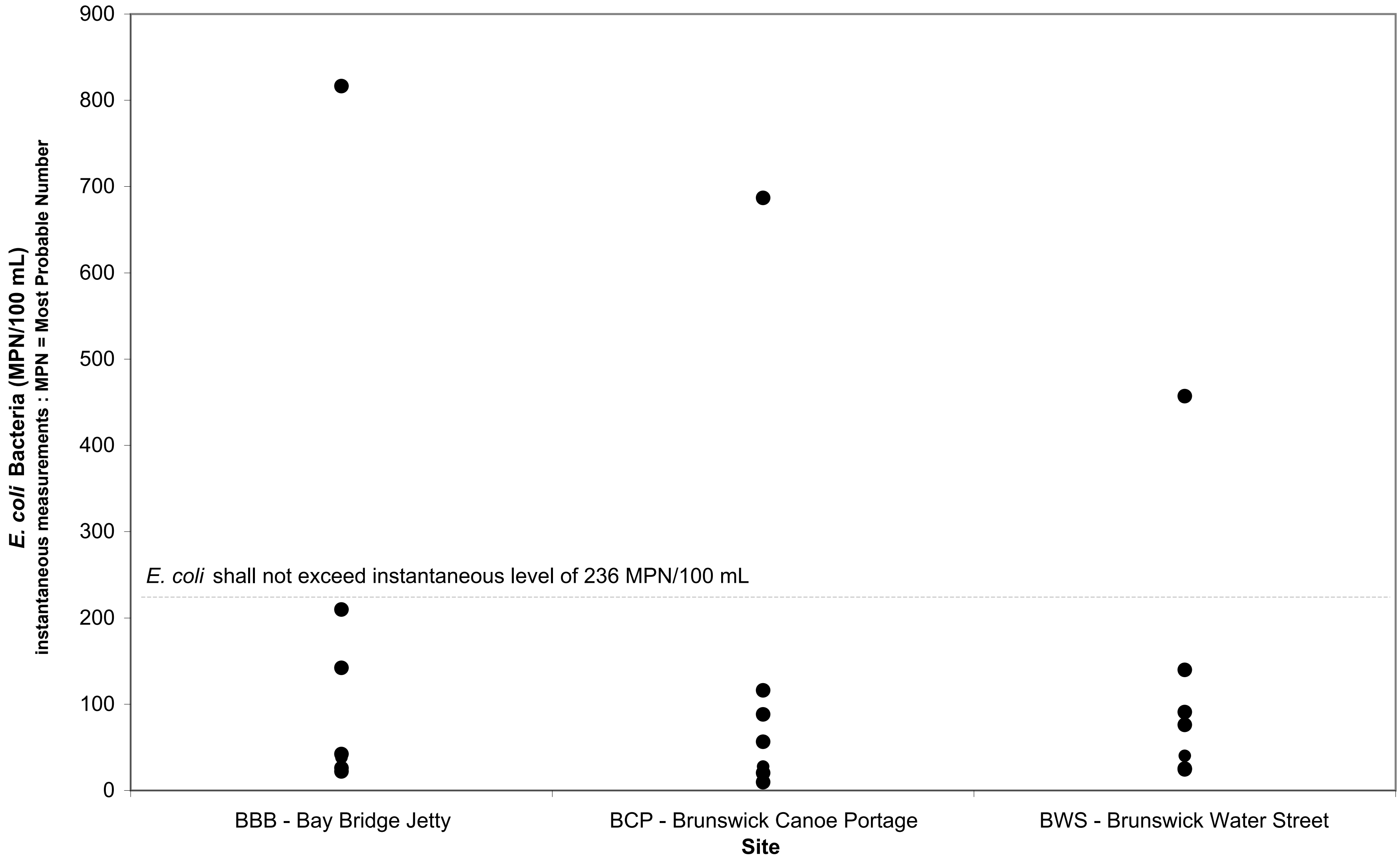


Figure 5-1-14. *E. coli* bacteria concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

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 Appearance	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 Appear-ance	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 OBSERVATIONAL 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 OBSERVATIONAL DATA.
DBL	ANDROSCOGGIN RIV	4/18/2011	7:00 AM	D				BANK							NON-WADEABLE/3 FT BELOW SURFACE DID NOT RECORD ANY OF THE OBSERVATIONAL 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 OBSERVATIONAL 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 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 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

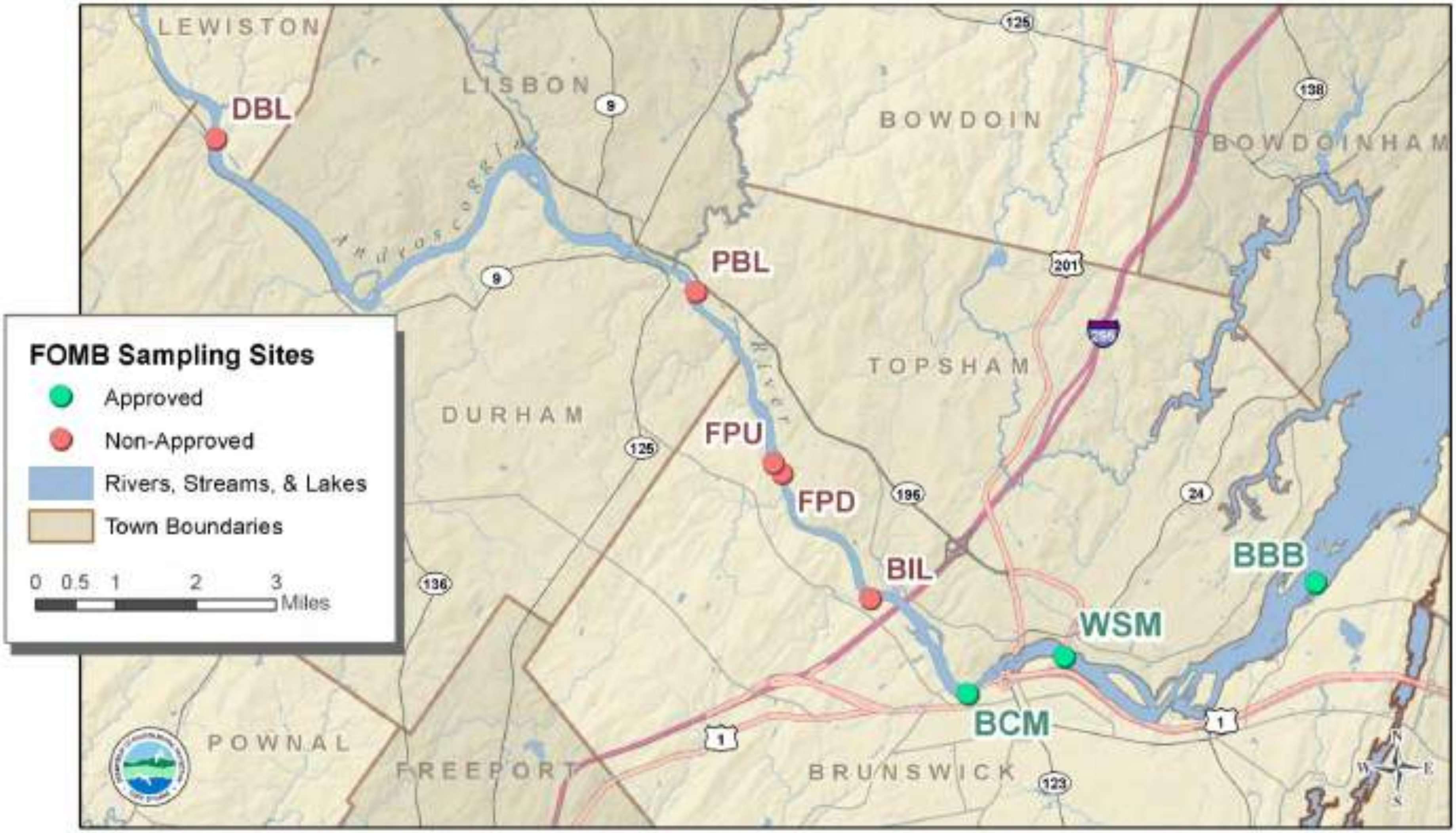


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

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.

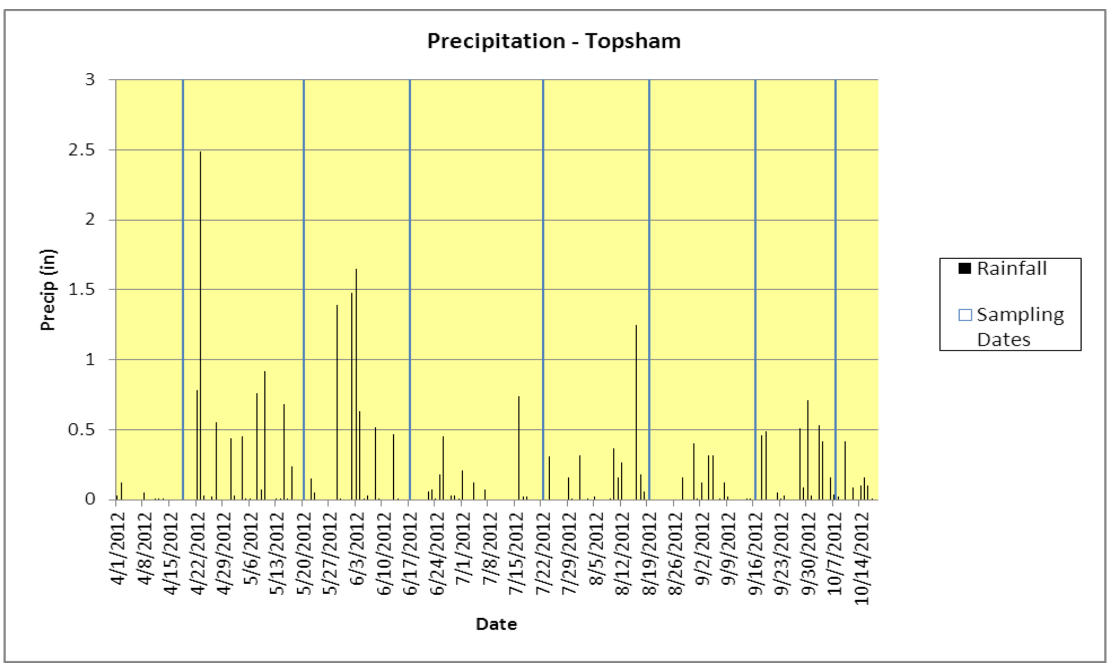


Figure 5-2-2: Seasonal precipitation measured at Highland Green, Topsham.

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).

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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.

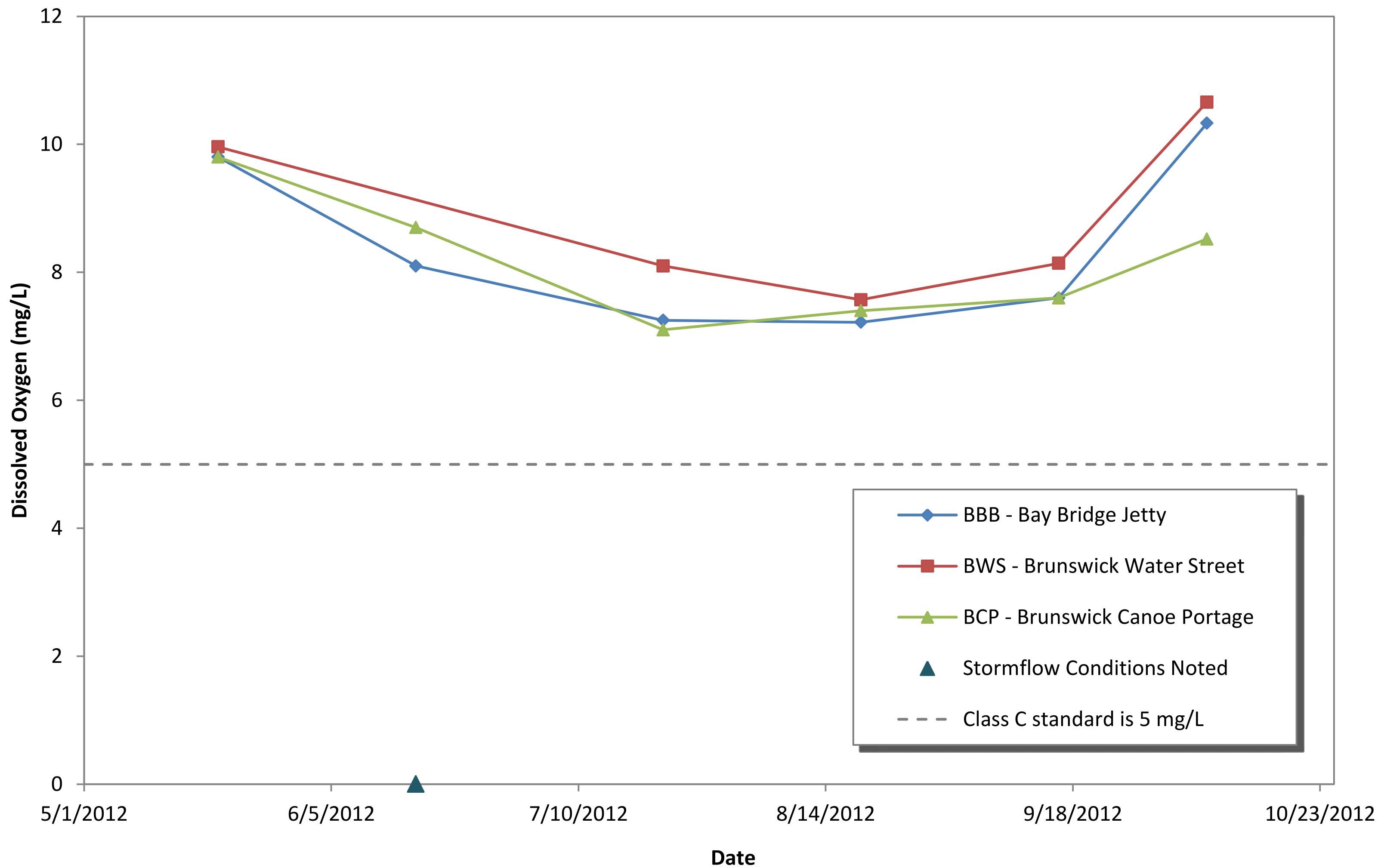

Figure 5-2-3. Dissolved oxygen concentrations of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

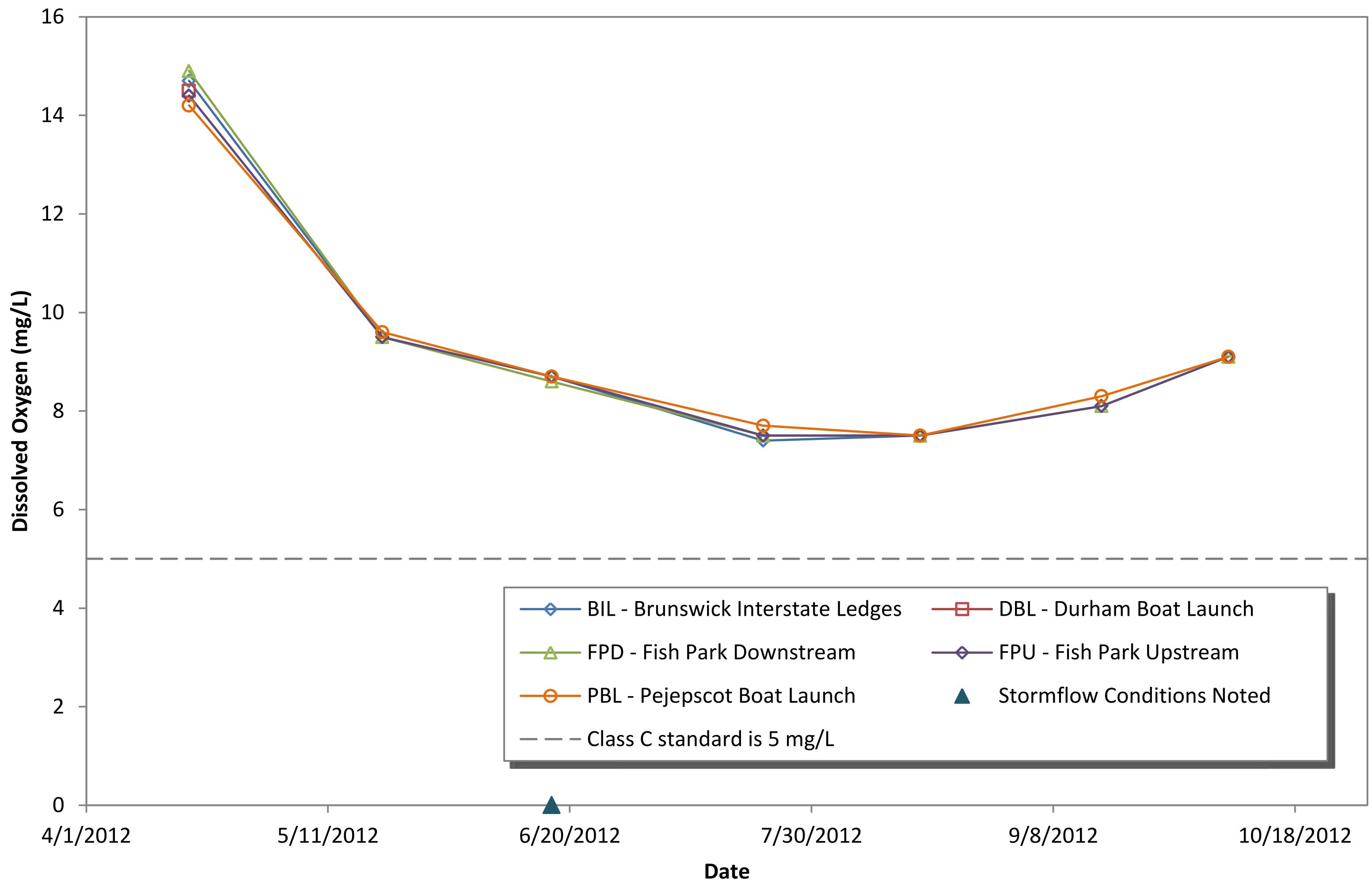

Figure 5-2-4. Dissolved oxygen concentrations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

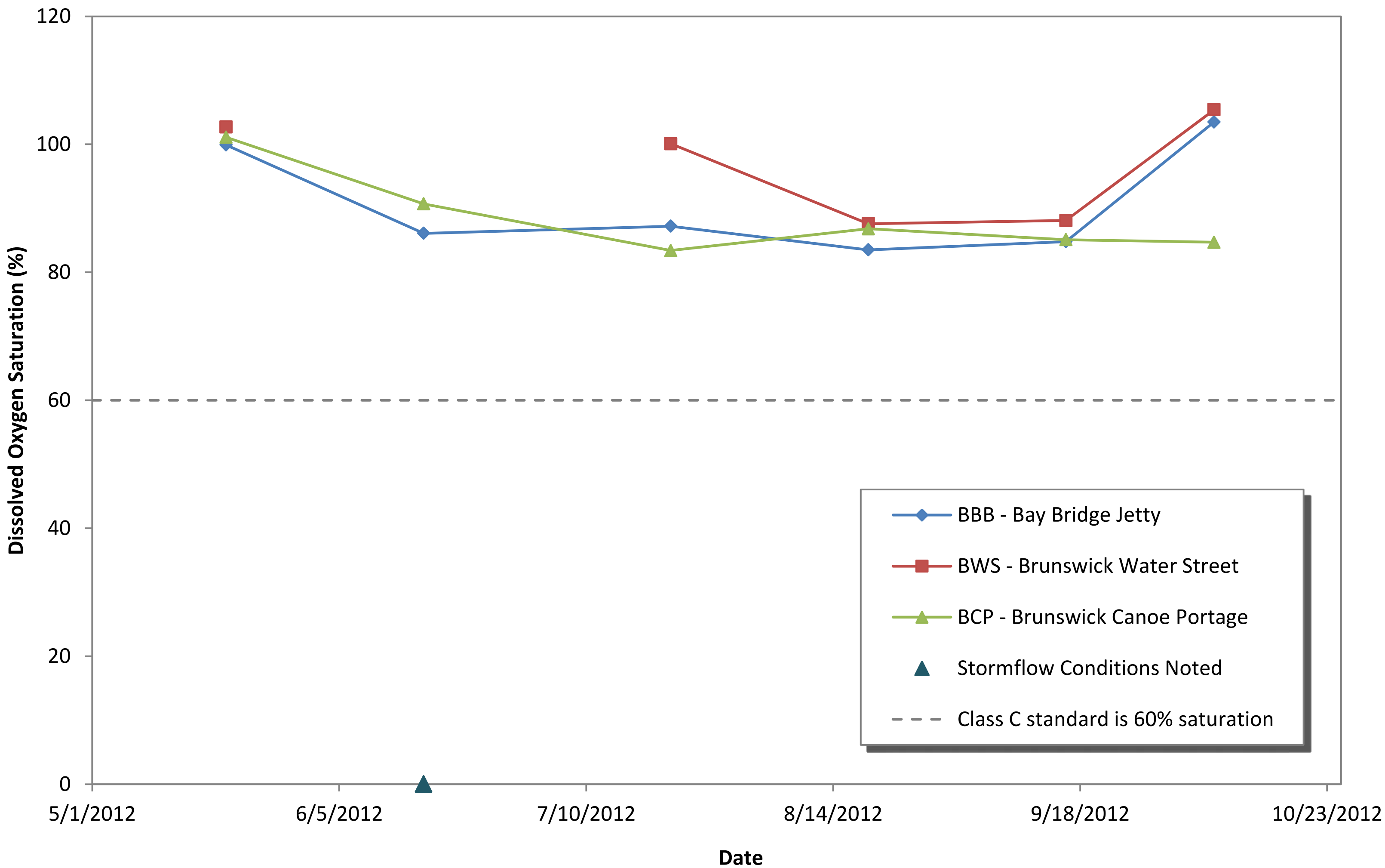

Figure 5-2-5. Dissolved oxygen % saturation of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

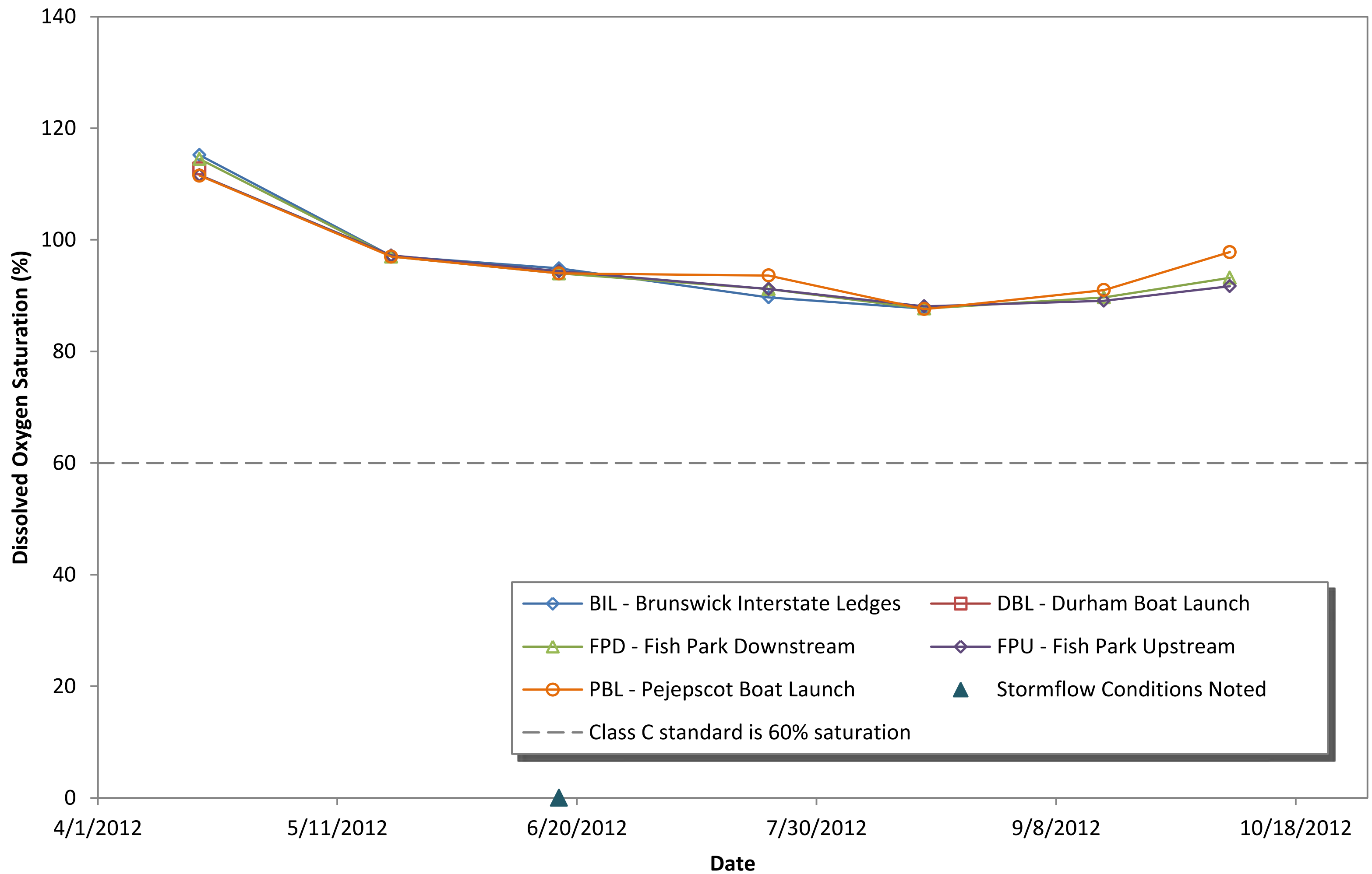

Figure 5-2-6. Dissolved oxygen % saturation at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

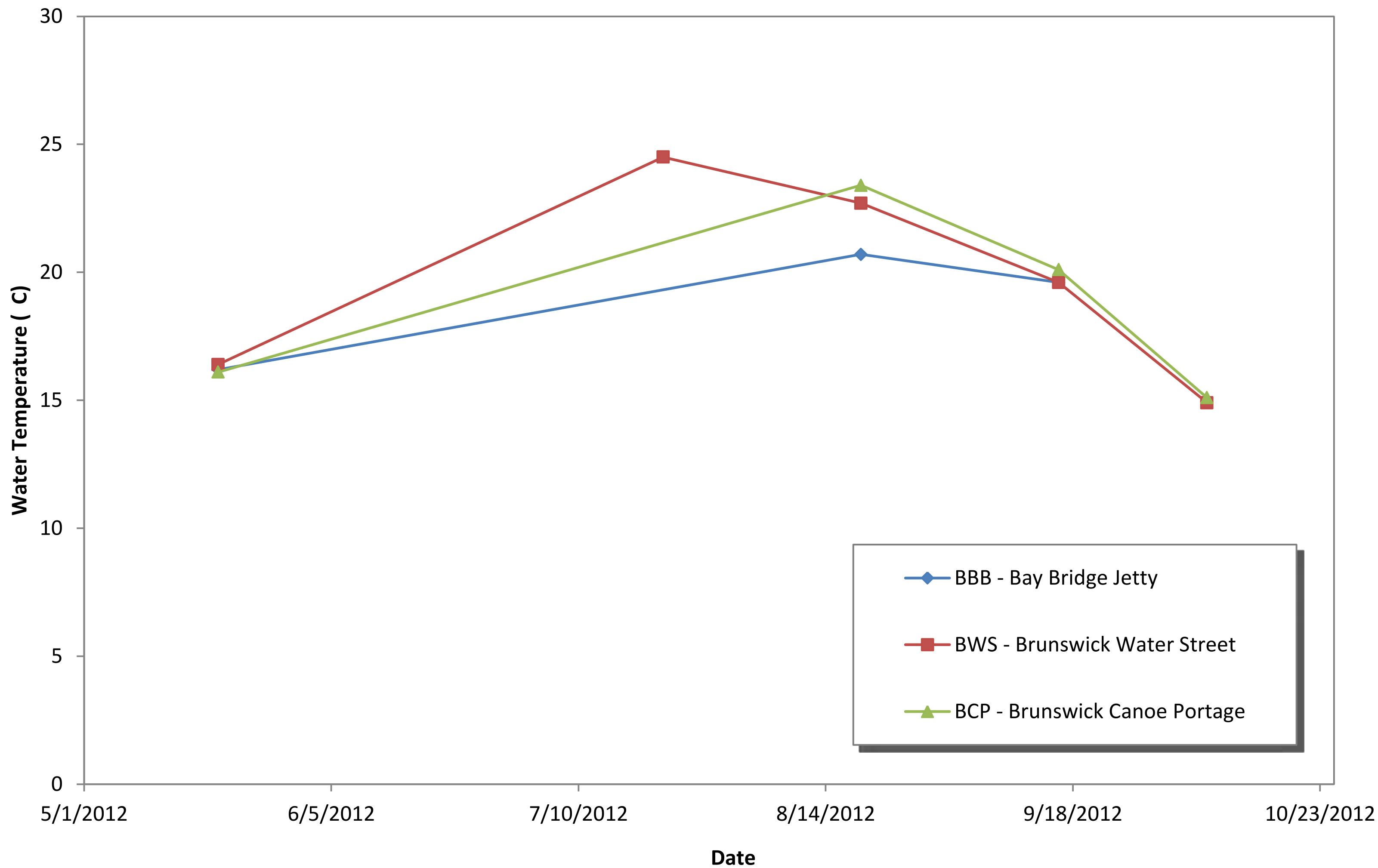

Figure 5-2-7. Water temperatures of Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

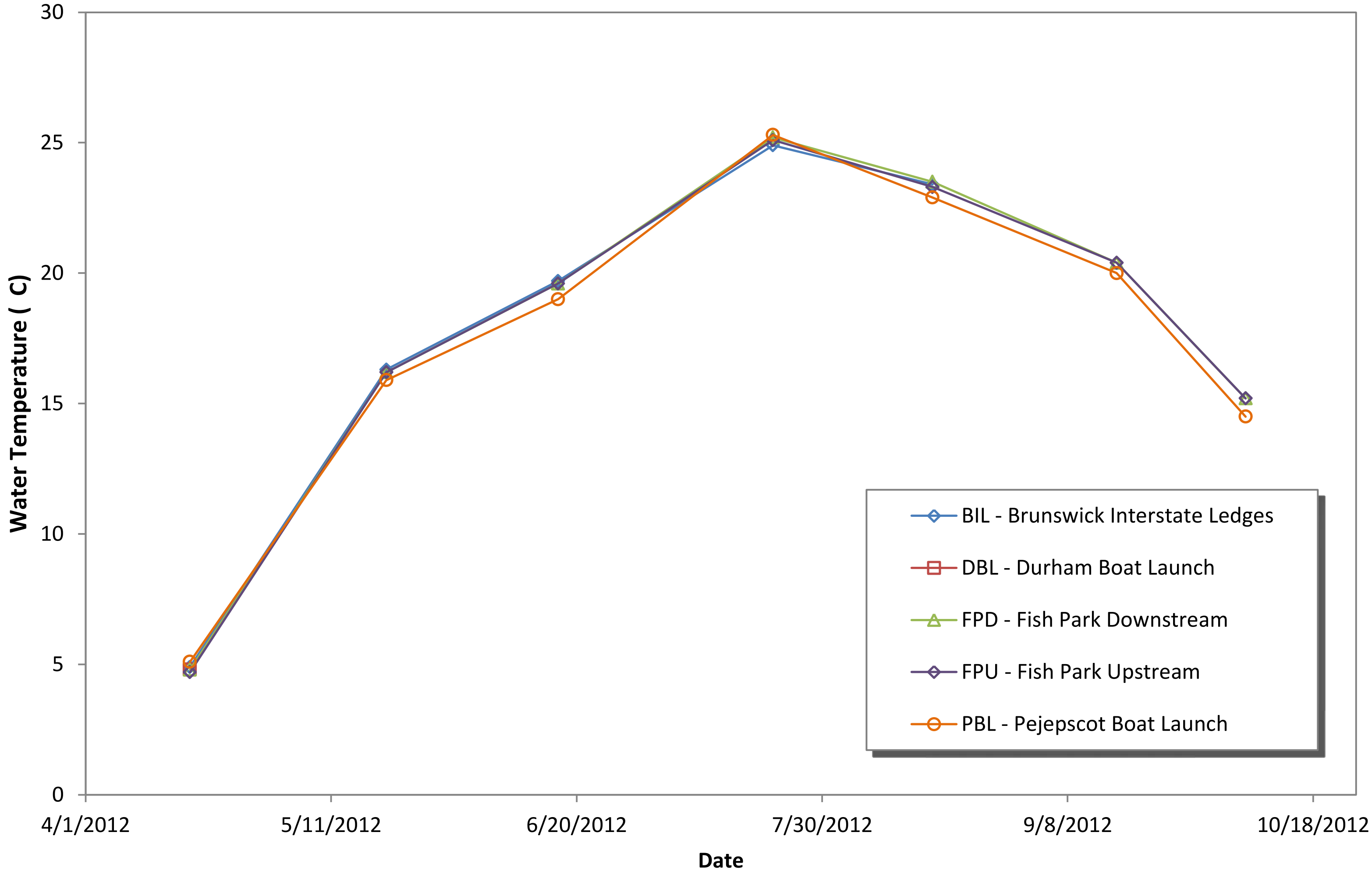

Figure 5-2-8. Water temperatures at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

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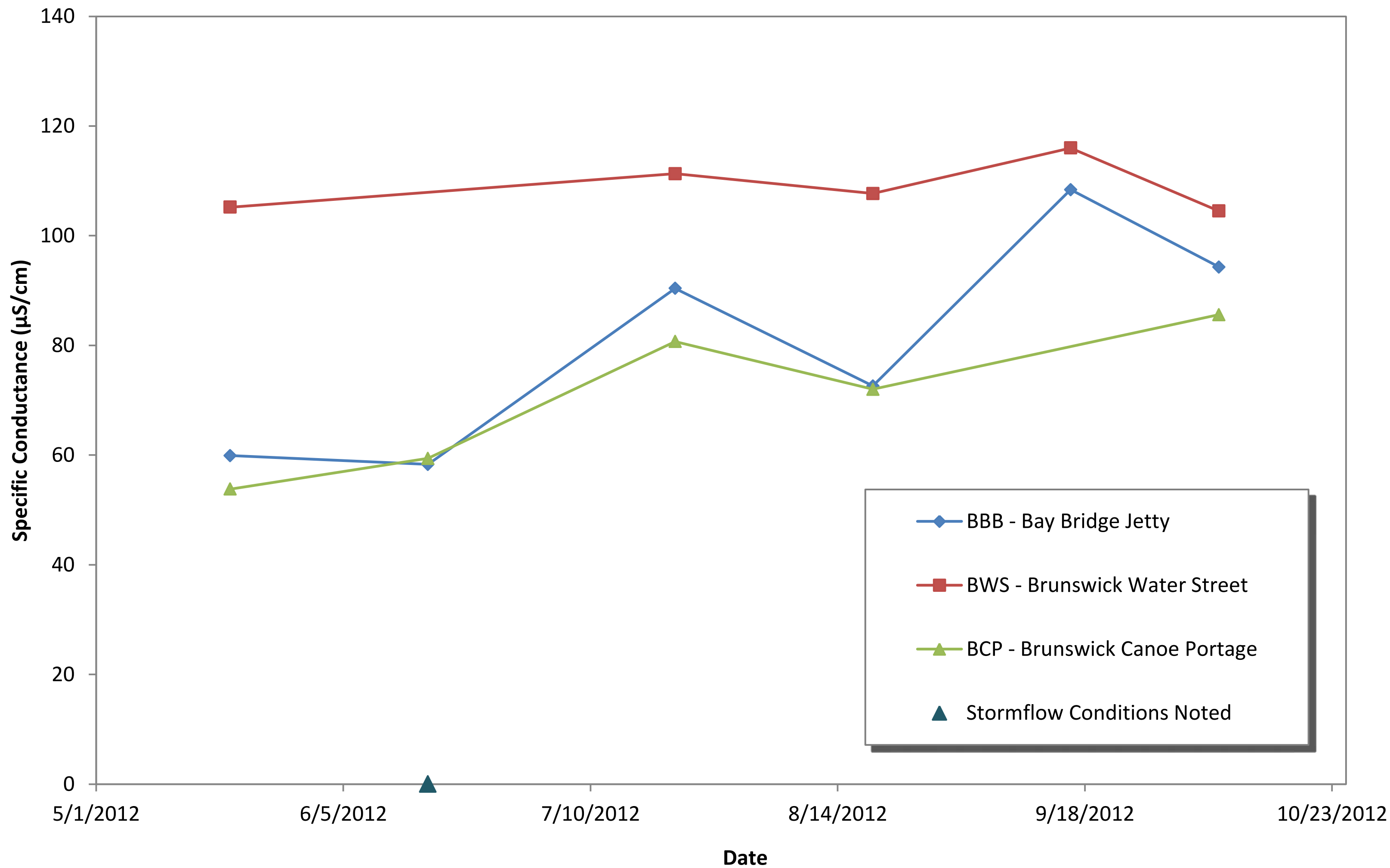


Figure 5-2-9. Specific Conductance at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

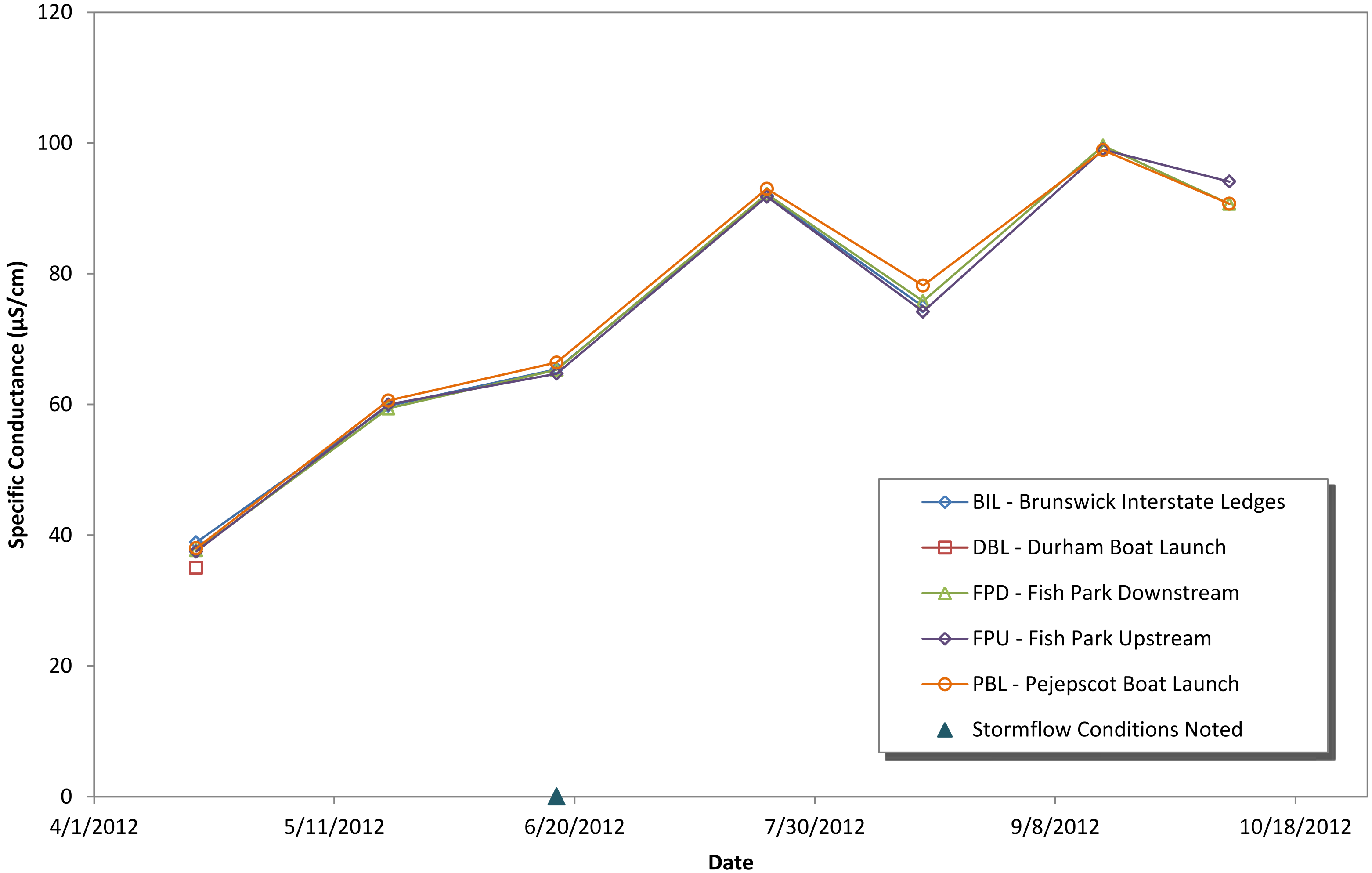


Figure 5-2-10. Specific conductance at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2012

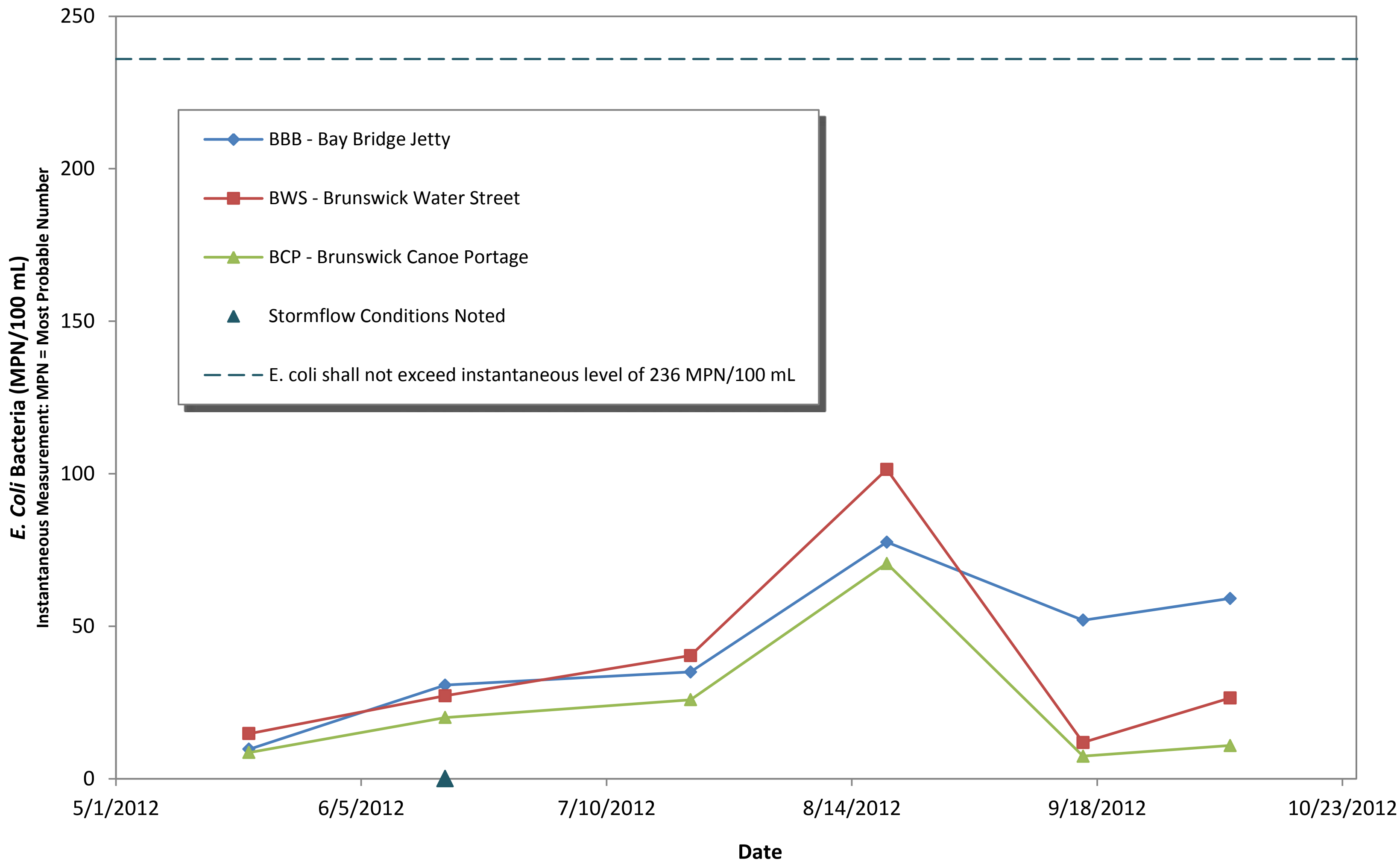


Figure 5-2-11. *E. Coli* bacteria at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2012

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 DOWNSTREA M	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:

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
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

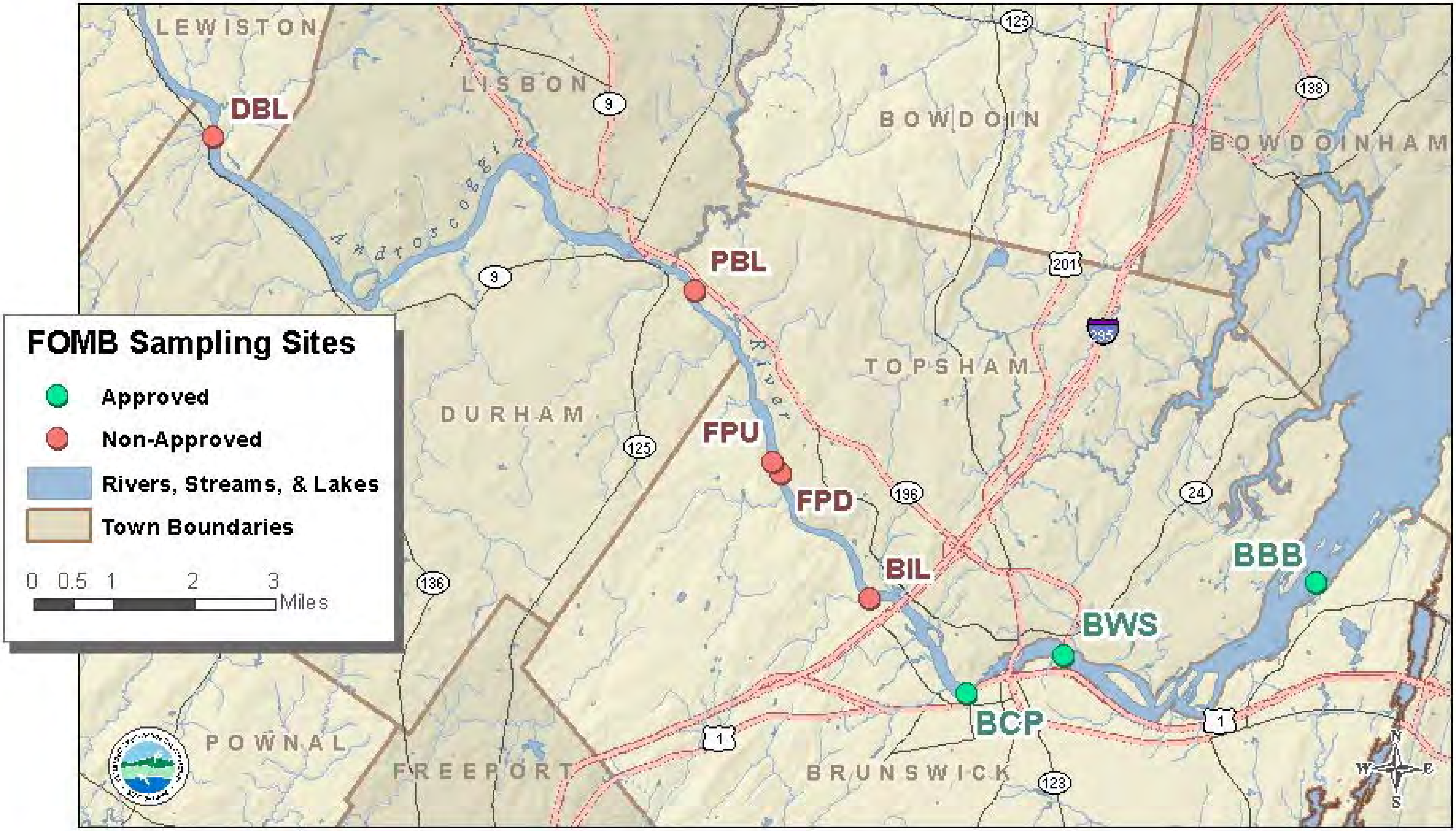


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

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.

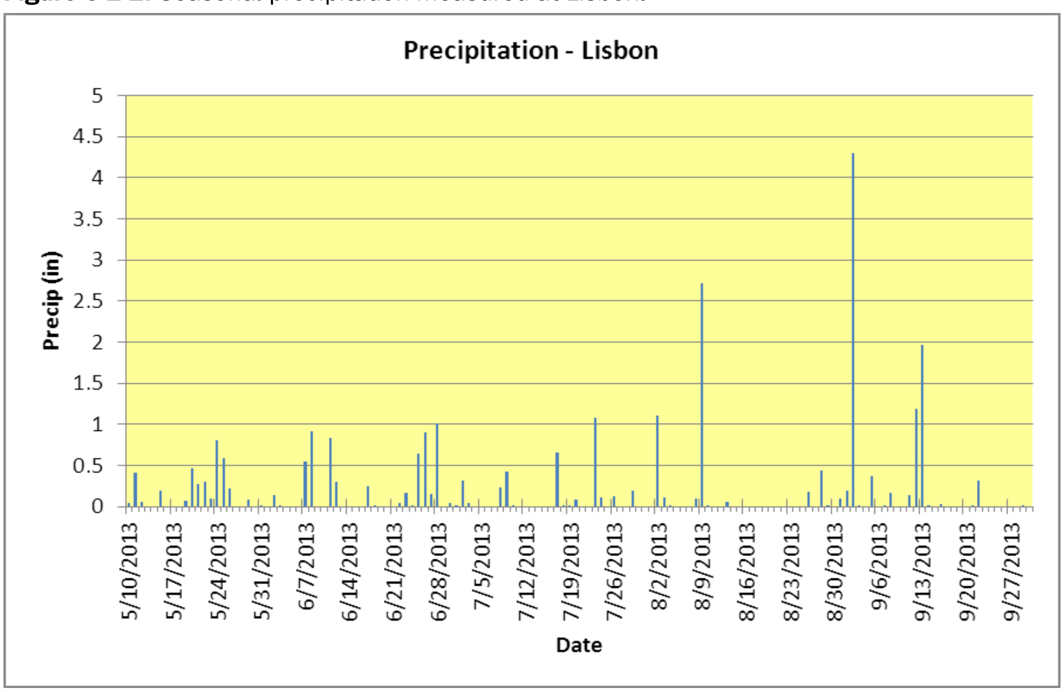
Results

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.



APPELLANT SUPP EX. 2 P.90

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.

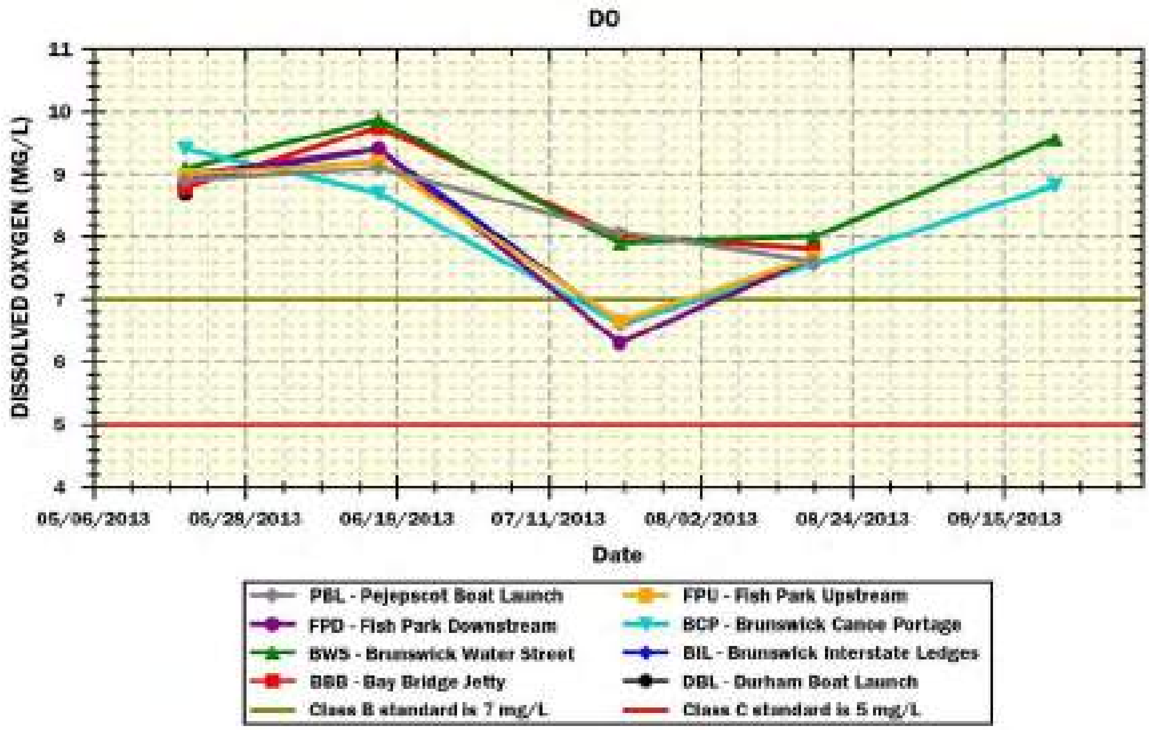


Table 5-2-2: A summary of minimum, maximum, and average dissolved oxygen concentration values (mg/l) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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

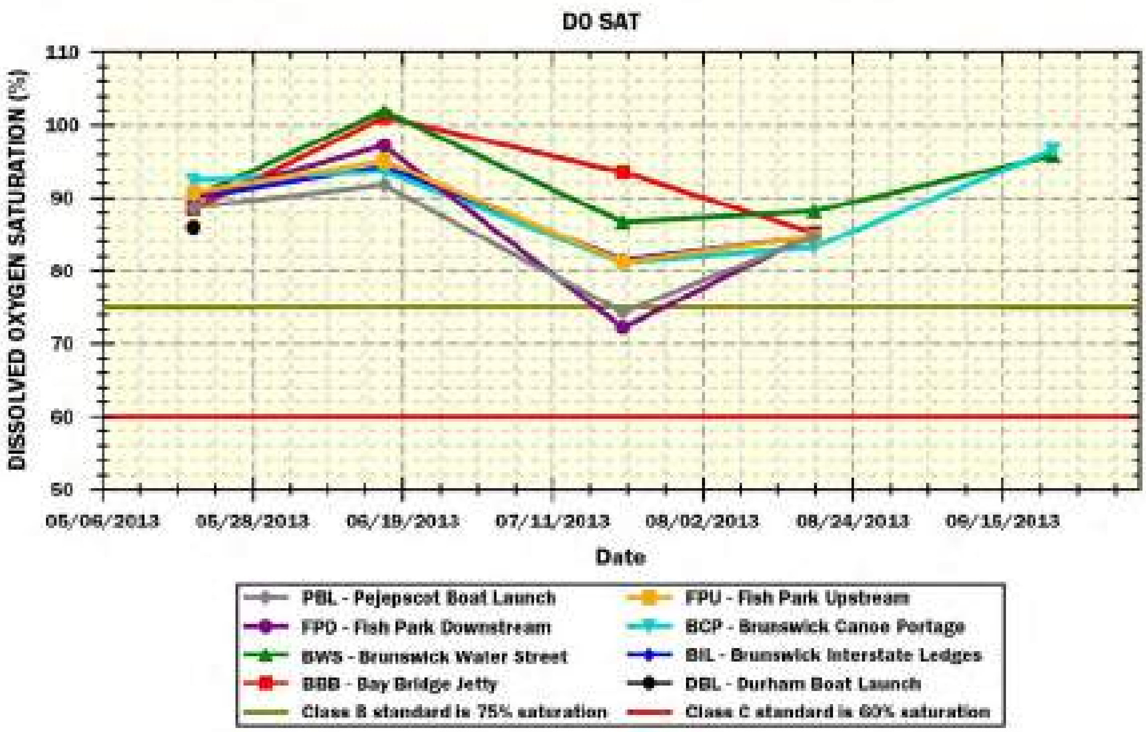


Table 5-2-3: A summary of minimum, maximum, and average dissolved oxygen saturation (%) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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.

APPELLANT SUPP EX. 2 P.92

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

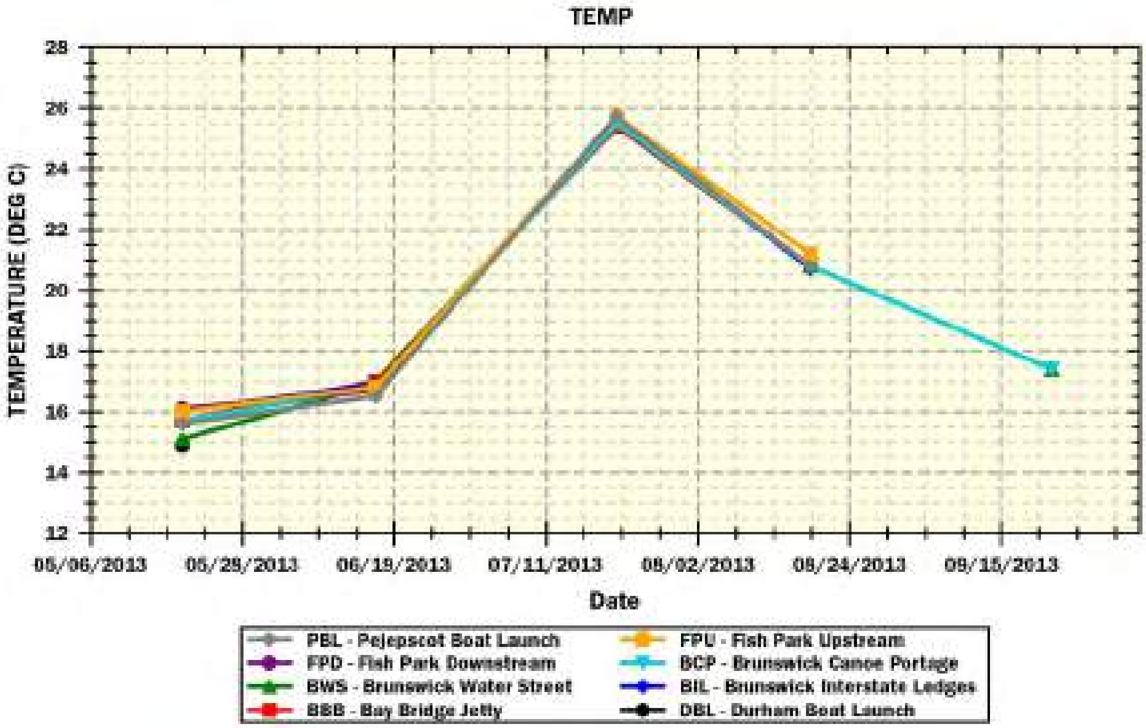


Table 5-2-4: A summary of minimum, maximum, and average water temperature (°C) values at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

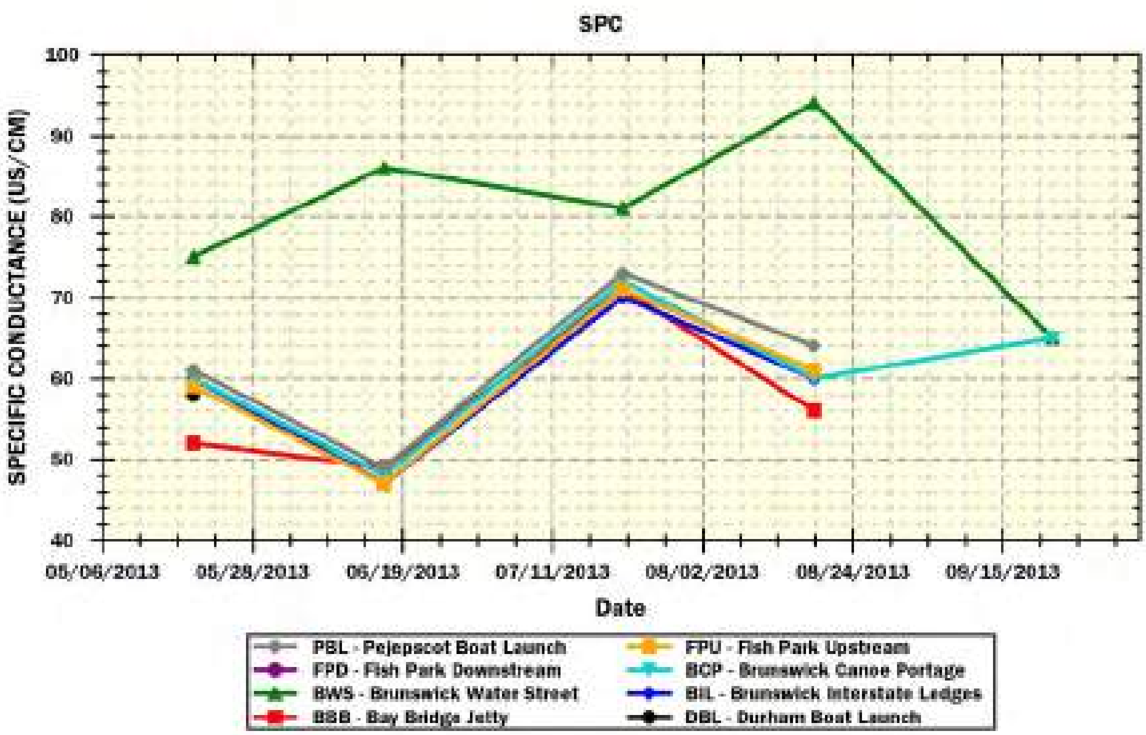
Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
BBB	Y	4	15.7	25.4	19.7
BWS	Y	5	15.1	25.6	19.2
BCP	Y	5	15.7	25.5	19.2
BIL	N	4	16.0	25.6	19.8
FPD	N	4	16.1	25.7	19.9
FPU	N	4	16.0	25.7	19.9
PBL	N	4	15.6	25.7	19.7
DBL	N	1	14.9	14.9	14.9

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



APPELLANT SUPP EX. 2 P.95

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)

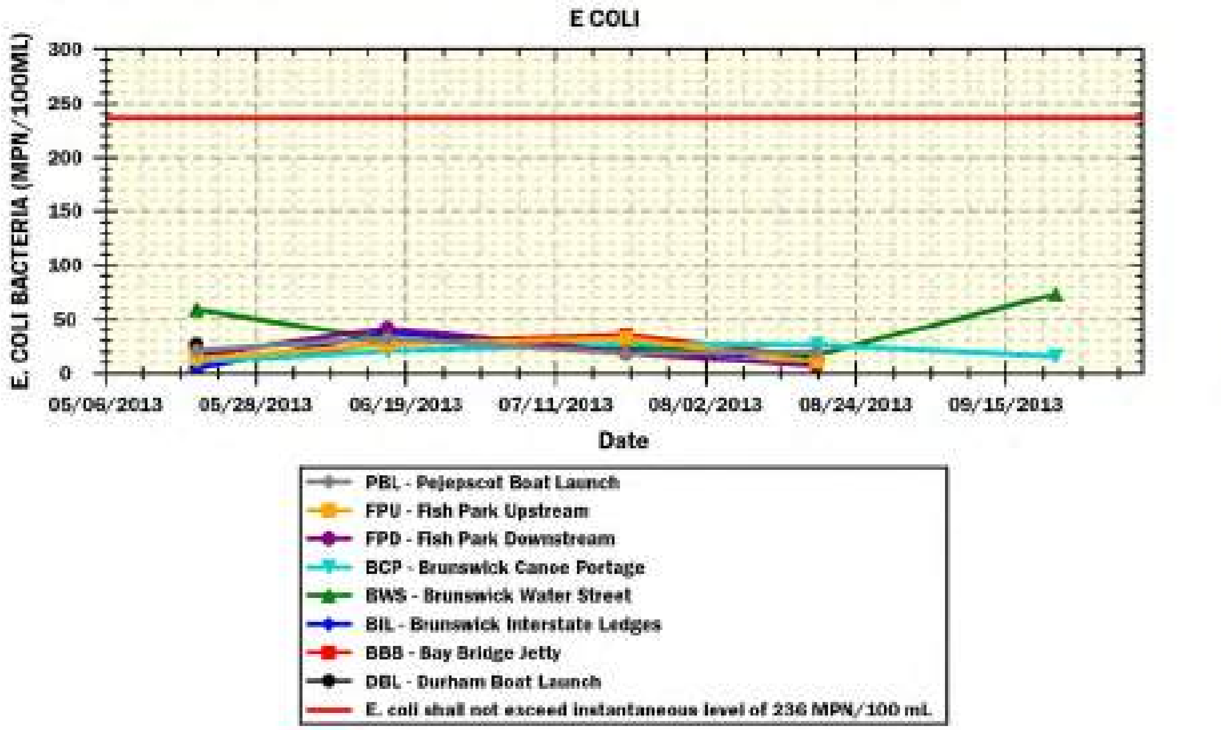


Table 5-2-6: A summary of minimum, maximum, and geometric mean values (MPN/100mL) for bacteria at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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.

APPELLANT SUPP EX. 2 P.102

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.

APPELLANT SUPP EX. 2 P.104

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

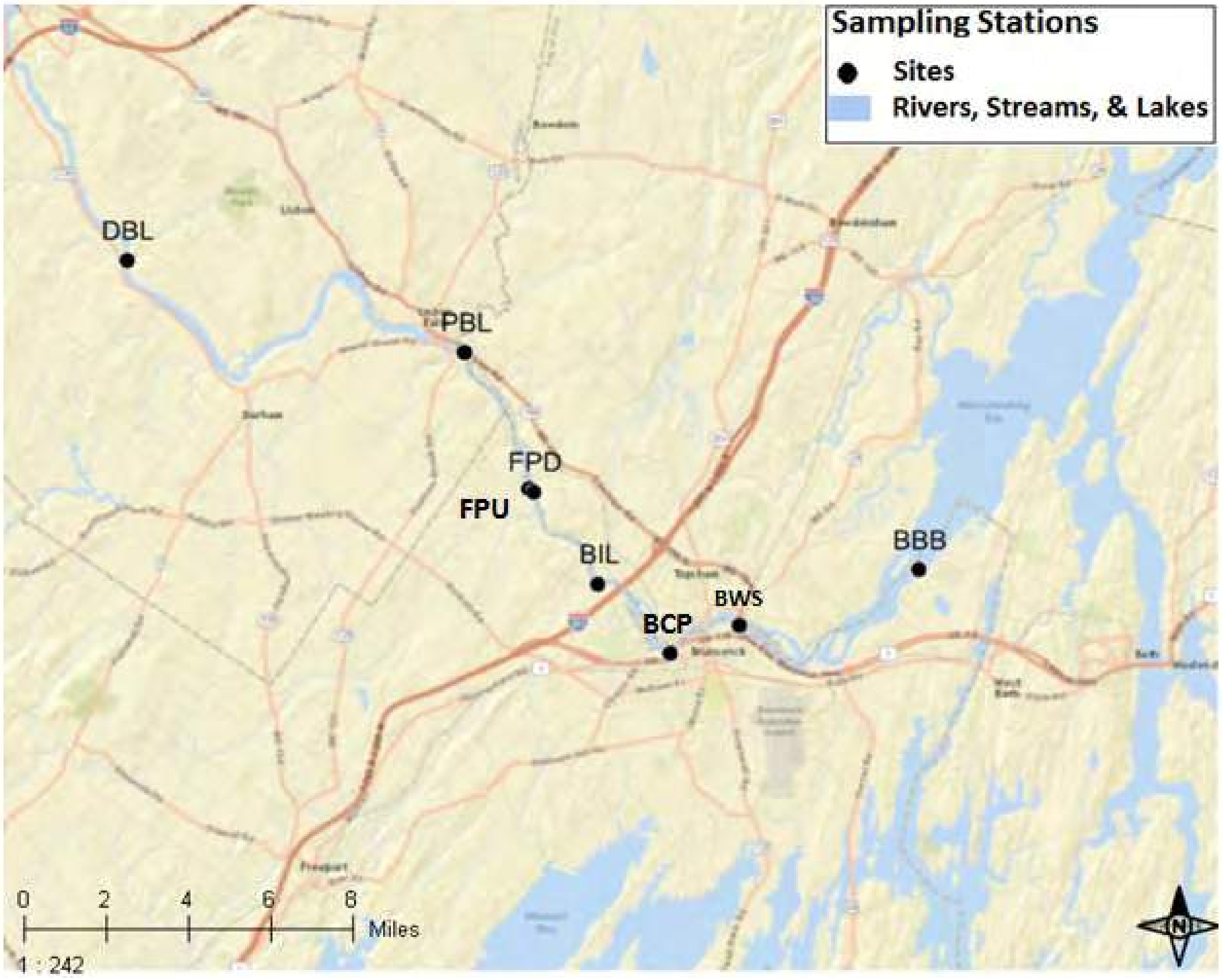


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River

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.

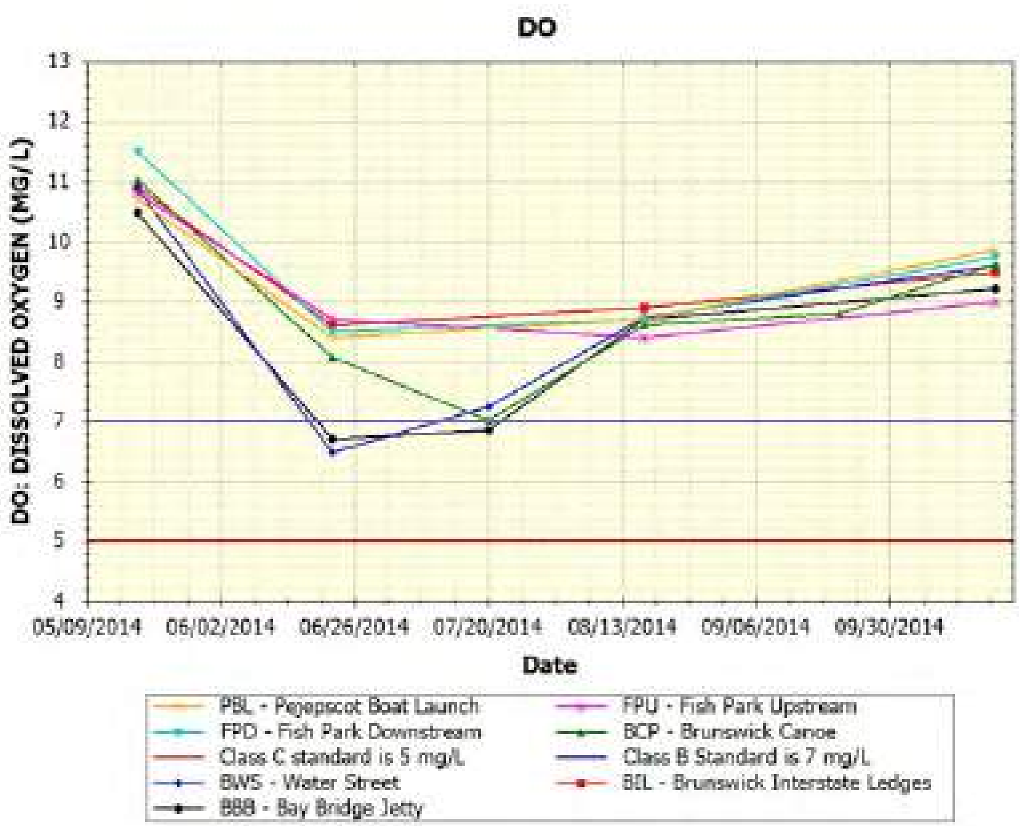
Table 5-2-2: A summary of minimum, maximum, and average dissolved oxygen concentration values (mg/l) at Friends of Merrymeeting Bay monitoring sites on the Androscoggin River.

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.

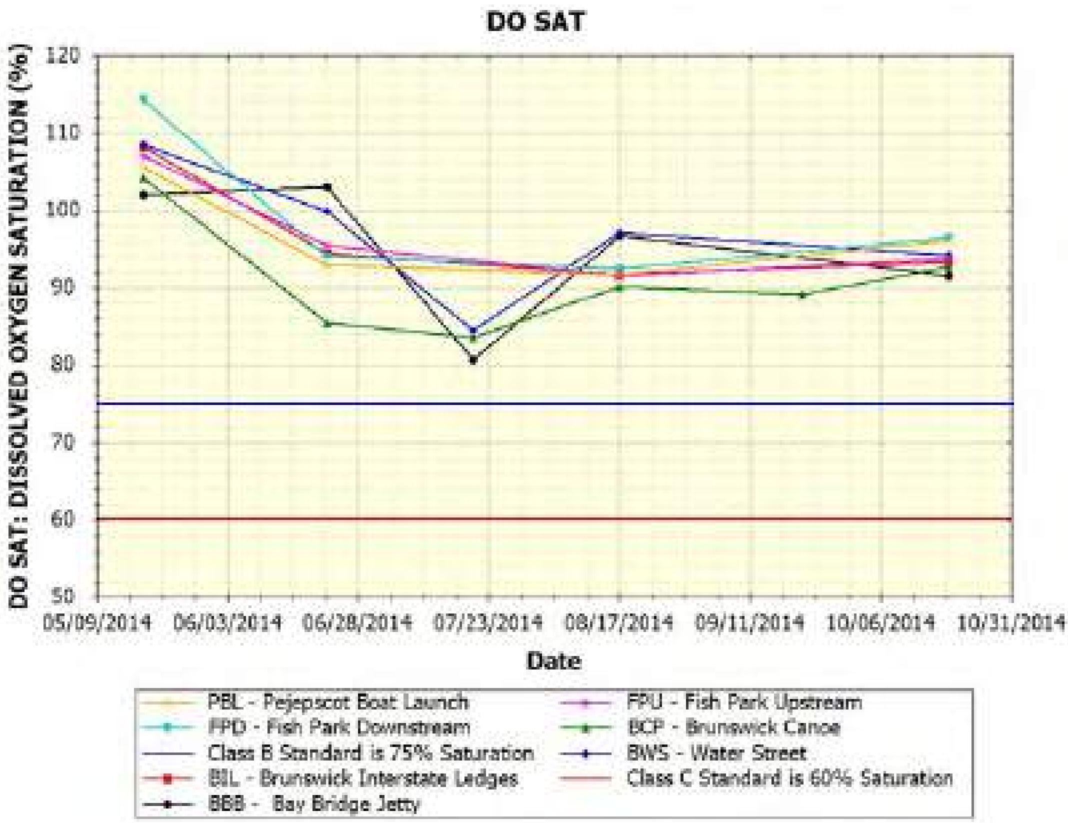
Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
BBB	C	5	94.8	80.7	103.0	60	0
BWS	C	5	96.8	84.5	108.4	60	0
BCP	C	6	90.8	83.5	104.1	60	0
BIL	C	4	96.9	91.7	108.2	60	0
FPD	C	4	99.3	92.4	114.3	60	0
FPU	C	4	96.9	91.5	107.0	60	0
PBL	C	4	96.6	91.7	105.6	60	0

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



APPELLANT SUPP EX. 2 P.109

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:

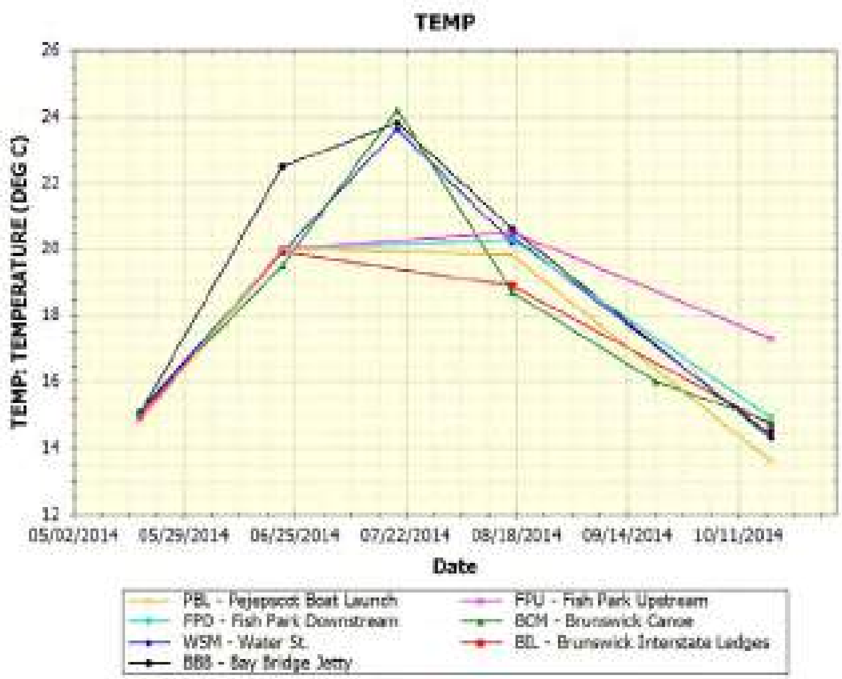
Temperature at the 3 lowest sampling sites (BBB, BWS and BCP) were similar with highest temperatures occurring in July (23°-24°C). Temperature was very similar at the 4 sampling sites above (BIL, FPD, FPU, PBL) with highest readings being around 20°C). Temperature for July is not reported here because 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.

APPELLANT SUPP EX. 2 P.110

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.

APPELLANT SUPP EX. 2 P.111

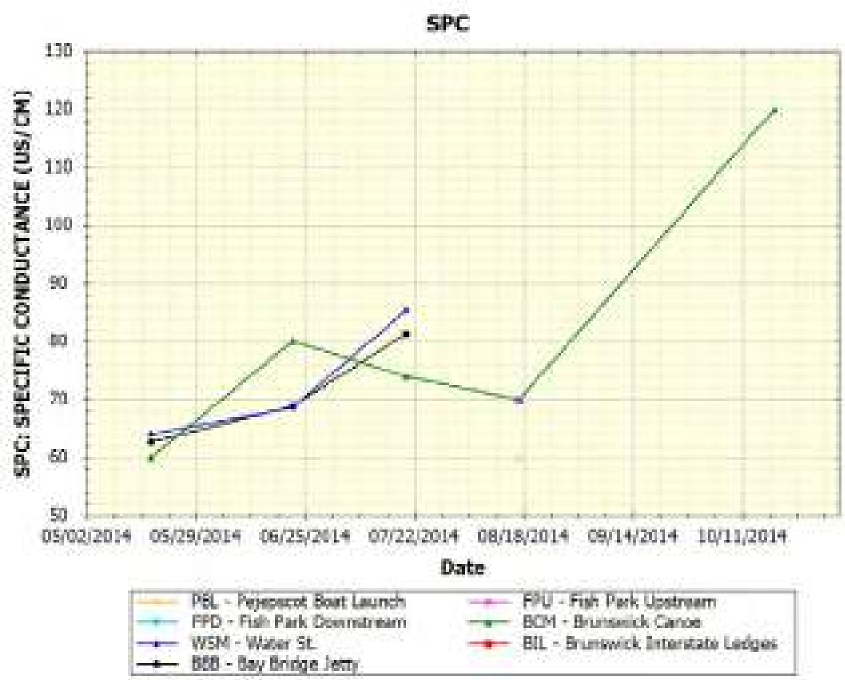
2014 Results:

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



APPELLANT SUPP EX. 2 P.112

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.

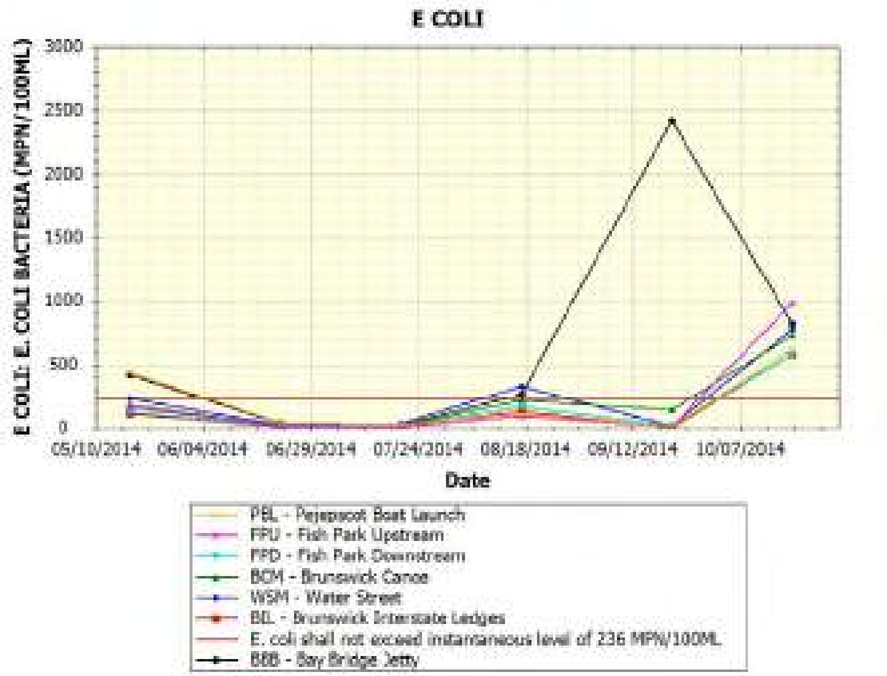
2014 Results:

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:

APPELLANT SUPP EX. 2 P.114

- **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	

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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

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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.

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[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

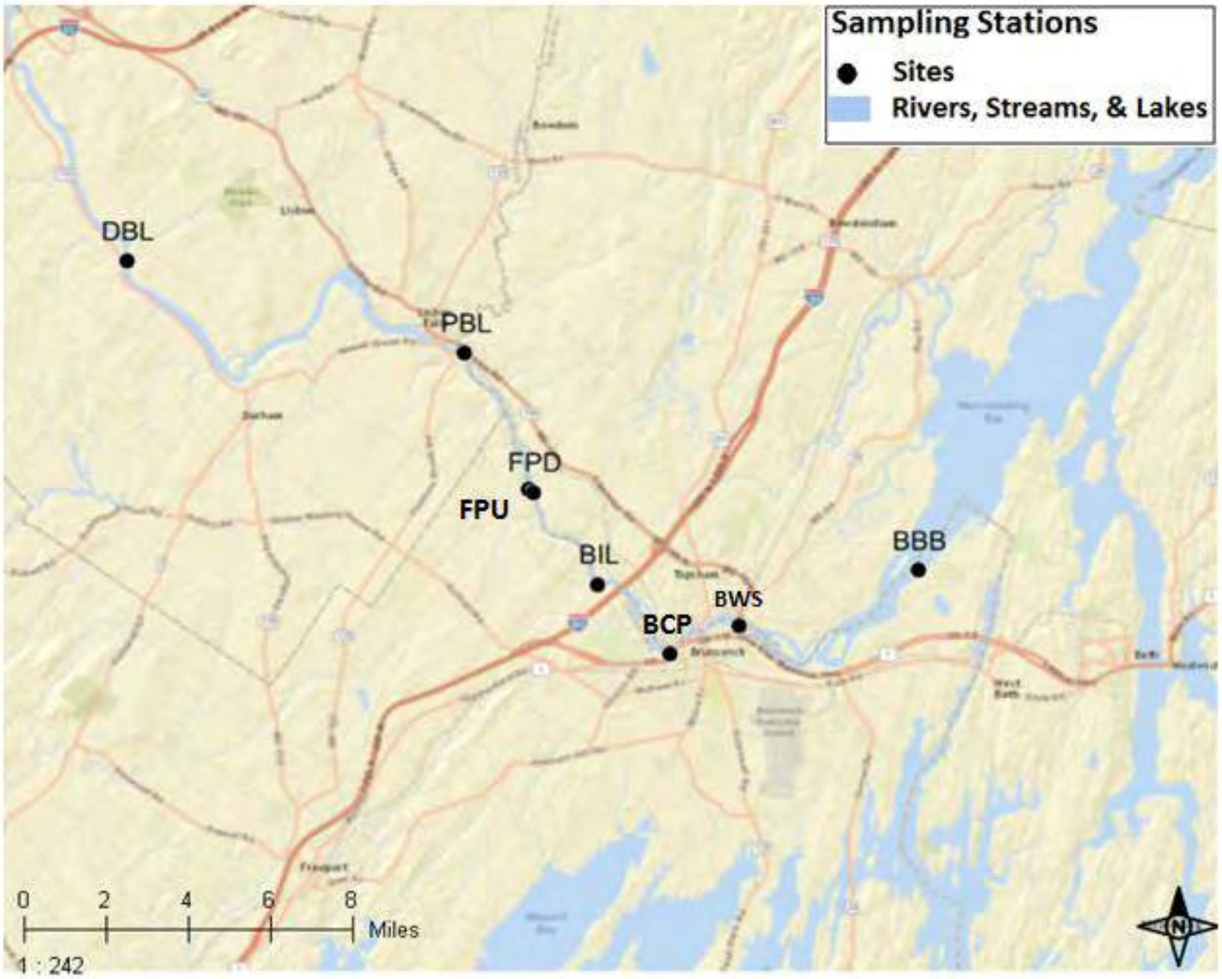


Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River

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

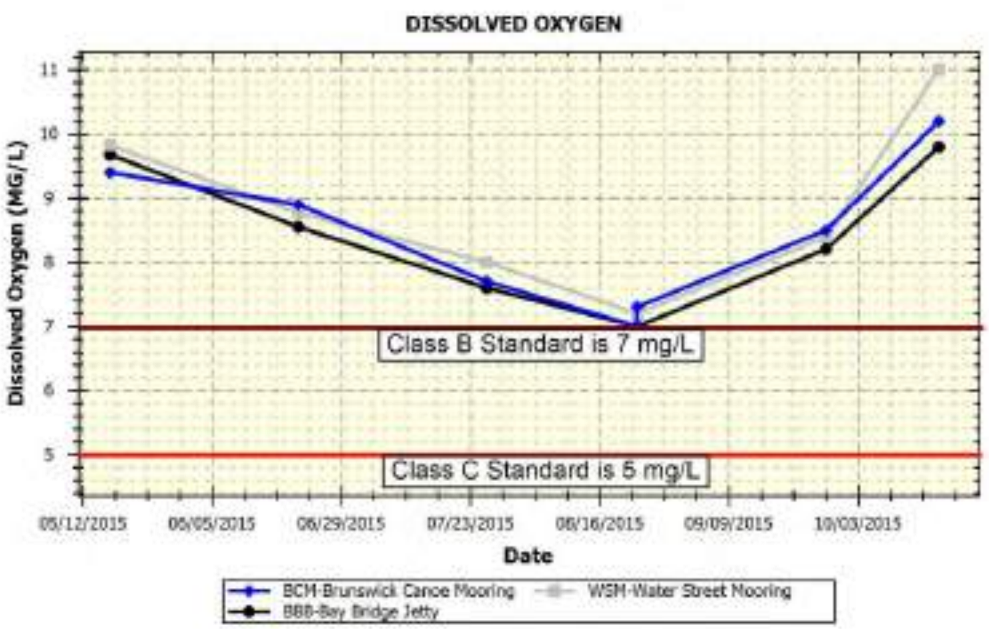


Figure 5-2-3: Graph of dissolved oxygen concentrations-upper sites

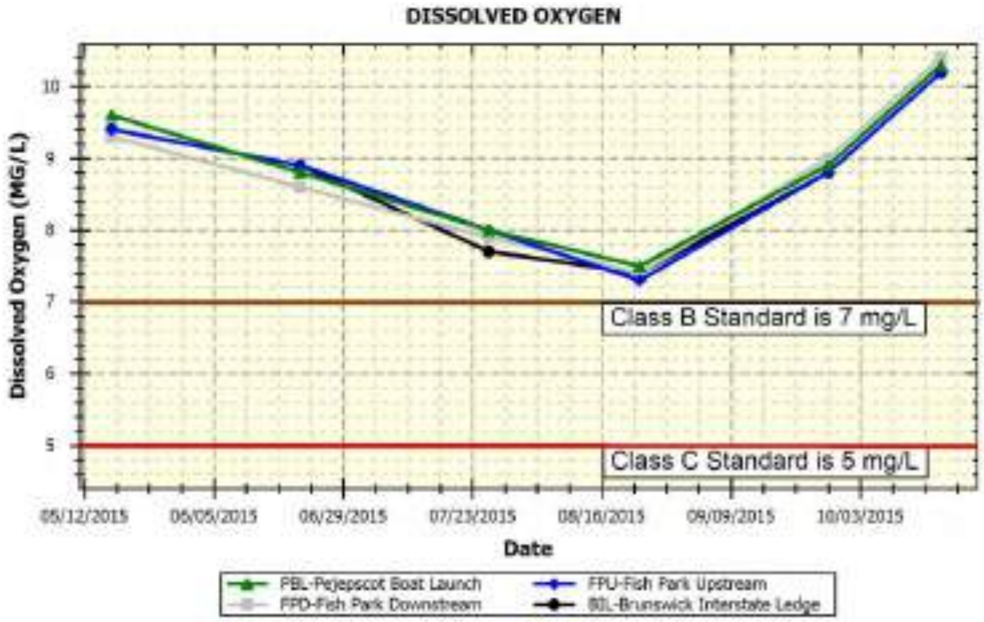


Figure 5-2-4: Graph of dissolved oxygen saturation-lower sites

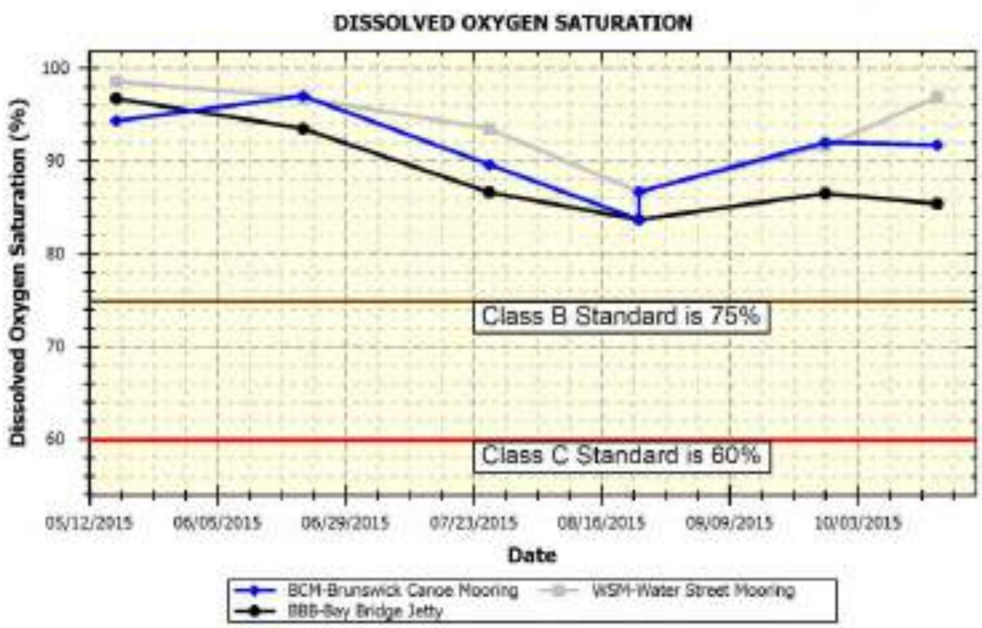
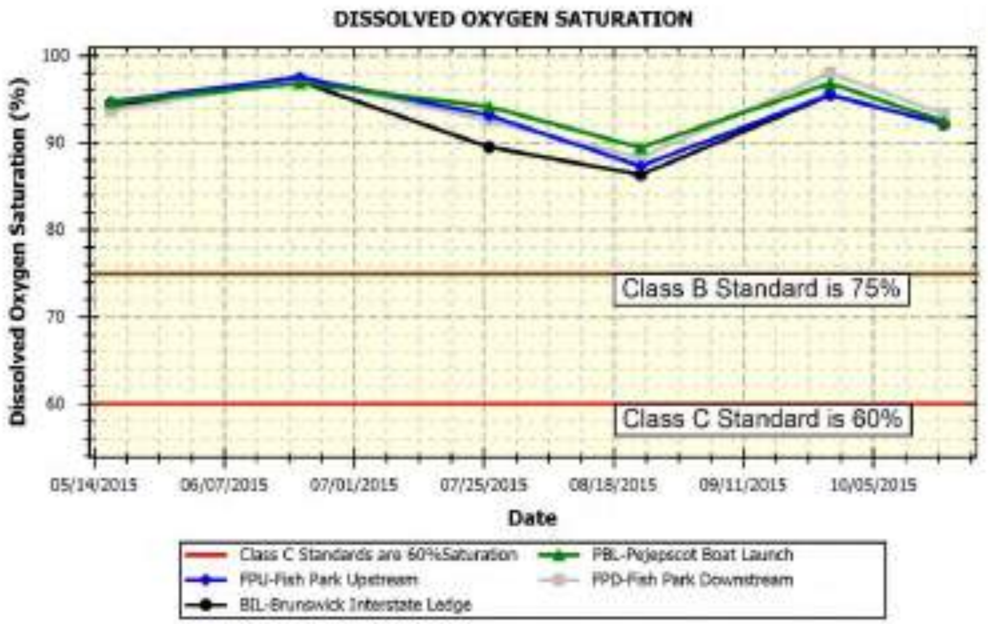


Figure 5-2-5: Graph of dissolved oxygen saturation-upper sites



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.

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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

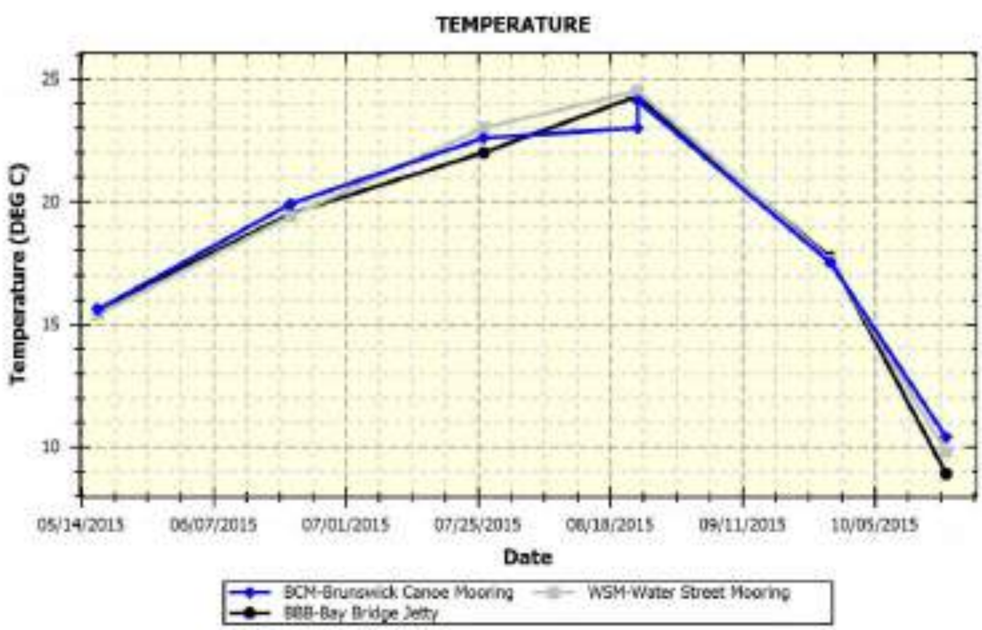
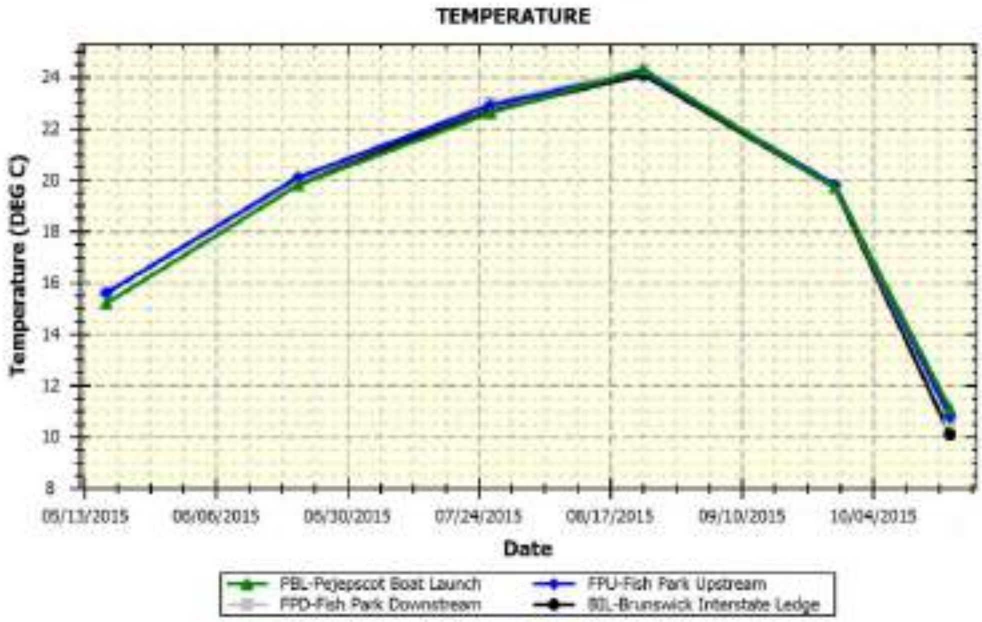


Figure 5-2-7: Graph of temperature-upper sites



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

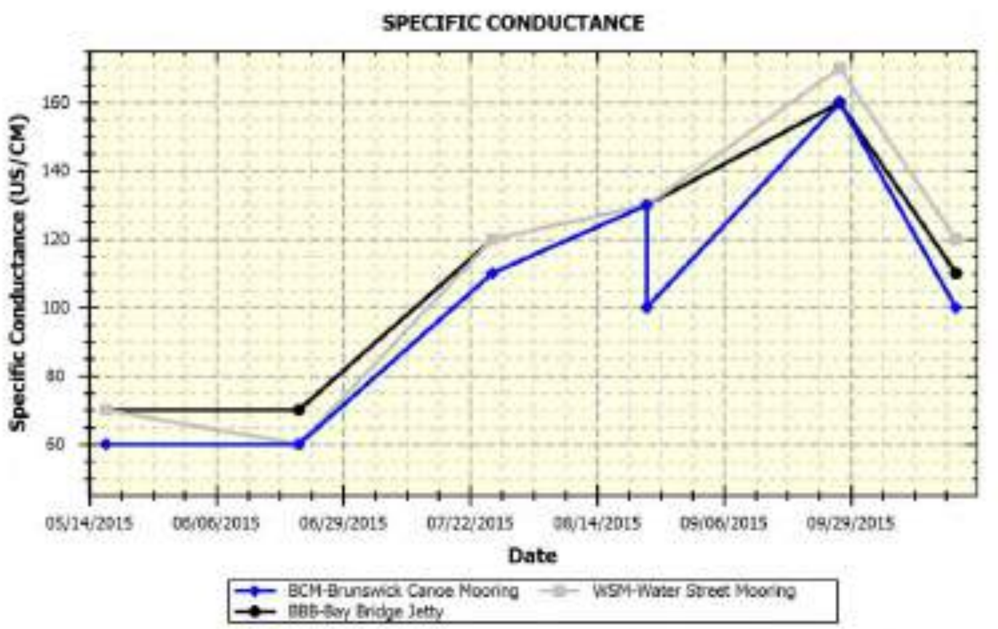
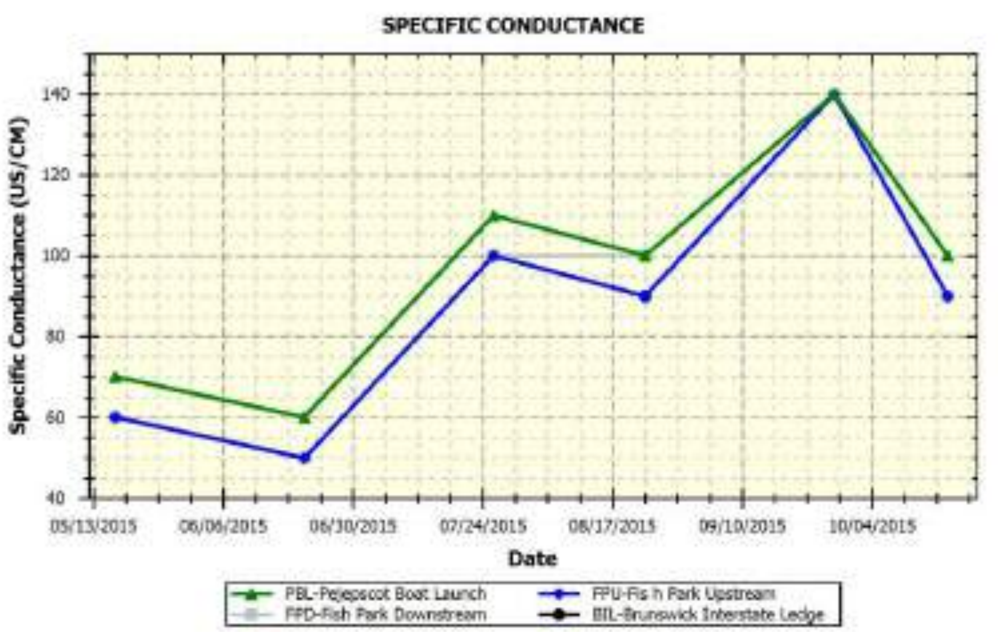


Figure 5-2-9: Graph of specific conductance-upper sites



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

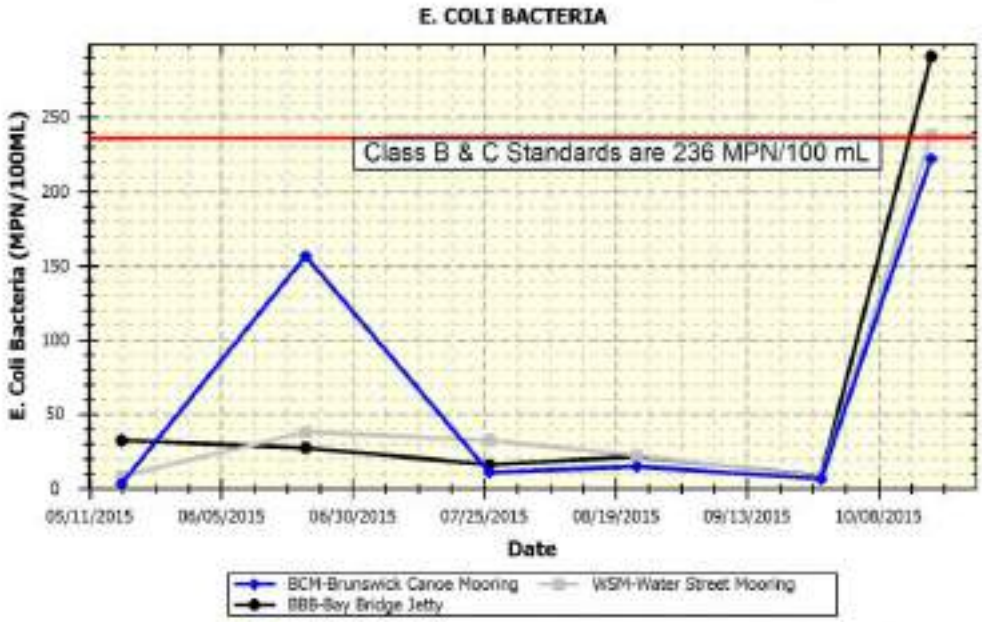
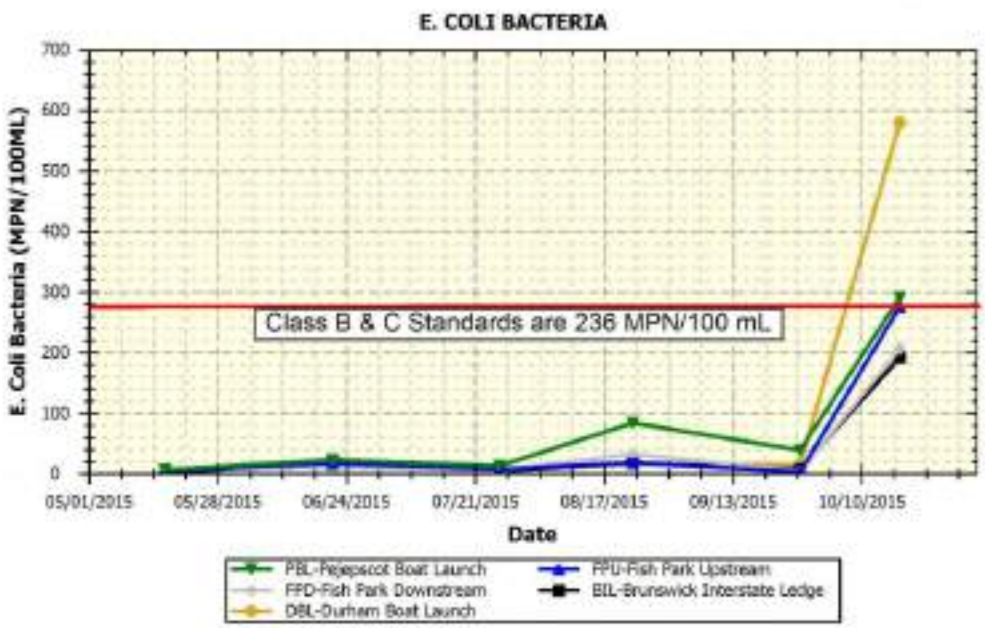


Figure 5-2-10: Graph of E. coli (MPN/ml)-upper sites



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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.

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[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

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.

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.

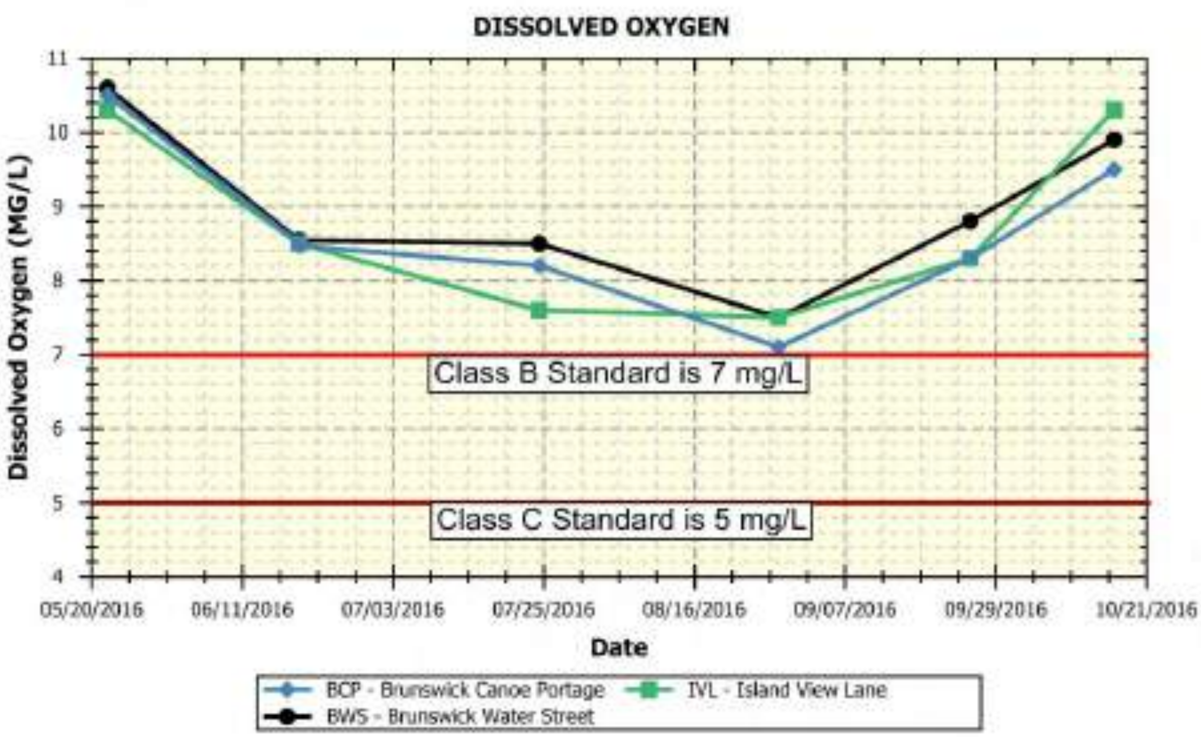

Figure 5-2-3: Graph of dissolved oxygen concentrations - Upper sites.

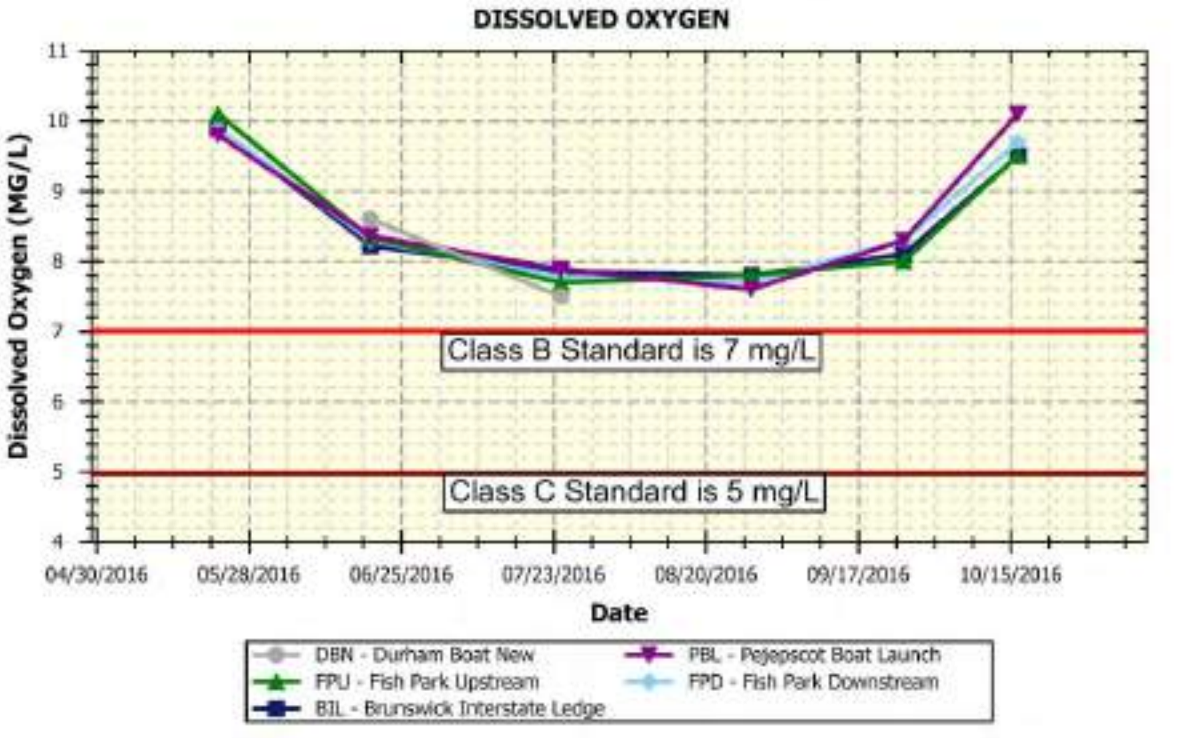

Figure 5-2-4: Graph of dissolved oxygen saturation - Lower sites.

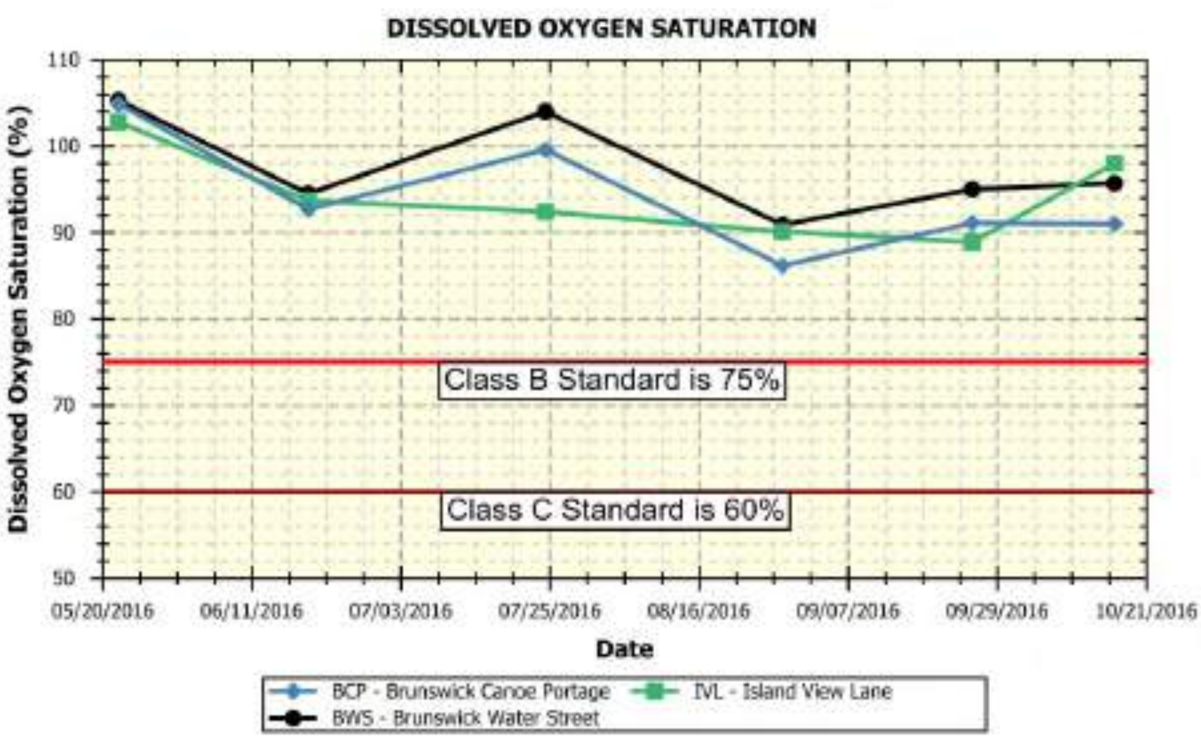

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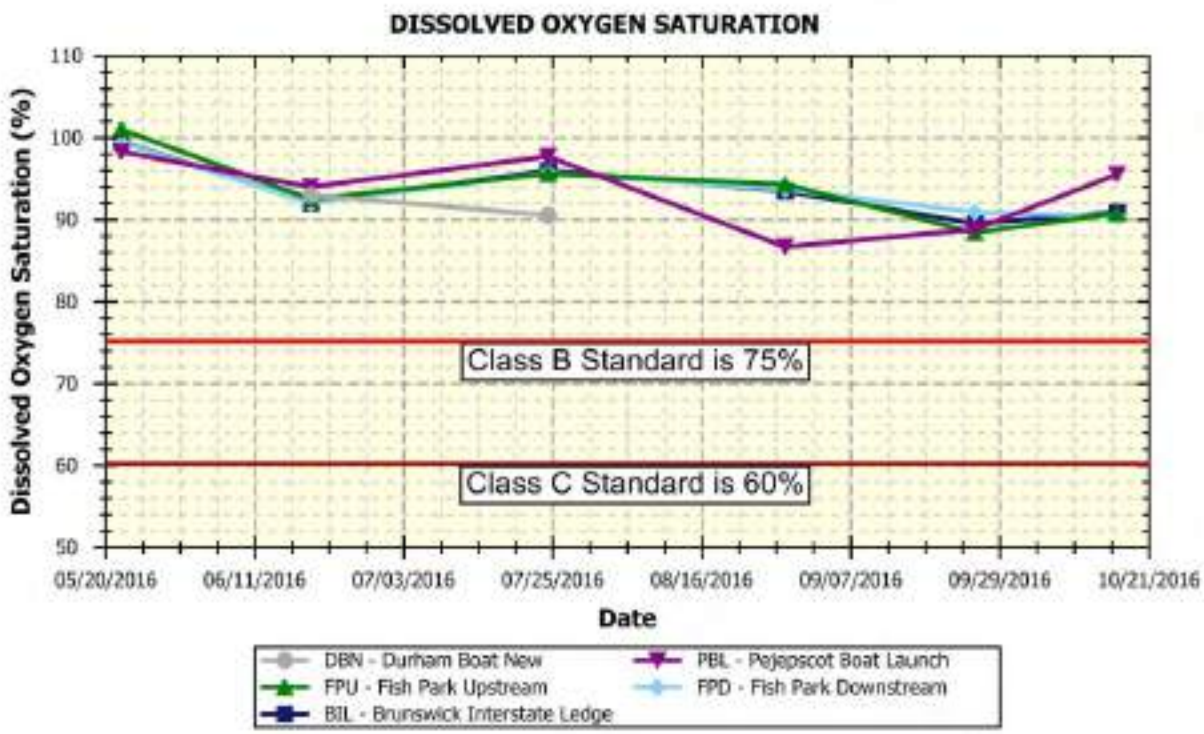
Figure 5-2-5: Graph of dissolved oxygen saturation - Upper sites.



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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.

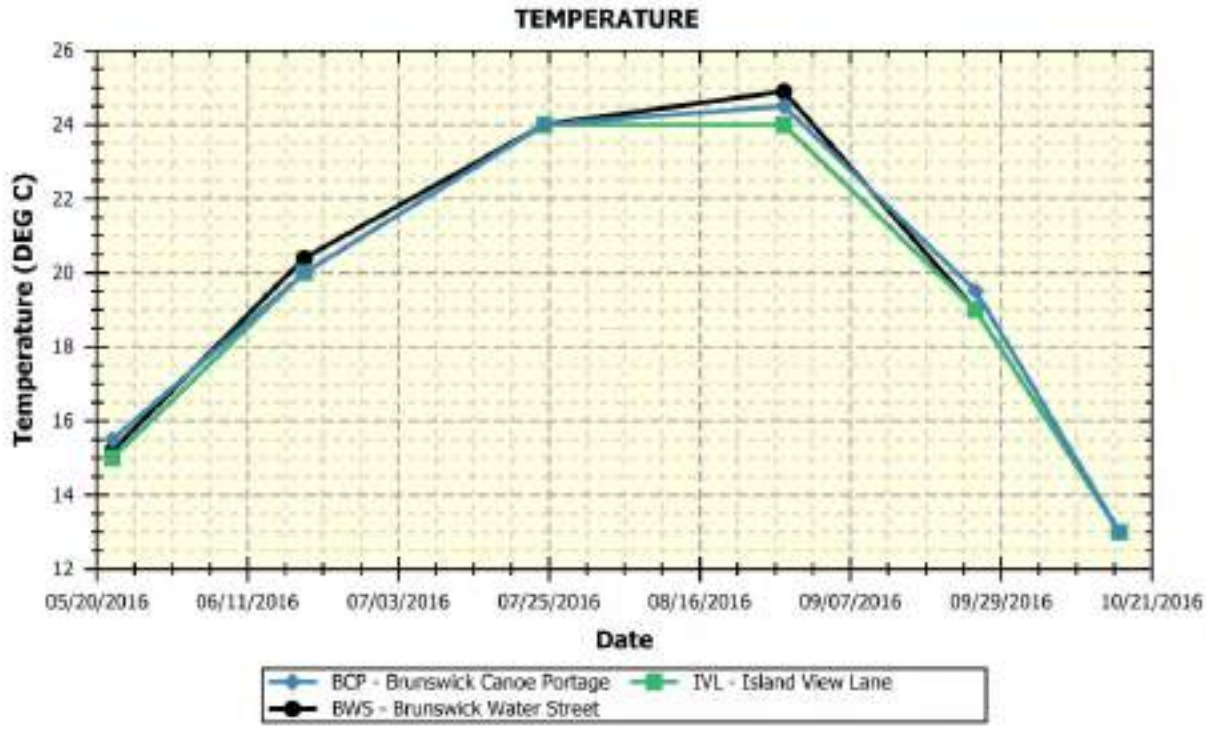
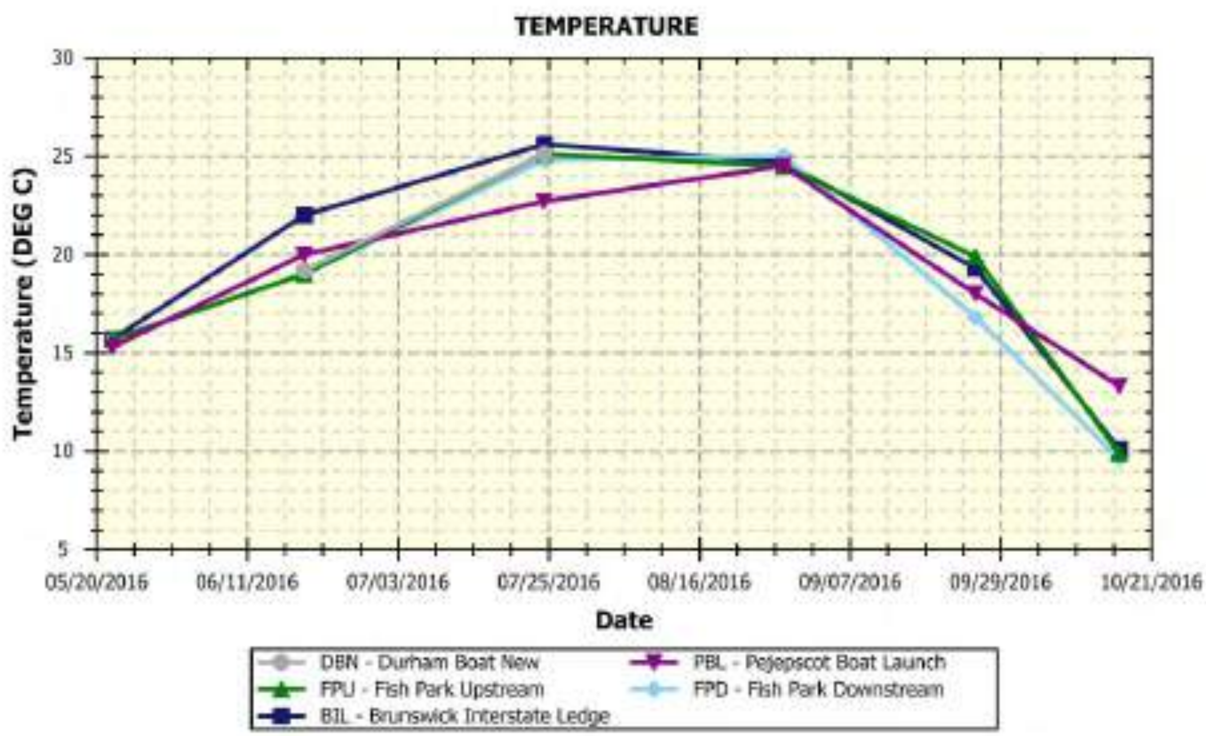


Figure 5-2-7: Graph of temperature - Upper sites.



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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.

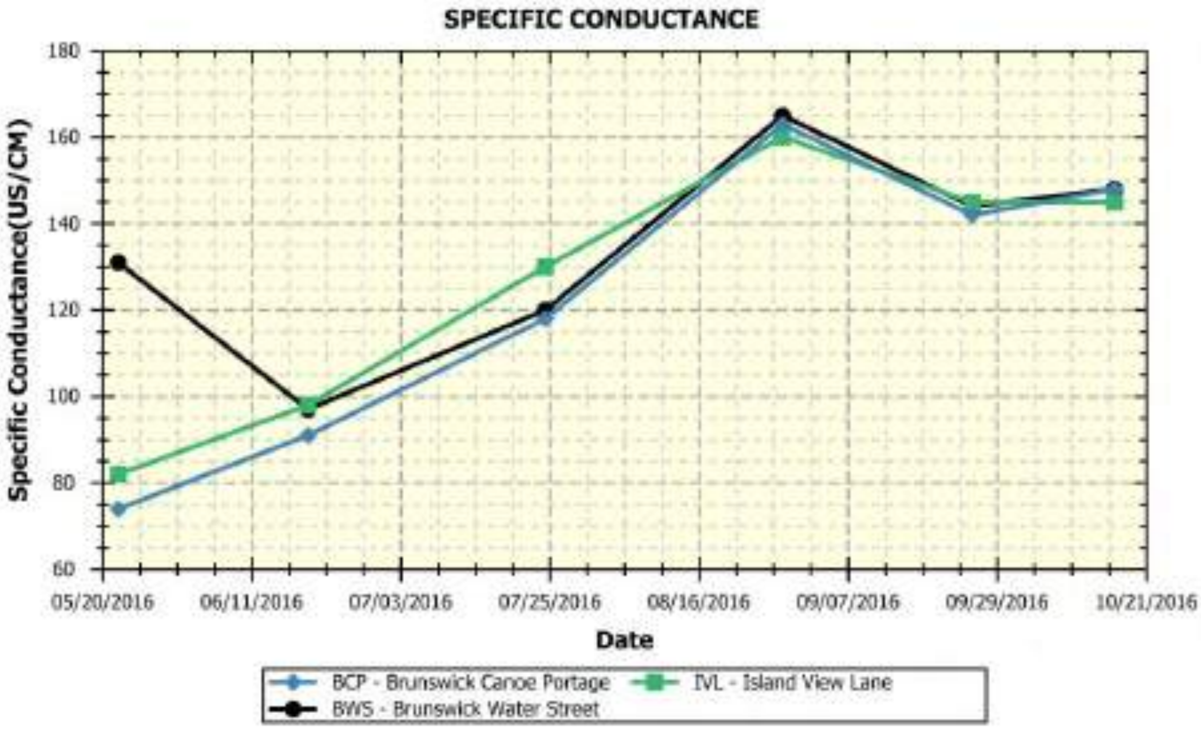
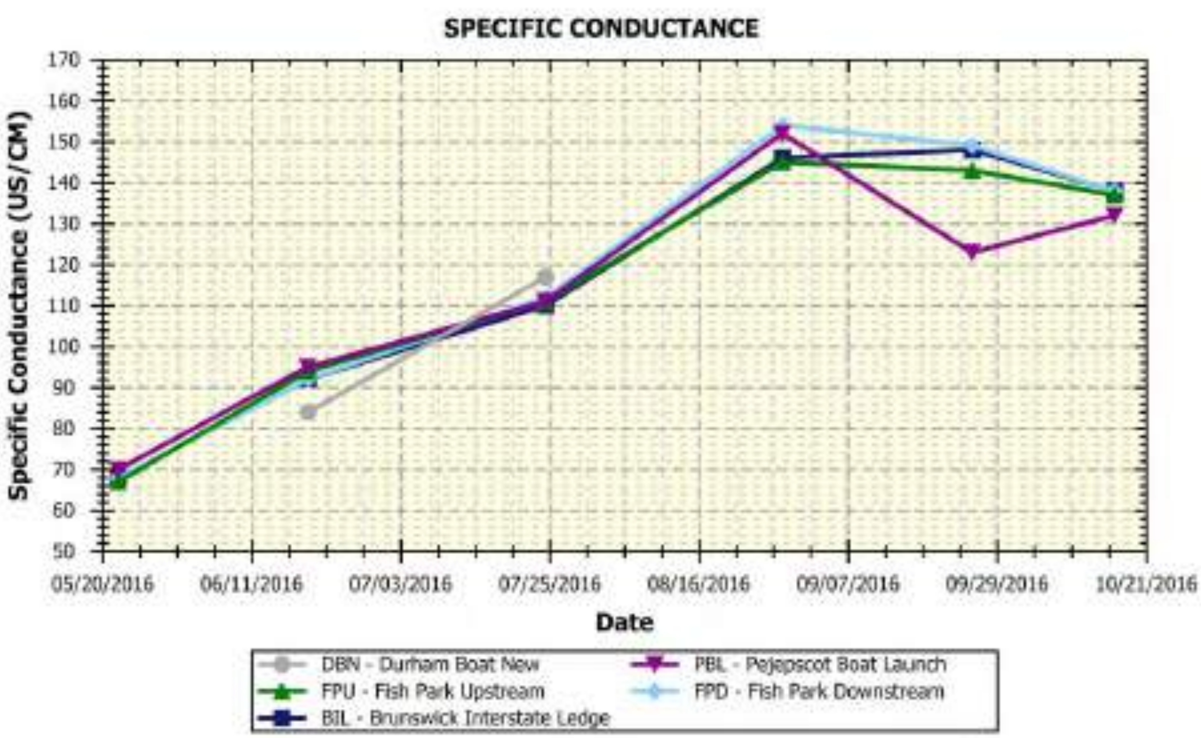


Figure 5-2-9: Graph of specific conductance - Upper sites.



APPELLANT SUPP EX. 2 P.149

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.

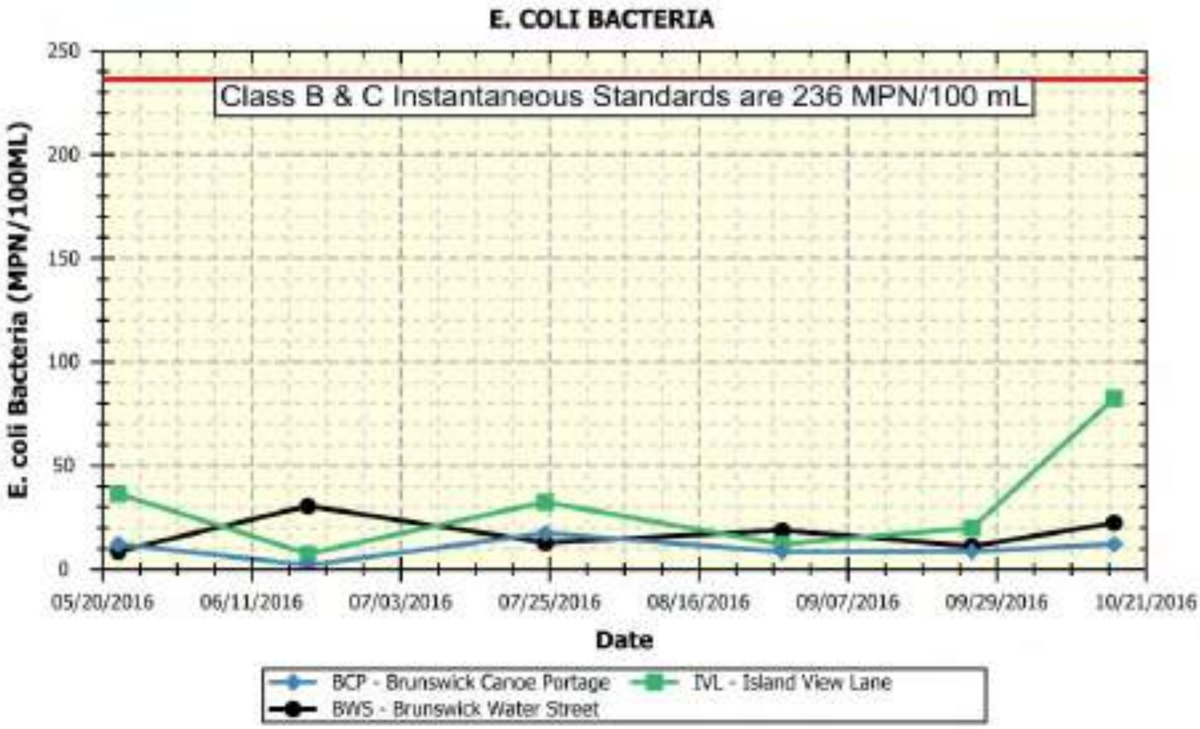
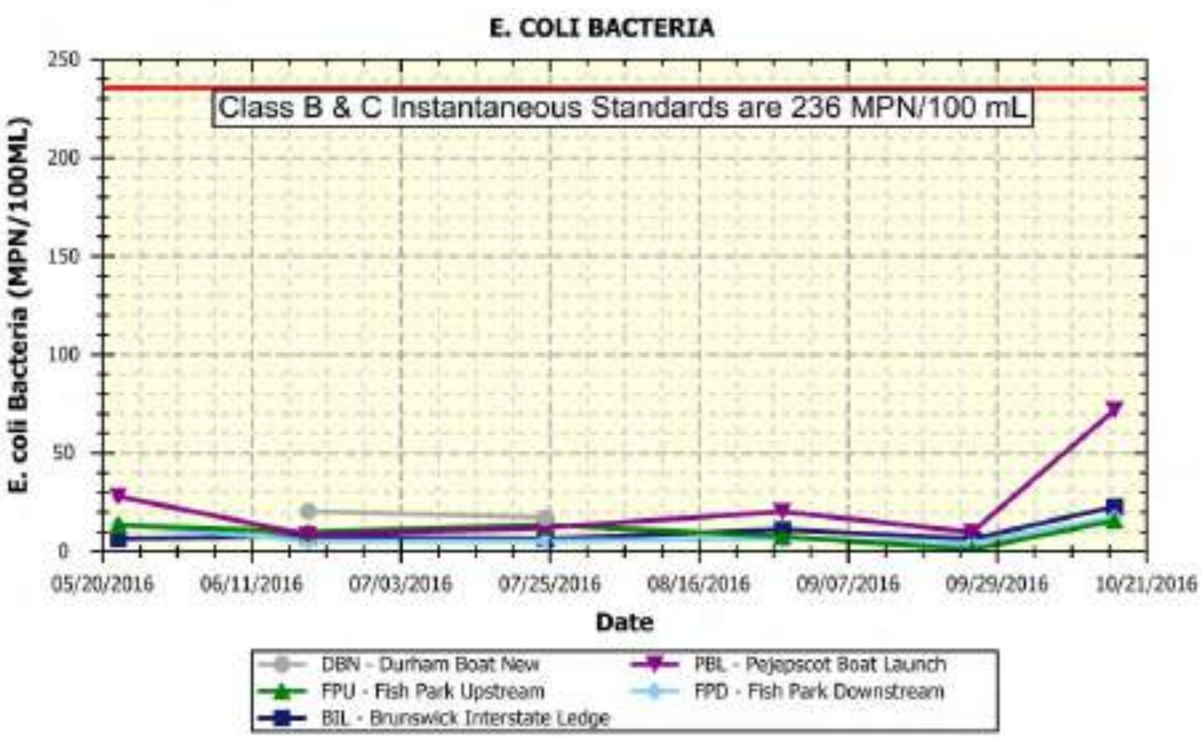


Figure 5-2-11: Graph of *E. coli* (MPN/100 ml) - Upper sites.



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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.

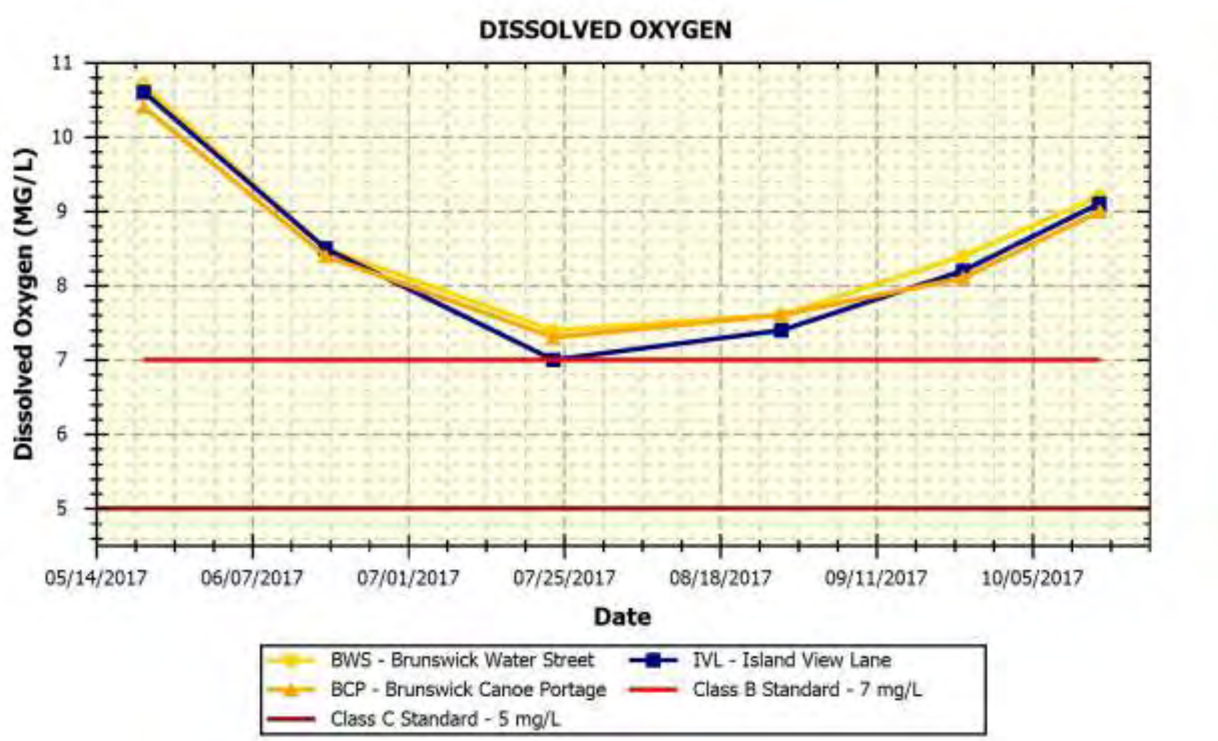

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Figure 5-2-3: Graph of dissolved oxygen concentrations - Upper sites.

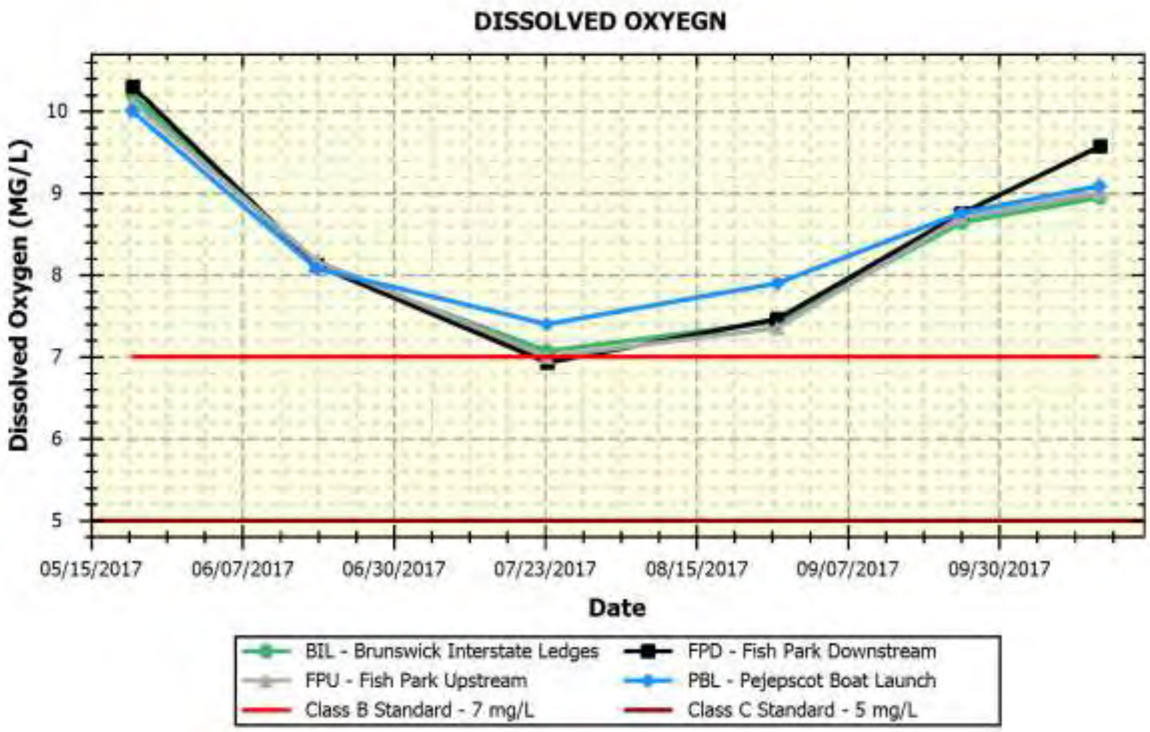


Figure 5-2-4: Graph of dissolved oxygen saturation - Lower sites.

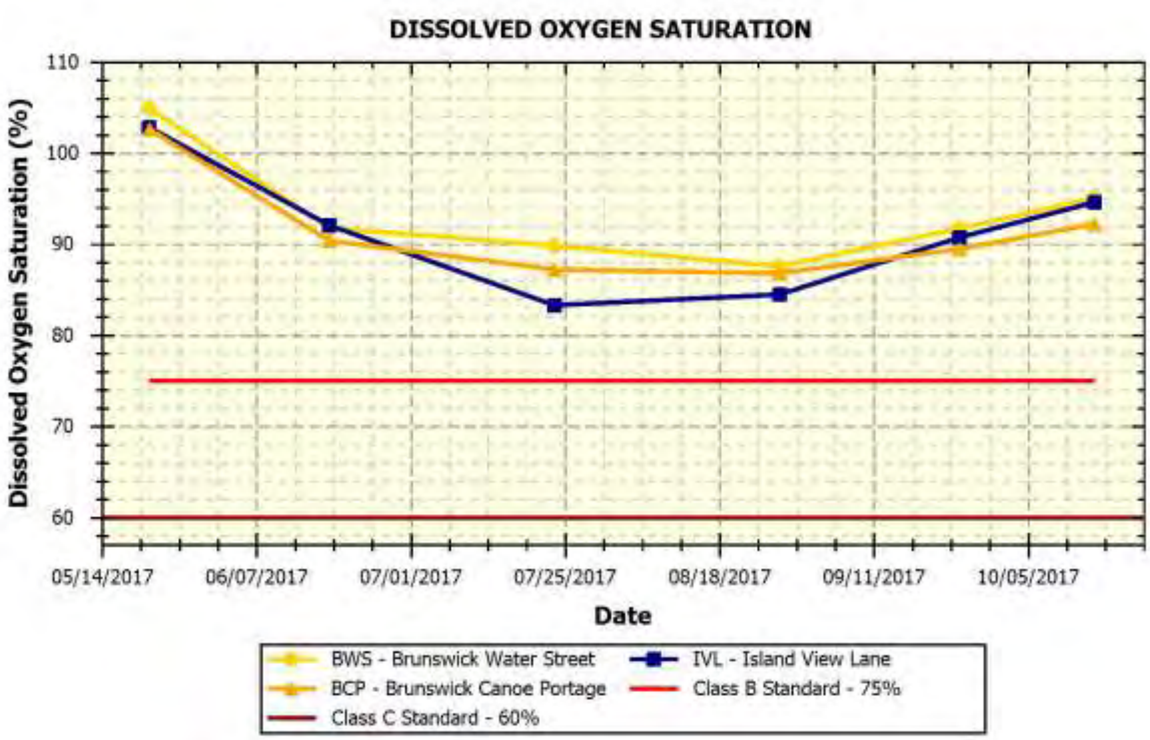
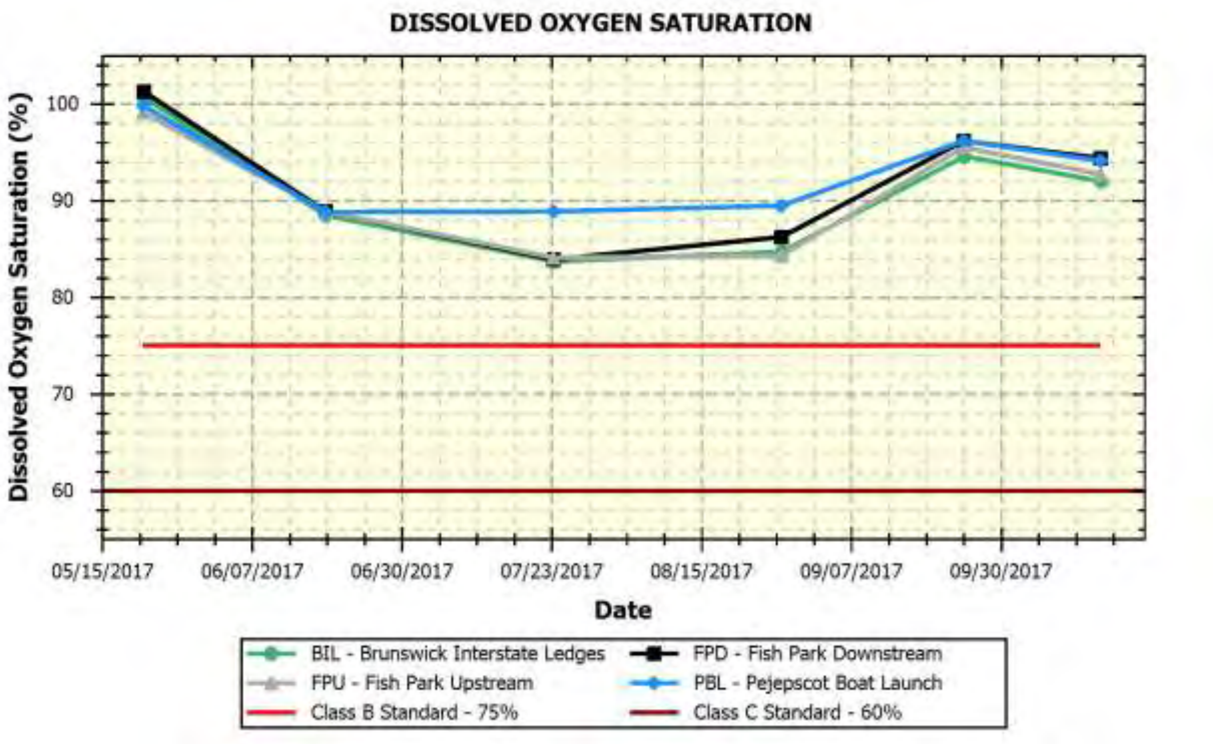


Figure 5-2-5: Graph of dissolved oxygen saturation - Upper sites.



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.

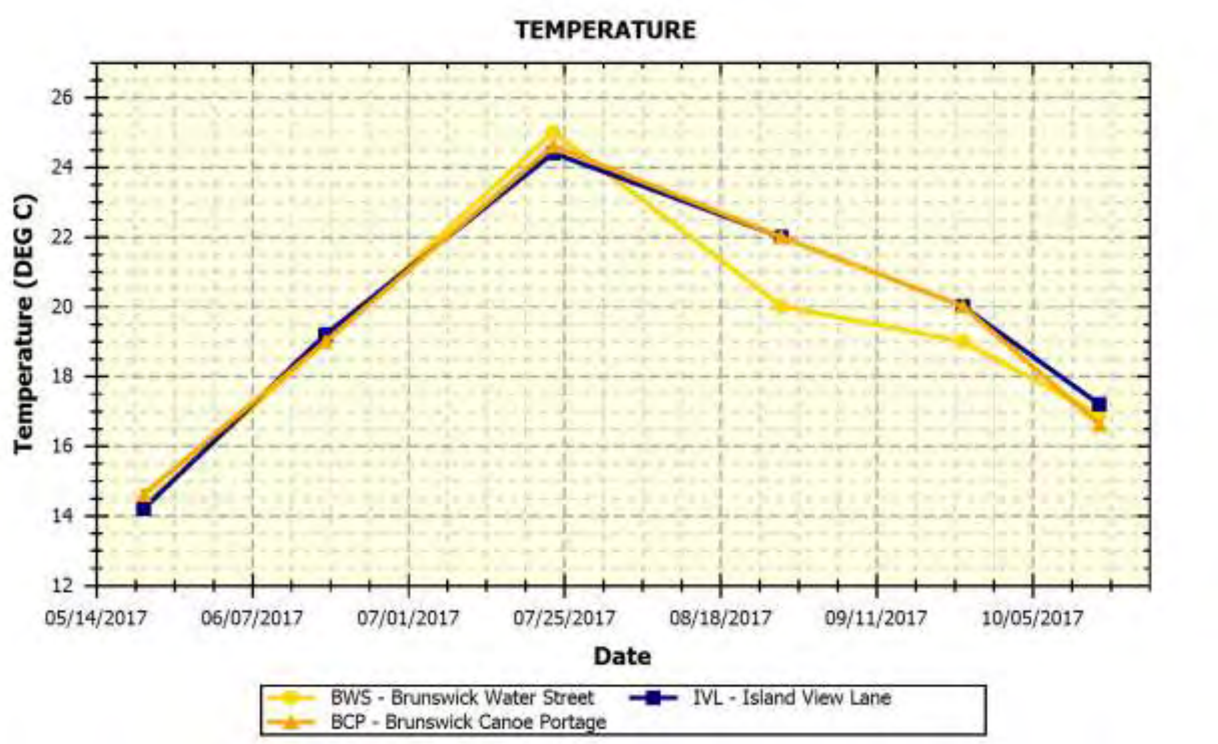
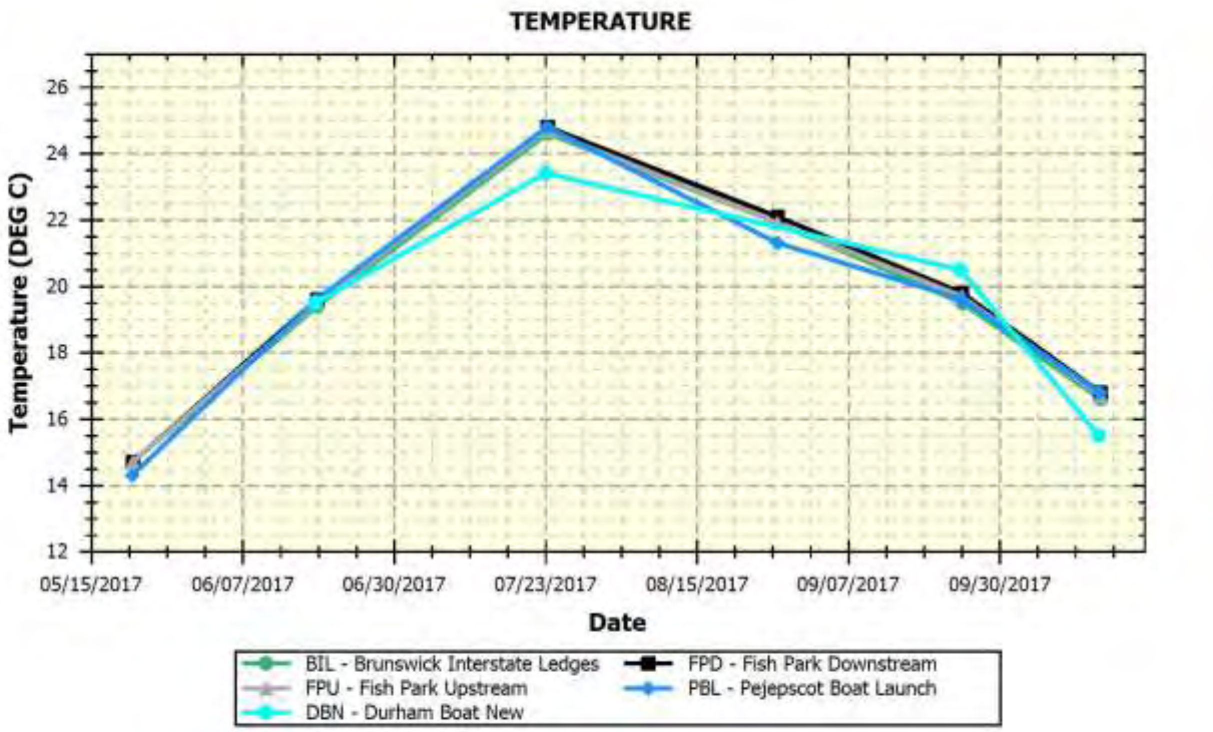


Figure 5-2-7: Graph of temperature - Upper sites.



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.

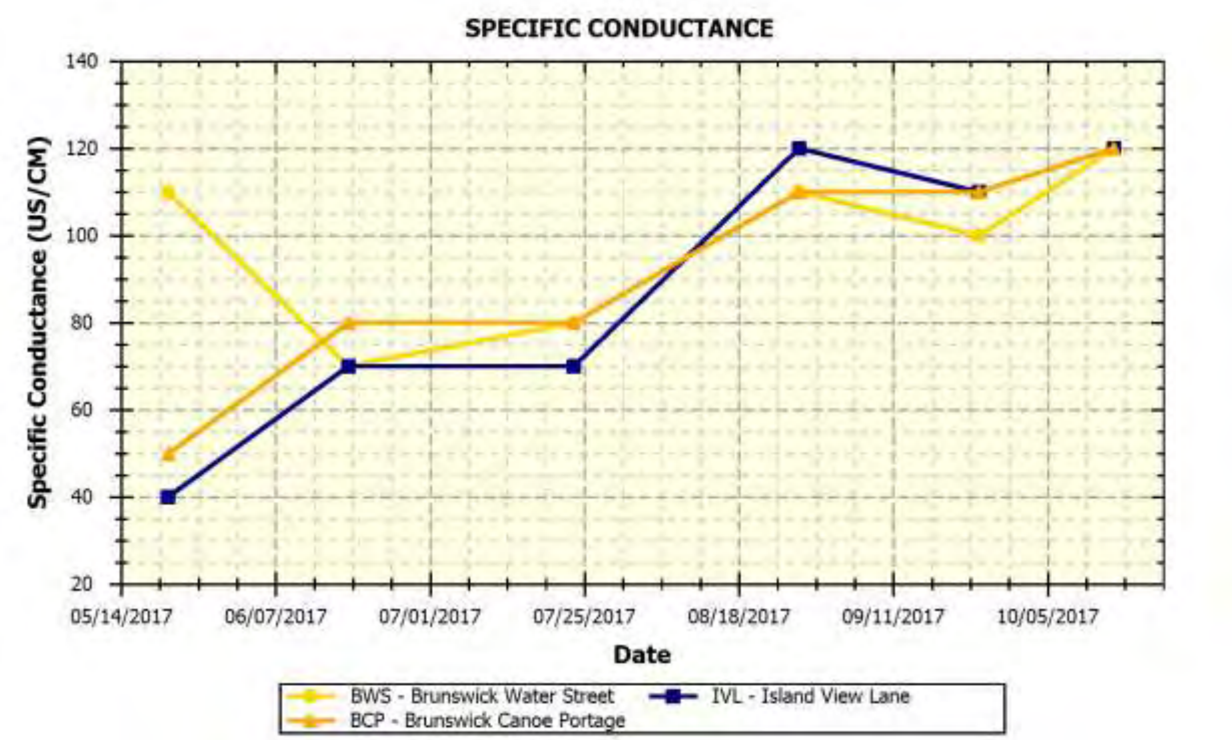


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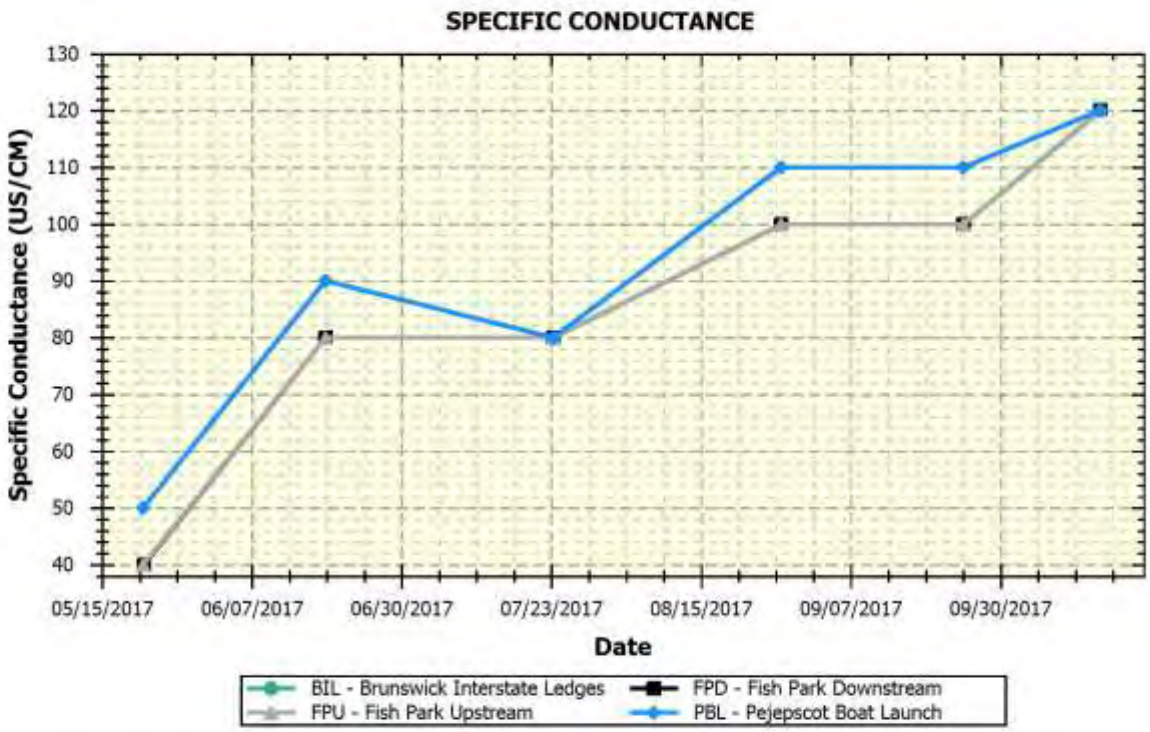
Figure 5-2-9: Graph of specific conductance - Upper sites.



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.

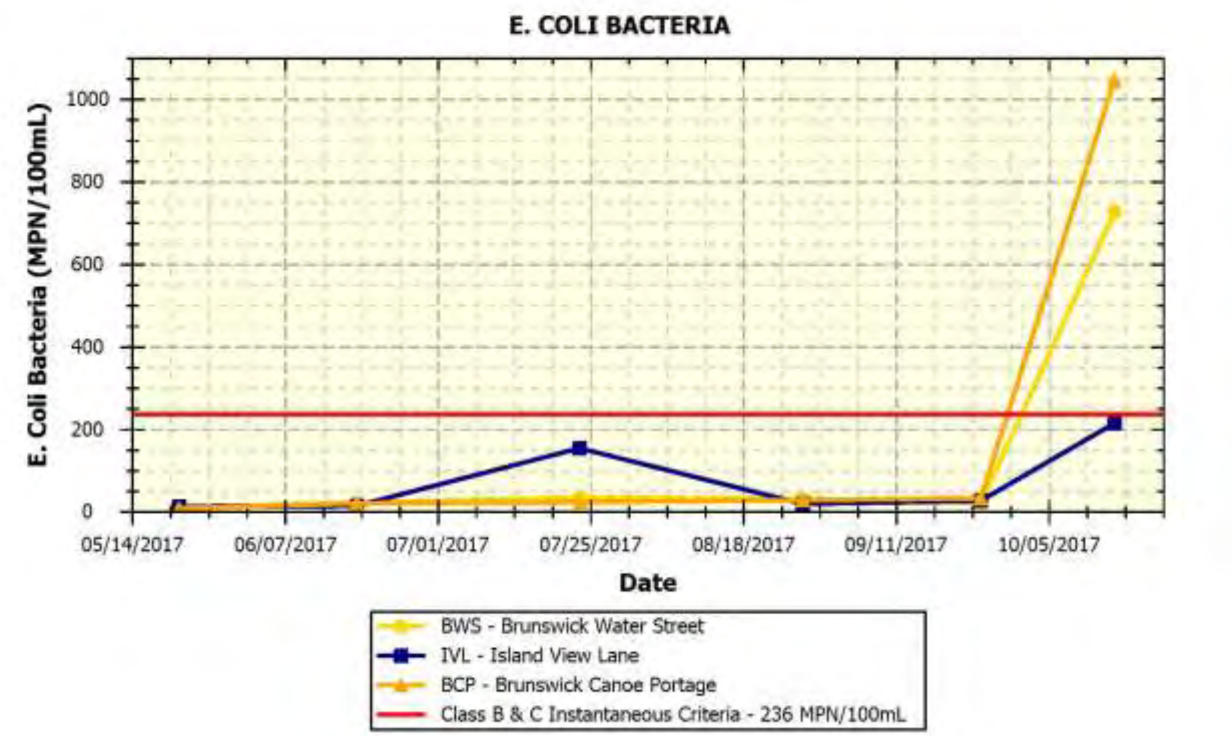


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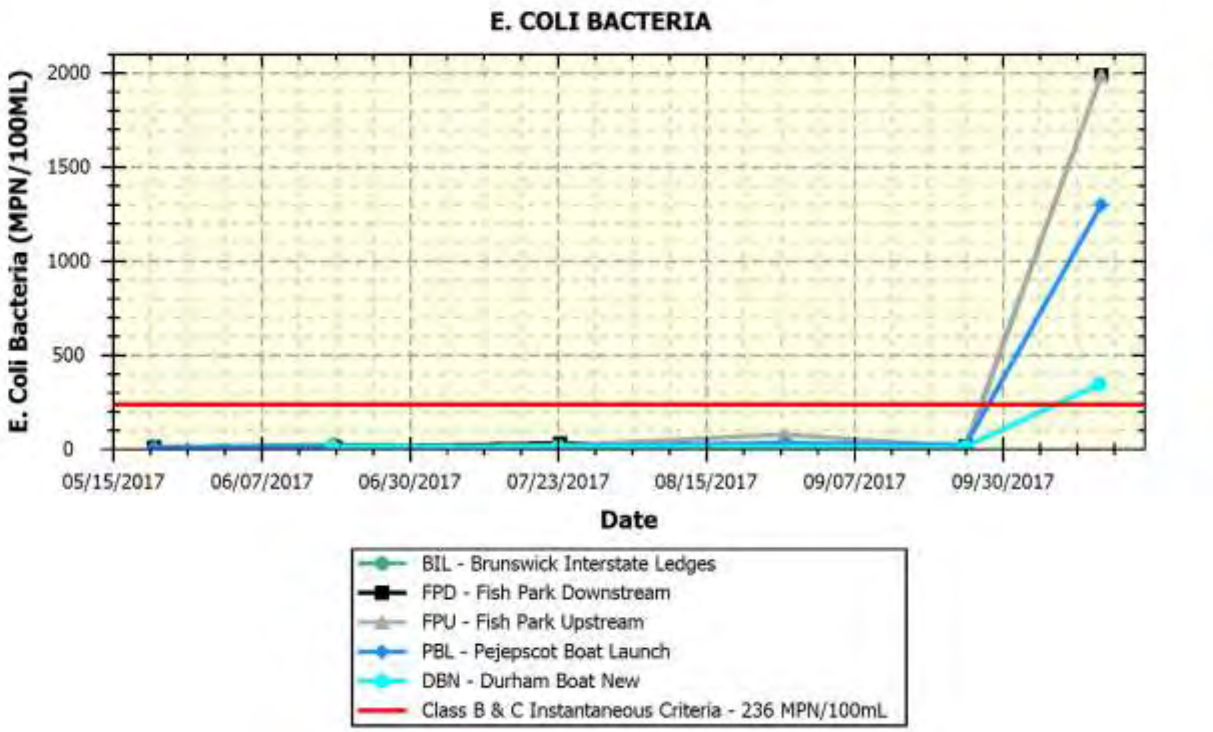
Figure 5-2-11: Graph of *E. coli* (MPN/100 ml) - Upper sites.



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].

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[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

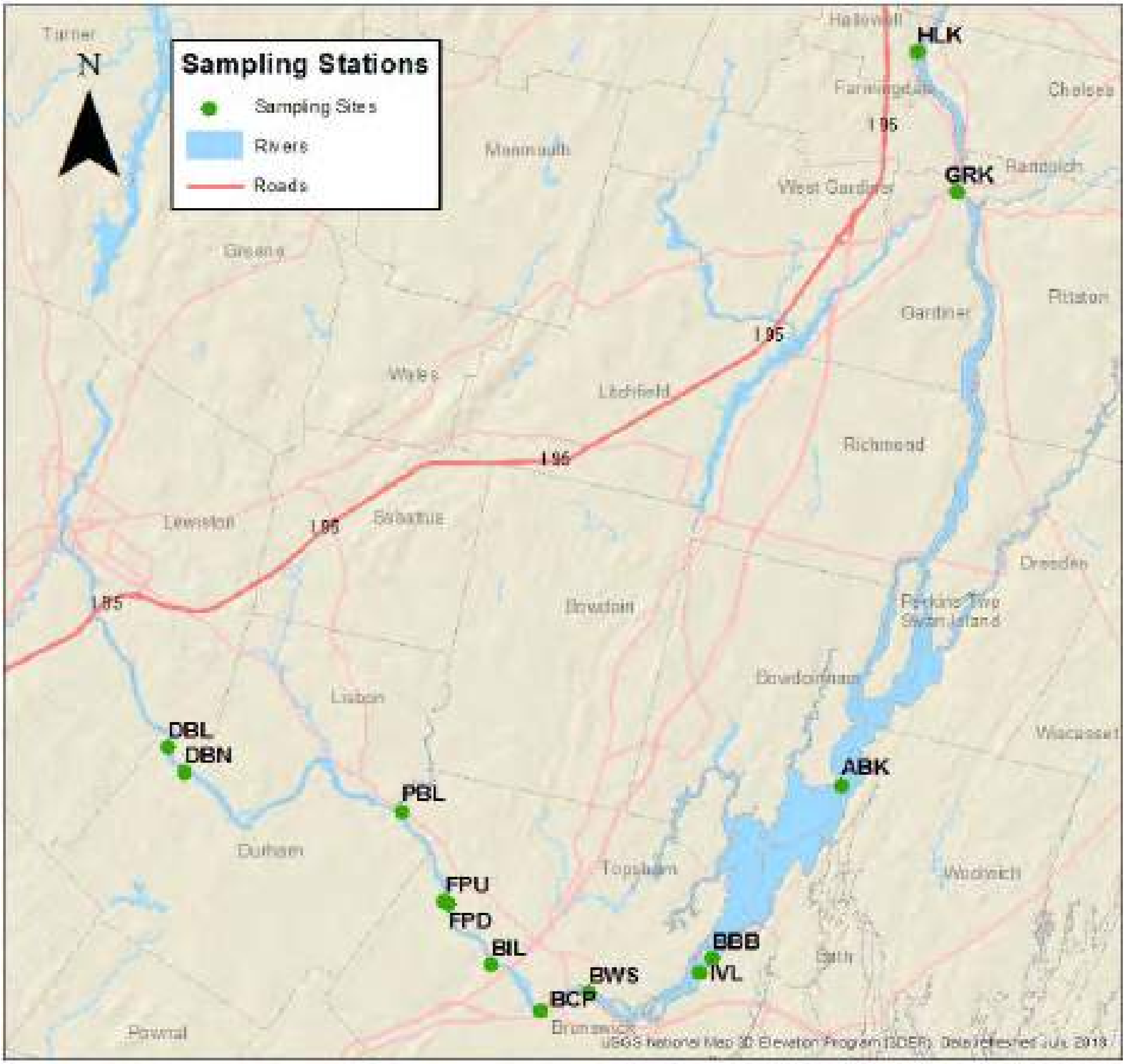

Figure 5-2-1: Map of all Friends of Merrymeeting Bay sampling sites on the Androscoggin River.

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.

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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

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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

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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

Site	Monitor	Date	Sample Time	Weather	Adversities	Sample Type
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

APPELLANT SUPP. EX. 3 P.1

So what’s new in 2021?

1. Continued dissolved oxygen & bacteria monitoring

2. Additional detailed legal analyses & opinions

3. Grow L+A co-sponsorship/new supporters

4. Significant Lewiston / Auburn CSO improvements since 2010

5. Comprehensive & current benthic invertebrate aquatic life sampling

Benthic sampling rock baskets and bags

FOMB has the most complete set of monitoring data for the reaches in this lower Androscoggin River upgrade proposal. We began our monitoring program in 1999 and continue to this day with at times over twenty sampling sites on the Androscoggin, Kennebec and around Merrymeeting Bay. After years working in conjunction with Friends of Casco Bay under their EPA Quality Assurance Plan, FOMB joined the DEP Volunteer River Monitoring Program (VRMP) in 2009 to further support and substantiate water classification upgrades.

Because lower Androscoggin surface waters meet Class B standards virtually all of the time, an upgrade is required under the CWA & Maine statute.

DME 1
Durham Boat Launch Old [DB]
Durham New [DN]
Durham Boat Ramp
FOMB 2
Durham Hand Carry
FOMB 3
Lisbon
Sabattus Boat Ramp
Lisbon Falls Old Gone [LF]
FOMB 4
Lisbon Falls New [LN]
Pejepscot Boat Ramp-PBL
FOMB 5
Bowdoin
BTLT Bradley Pond
Head Tide Park
DEP 955 & 954
Fish Park Down-FPD
Fish Park Up-FPU Hand Carry
Durham
Brunswick Interstate Ledge-BIL
FOMB 6
Topsham
CF
3.5

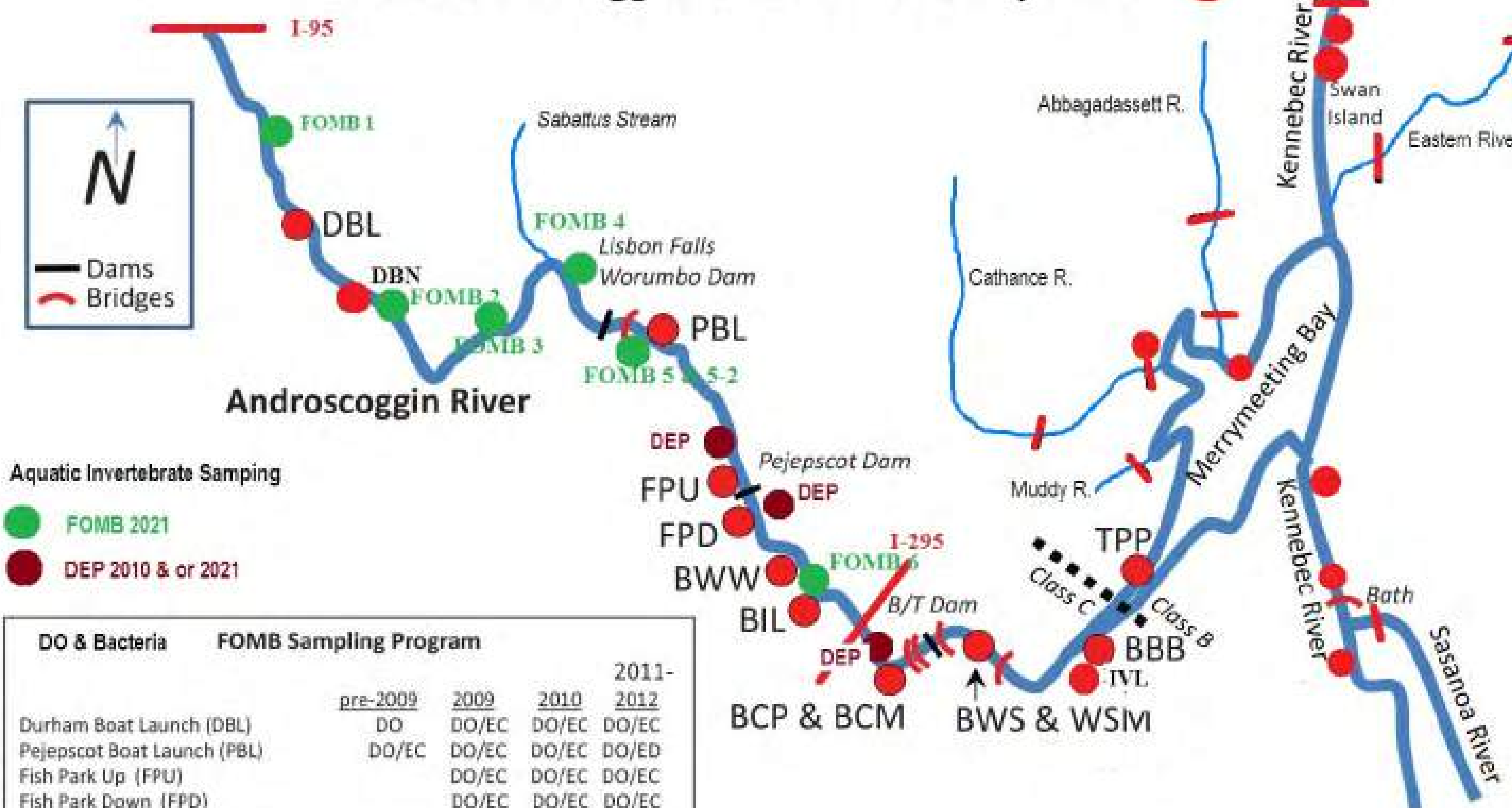
- **Androscoggin River Upgrade Proposal 2020**

Andro Upgrade Proposal Intro 5-1-21.pdf
Exhibit 01 Submission_Responses.pdf
Exhibit 02 Suggested_Amendment_Language
Exhibit 03 Andro_Upgrade_Fact_Sheet-Exec_Summary_3-31-20.pdf
Exhibit 04 Greenfire_Law_ Memo_re_Reclassification_3-31-20.pdf
Exhibit 05 2009-10-02_CLF_BEP_Comments_abridged.pdf
Exhibit 06 Andro_Comp_Plan_Excerpts.pdf
Exhibit 07 Androscoggin_Reclassification_Support_letters.pdf
Exhibit 08 Economic_Benefit_Articles.pdf
Exhibit 09 USFWS_Merrymeeting_Bay-Lower_Kennebec_Composite_HVH.pdf
Exhibit 10 MNAP_BWH_High Value_Plant_&_Habitats_Bowdoinham.pdf
Exhibit 11 MNAP_BWH_Kennebec_EstuaryFocus_Area_Intro.pdf
Exhibit 12 MNAP_BWH_Kennebec-Estuary-Focus-Area.pdf
Exhibit 13 MUSSELp_Mussel_of_the_Month.pdf
Exhibit 14 Maine_Shad_Habitat_Plan_V2.pdf
Exhibit 15 MDMR_Androscoggin_Fish_Restoration_Program.pdf
Exhibit 16 DMR_Historical_Sea_Run_Partial_Trap_Counts_2008-2019.pdf
Exhibit 17 Brookfield_Brunswick_2019_Fishway_Report.pdf
Exhibit 18 MMB_Cons_Lands_EF_3-1-20.pdf
Exhibit 19 USFWS_Merrymeeting_Bay_Regional_Conservation_Planning_Map_1-22-13.pdf
Exhibit 20 BTLT_Androscoggin_Properties.pdf
Exhibit 21 Androscoggin_River_Greenway_Trail.pdf
Exhibit 22 Androscoggin_Land_Trust_Preserves_along_or_in_Lower_Androscoggin.pdf
Exhibit 23 Defining_a_Nuisance.pdf"
Exhibit 24 Auburn_Lewiston_CSO_Charts_200-2018.pdf
Exhibit 25 LA_20_Year_CWA_Master_Plan_Update_2019.pdf
Exhibit 26 E_coli_geo_means_2006-2019-page-001.pdf
Exhibit 27 DO_Geomeans_2003-2019.pdf
Exhibit 28 FOMB_VRMP_Exhibits.pdf
Exhibit 29 FOCB_QAPP_revision 3_final.pdf
Exhibit 30 FOMB_Auburn_Boat_Launch_DO_data_2010-2011.pdf
Exhibit 31 DEP_lowerandromodelreport_final_march_2011.pdf
Exhibit 32 Androscoggin_2010_DEP_Bug_Summary-Annotated.pdf
Exhibit 33 2019-10-25_Kavanaugh_letter_to_Sen._Libby_Sen._Claxton_Lower_Androscoggin.pdf
Exhibit 34 VRMP_Sampling_Protocols_2015.pdf
Exhibit 35 Applied_Biomonitoring-FOMB_Andro_2009_Repor_ Complete_2-8-2010-1.pdf
Exhibit 36 Applied_Biomonitoring-FOMB_Andro_2010_Report_Complete_1-28-2011.pdf
Exhibit 37 Applied_Biomonitoring-FOMB_Andro_2011-2012_Report_Complete_3-29-2013.pdf
Exhibit 38 FOMB_WQ Data_1999-2019.xls
Exhibit 39 Pejepscot April 2020 Summary and Report.pdf
Exhibit 40 Andro Dischargers Actual vs. Licensed 2012-2013.pdf

38 M.R.S.A. § 464 (F) (4)

"When the ***actual quality*** *of any classified water exceeds the minimum standards of the next highest classification,* ***that higher water quality must be maintained and protected****. The board* ***shall recommend*** *to the Legislature that water be reclassified in the next higher classification."*

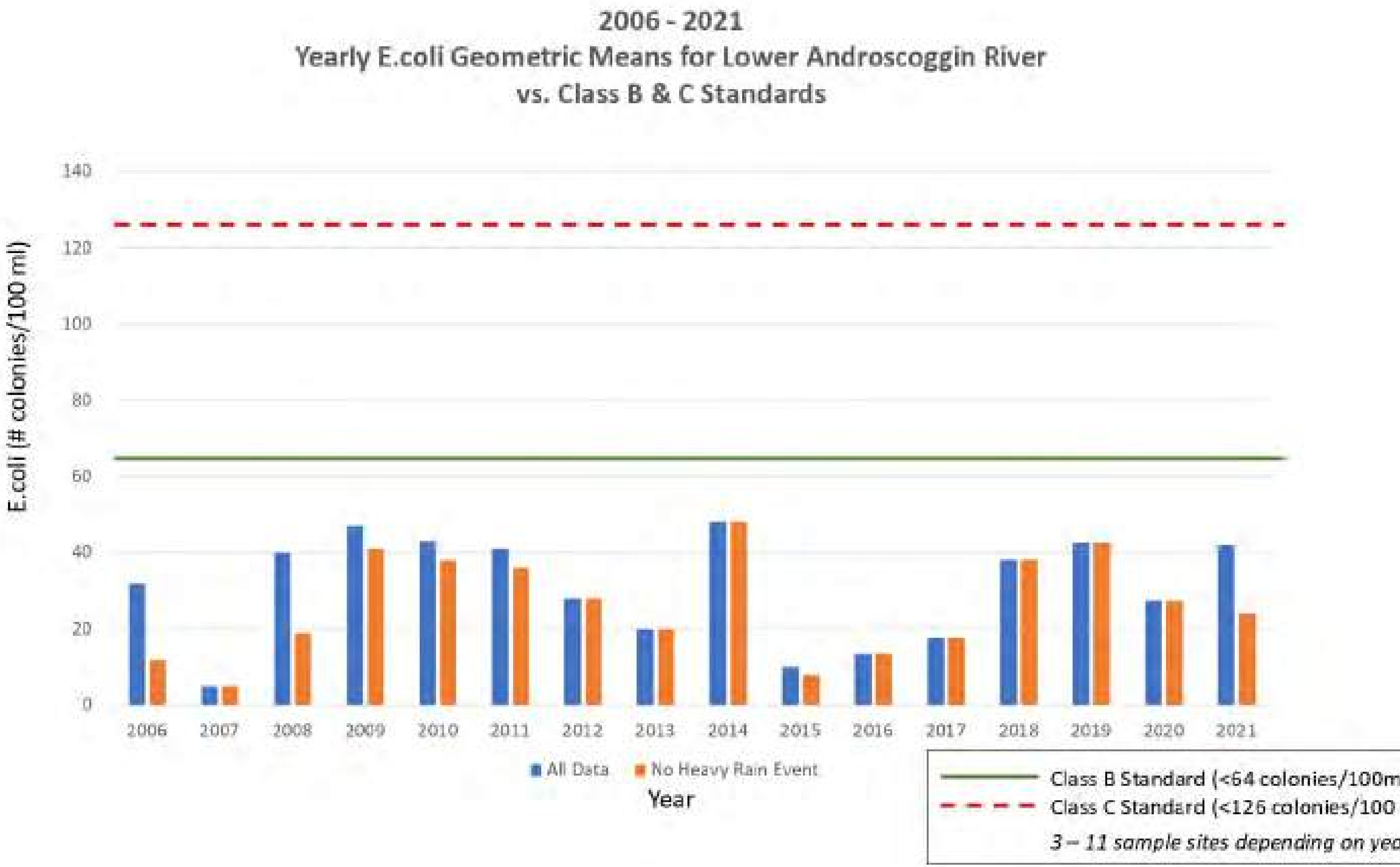
Lower Androscoggin River – FOMB Sample Sites

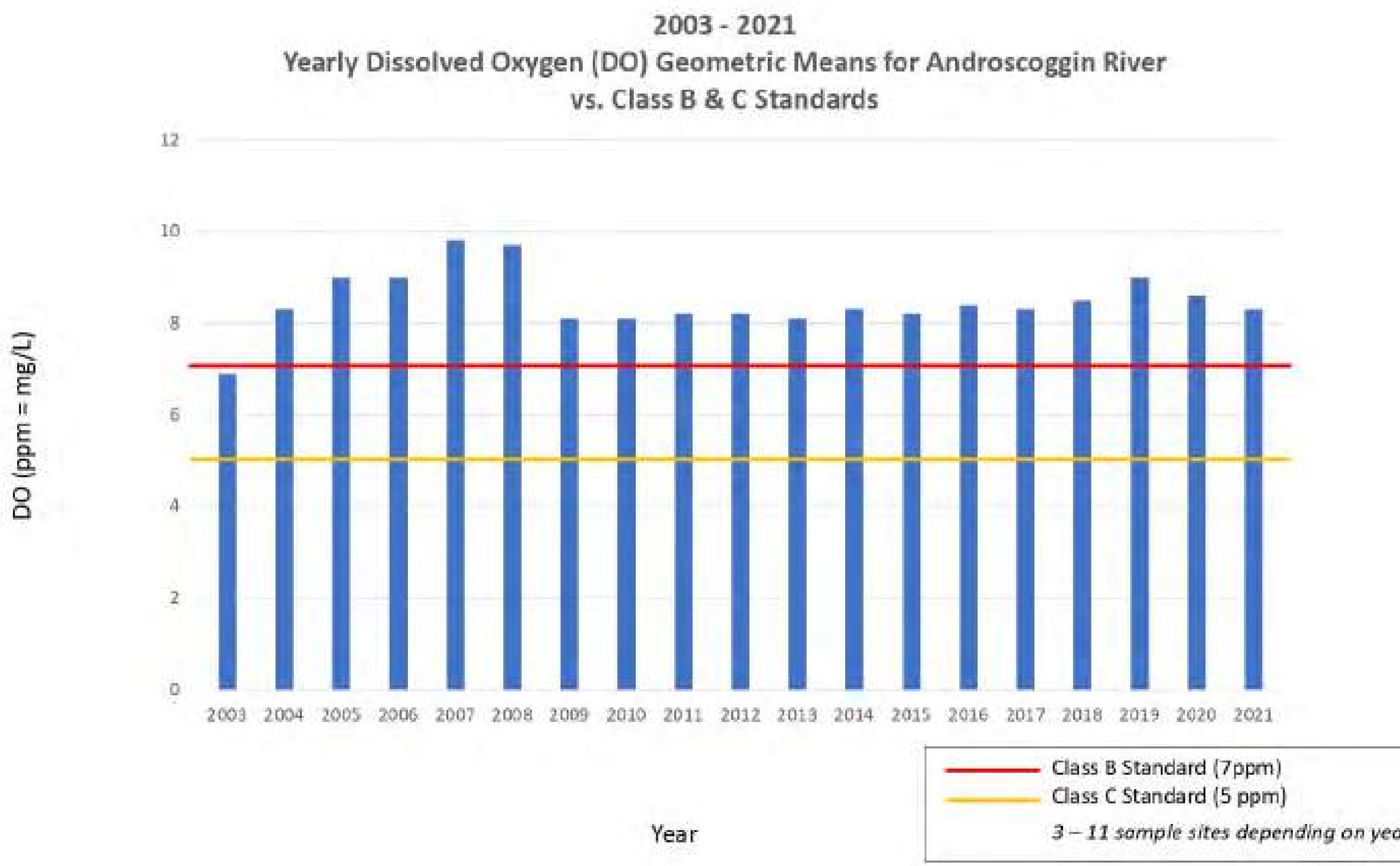


DO & Bacteria **FOMB Sampling Program**

	pre-2009	2009	2010	2011-2012
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Portage (BCP)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Mooring (BCM)		DO/EC	DO/EC	na
Brunswick Water St. Boat Launch (BWS)	EC	DO/EC	DO/EC	DO/EC
Water Street Mooring (WSM)		DO/EC	DO/EC	na
Brunswick Bay Bridge (BBB)	EC	DO/EC	DO/EC	DO/EC
Topsham Pleasant Pt. (TPP)	DO	DO	DO	DO

Upstream Monitoring	pre-2009	2009	2010-2012
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO


2006 - 2021
Yearly E.coli Geometric Means for Lower Androscoggin River
vs. Class B & C Standards
140
120
100
80
60
40
20
0
E.coli (# colonies/100 ml)
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
All Data
No Heavy Rain Event
Year
Class B Standard (<64 colonies/100m
Class C Standard (<126 colonies/100
3 – 11 sample sites depending on yea


2003 - 2021
Yearly Dissolved Oxygen (DO) Geometric Means for Androscoggin River
vs. Class B & C Standards
DO (ppm = mg/L)
12
10
8
6
4
2
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
Class B Standard (7ppm)
Class C Standard (5 ppm)
3 – 11 sample sites depending on yea

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 6**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

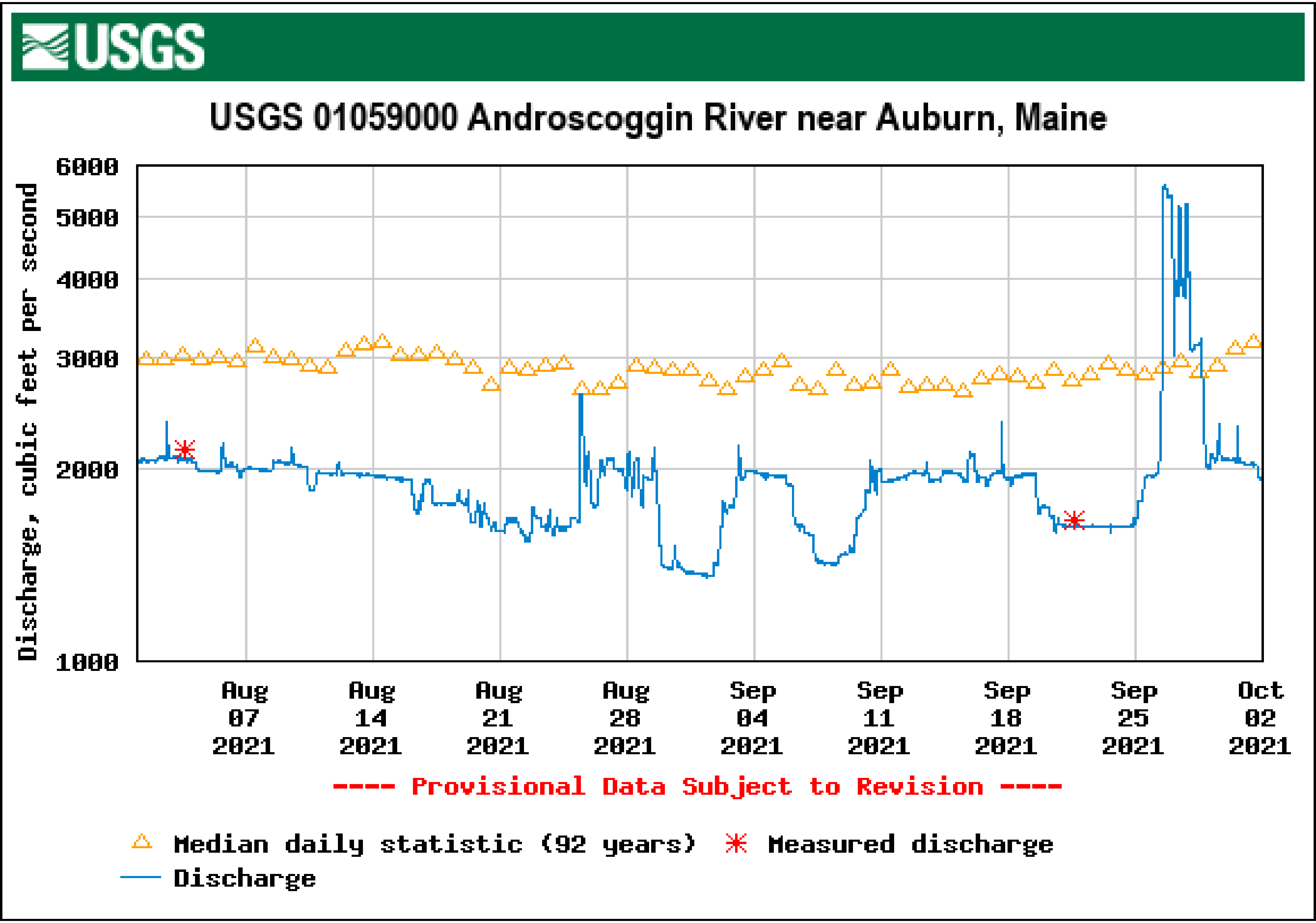
Qualitative Macrobenthos Sample List

Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**C**	**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)		**Perlidae (stoneflies)**	**C**	**Other**	

Est. Total Abundance	**100**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, good richness, good #s of stoneflies and brachycentrid caddisflies drives model up.

2021 Androscoggin Flows during FOMB Aquatic Invertebrate Sampling 8/4-9/4 & 9/4-9/29/2021



Auburn & Lewiston CSO Charts 200-2018

Section 3 CSO Improvements - Nineteen Years of Progress (2000 2018) Tighe&Bond

FIGURE 3-6
Auburn Sewer District 2000-2018 Precipitation vs. CSO Discharge

Section 3 CSO Improvements - Nineteen Years of Progress (2000-2018) Tighe&Bond

FIGURE 3-13
City of Lewiston 2000-2018 Precipitation vs. CSO Discharge

Androscoggin Dischargers: Actual Discharges vs Licensed Limitations 1/2012-2/2013 - Source: DEP					
Brunswick POTW					
	Monthly Avg. Actual/License	Daily Max. Actual/Lic.	Monthly Avg. Concentration, A/L mg/l	Daily Max. Concentration, A/L	Monthly Avg A/L
	% of Limit %Lic. Buffer		mg/litre		
Flow (MGD)	2/3.85 52% 48%	2.9 actual	No Data (ND)	ND	
BOD (lbs/day)	295/963 31% 69%	364/1605 23% 77%	13/30 43% 57%	18/50 36%	
TSS (lbs/day)	309/963 32% 68%	485/1605 30% 70%	17/30 57% 43%	23/50 46%	
E. coli (/100ml)					
Lisbon POTW					
Flow (MGD)	.62/2.03 30% 70%	ND	ND	ND	
BOD (lbs/day)	26/507 5% 95%	53/845 6% 94%	5/30 17% 83%	10/50 20% 80%	
TSS (lbs/day)	20/507 4% 96%	41/845 5% 95%	4/30 13% 87%	8/50 16% 84%	6/126 5% 95%
E. coli (/100ml)	ND	ND	ND	ND	
LAWPCA POTW					
Flow (MGD)	11 actual	21 actual	ND	ND	
BOD (lbs/day)	1307/3553 37% 63%	4579actual	14/30 47% 53%	41/50 82% 18%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	19/126 15% 85%
Livermore Falls					
Flow (MGD)	.53/2.0 27% 73%	1 actual	ND	ND	
BOD (lbs/day)	40/500 8% 92%	82/834 10% 90%	10/30 33% 67%	15/50 30% 70%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	15/126 12% 88%
Verso Pipe #001A			% of Limit %Lic. Buffer	% of Limit %Lic. Buffer	
Flow (MGD)	36 actual	41/51	ND	ND	
BOD (lbs/day)	2429/4400summer*,7400winter**	3633/8000S^, 13,875W^^	ND *55% 45%, **33% 66%	ND ^45% 55%, ^^26% 74%	
TSS (lbs/day)	6796/12,000S*, 25,000W**	8521/22,300S^, 44,600W^^	ND *57% 43%, **27% 73%	ND ^38% 62%, ^^19% 81%	
Tot. Phos. (lbs/day)	84/130 64% 36%	113 actual	.27 actual	.35 actual	
Ortho Phos. (lbs/day)	15/28 54% 46%	29.3 actual	ND	ND	
Ads. Org. Halo (AOX)	739/1495 49% 51%	801/2282 35% 65%	ND	ND	

Lower Androscoggin Classification Upgrade Supporters

Municipal Letters In Support of Upgrading the Lower Androscoggin (2008, 2010, 2013, 2017 & or 2020)

Town & Cities: Brunswick, Topsham, Durham, Lewiston, Auburn

Sewer Districts: Auburn Sewerage District (neither for nor against but supporting a cleaner river), Brunswick

Organizations Writing or Speaking in Support of Upgrading the Lower Androscoggin (present & past).

Alewife Harvesters of Maine, Androscoggin River Alliance, Androscoggin Land Trust, Atlantic Salmon Federation, Brunswick Topsham Land Trust, Conservation Law Foundation, Downeast Salmon Federation, Friends of Casco Bay, Friends of Merrymeeting Bay, Friends of Sebago Lake, Grow L+A, Lewiston-Auburn Metropolitan Chamber of Commerce, Maine Audubon, Maine Medical Association, Maine Municipal Association, Maine Rivers, Native Fish Coalition, Natural Resources Council of Maine, Trout Unlimited-Maine Council

<u>Why Upgrade?</u>

1. The Legislature declares it is the State's objective to restore and maintain the chemical, physical and biological integrity of the State's waters… (§464.1.)

2. Anti-degradation language prohibits backsliding in water quality. (§464 (F)(4))

3. An upgrade locks in water quality improvements.

4. A cleaner river has well-documented economic and quality of life benefits.

5. Sixty percent of our wildlife species inhabit river corridors and benefit as do we.

6. <u>It is the law!</u>

Friends of Merrymeeting Bay

P.O. Box 233, Richmond, ME 04357 www.fomb.org

Date: October 25, 2021

To: Maine Board of Environmental Protection, Mark Draper, Chair
C/o Susanne Meidel, Water Quality Standards Coordinator
Maine Department of Environmental Protection
SHS 17
Augusta, ME 04333
207-441-3612
Susanne.K.Meidel@maine.gov

From: **FOMB,** Ed Friedman, edfomb@comcast.net 666-3372

E-Filed

Subject: Lower Androscoggin Re-Classification Proposal

River/Sections: Androscoggin from Worumbo Dam to Merrymeeting Bay
Proposed Upgrade: C to B
Basis for Proposal: Actual conditions meet Class B
Documentation: Supporting data from FOMB monitoring program approved by Maine DEP and USEPA, Supplementary aquatic life sample data, MDEP sonde data, Lewiston/Auburn POTW/CSO data, USGS flow data
Data Collection Periods: DO-1999 to present; Coliform Bacteria-2006 to present
Sampling Intervals: Monthly or more: April-October
What's New: Expanded coalition plus additional VRMP data through 2021, DEP low flow sonde data, Lewiston/Auburn CSO data and wastewater report, extensive supporting exhibits, comprehensive aquatic life sampling and two new and comprehensive legal analyses.

Chair Draper, members of the Board & Ms. Meidel:

Multiple Segments for Consideration, but One Definitely Makes the Grade

Please consider these comments supporting our upgrade for the lower Androscoggin River segments between Merrymeeting Bay at the line from Pleasant Point in Topsham to North Bath extending upriver to Worumbo Dam in Lisbon Falls. As our data show, while classified as C, this section has long been actually meeting, Class B standards approximately 98% of the time. We therefore propose it be upgraded from C to B. We focus on this stretch of river because it is here we have the most complete data monitoring of dissolved oxygen (DO), bacteria and now benthic invertebrate sampling.

Excellent data exist for the Friends of Merrymeeting Bay (FOMB) Durham monitoring stations as well but collecting of regular DO samples halted there in 2018 when switching from use of Winkler Titration to only DEP meters at more select sites. Bacteria samples are still collected in Durham. In 2019 DEP deployed two sondes in this reach during low flows. One was in the Durham Boat Launch area and the other below Great Falls. DO levels remained above the Class B threshold of 7mg/l at both sites (Ex. 03 page 7).

An upgrade from Gulf Island Pond to the Bay, while desirable, may be less justified at this time due to a paucity of data. FOMB also has limited DO data from Auburn Boat Launch collected in 2010 and 2011 (Ex. 30) with geometric means of 8.8 and 10.1 respectively. Since there are some to extensive data supporting upgrades for the three river segments between Worumbo and Gulf Island Pond, we request the Board consider recommending all these segments for reclassification to B, we are adamant about Worumbo to the Bay.

FOMB has the most complete set of monitoring data for the lower reaches in this proposal. We began our monitoring program in 1999 and continue to this day with at times over twenty sampling sites on the Androscoggin, Kennebec and around Merrymeeting Bay. FOMB joined the VRMP in 2009 to further support and substantiate water classification upgrades.

Ambient Surface Waters Meet Class B Standards Virtually All of the Time & an Upgrade is Required Under the CWA & Maine Statute

Because the actual water quality of the lower Androscoggin sections described here exceeds that of their current classification, our request for a reclassification from C to B is supported by the State antidegradation policy as cited below (emphasis added):

38 M.R.S.A. § 464 (F) (4)

> *"When the **actual quality** of any classified water exceeds the minimum standards of the next highest classification, that higher water quality must be maintained and protected. **The board shall recommend** to the Legislature that water be reclassified in the next higher classification."*

In the past, MDEP has sometimes said they cannot upgrade a river classification because under worse case (permitted) 7Q10 scenarios, proposed Class B (in this case) standards might be violated. At the same time, the Department has also said because receiving waters meet the *current* classification levels, Maine cannot upgrade classifications to meet actual conditions.

This condition, while often supported by industry, quite clearly violates Maine statute and the intents both of the Clean Water Act and NPDES creating an artificial ceiling on water quality improvement. In fact, reclassification and permitting **must** be used together to improve water quality. But, in the opposite way from that in which the DEP has been operating. The Supreme Judicial Court of Maine states in Bangor Hydro Electric v. BD. OF ENV. PROT., 1991 ME, 595 A.2d 438 that the BEP must consider state water reclassification when engaged in the permitting process and that **"classification is goal oriented as required by the federal Clean Water Act".** Nowhere in statute or case law does it say classification can or must be constrained by modeling and or critical flows or discharges, point source or non-point source.

The Clean Water Act dictates a state shall revise its standards to reflect uses and water quality actually being attained. 40 C.F.R. § 131.1O. See also id. § 131.6(d); 38 M.R.S.A. § 464(4)(F). Thus, the Board's analysis must be based on *existing* water quality – not hypothetical modeling, with point sources operating at maximum licensed discharge. Indeed, the Board is specifically prohibited from considering maximum licensed loads because both state and federal regulations prohibit consideration of waste discharge or transport as a designated use. 40 C.F.R. § 131.10 (a); 38 M.R.S.A. § 464(4)(F)(l)(d).

The CWA & Maine Classification Standards are Aspirational in Nature

Moreover, from the DEP Submission Guidelines:

> **Maine's Water Quality Classification System is goal-based.**
>
> *When proposing an upgrade in classification, recommend waters that either presently attain or with reasonable application of improved treatment or Best Management Practices (BMPs), could reasonably be expected to attain, the standards and criteria of a higher proposed class.*

Widespread Public Support for Clean Water with its Economic, Environmental and Recreation Benefits

It has been nearly 50 years since the passage of the Clean Water Act and the changes that it brought about have been profound. Bates Mill in Lewiston ceased being a textile mill that completely exploited the Androscoggin River by taking its water and power and returning dyes, bleaches and untreated human waste from overboard discharge. The Bates Mill Complex is now the site of Baxter Brewing Co., TD Bank, Androscoggin Savings Bank offices and The Symquest Group, Fishbones Casual Fine Dining Restaurant, and Museum L-A: The Story of Work and Community in Lewiston-Auburn. The other river communities of Durham, Lisbon, Brunswick and Topsham have all embraced the newer, cleaner river in various economic and recreational ways. No one wants to turn back the clock.

The language in various comprehensive plans (Ex. 6) tell the story:

In Lisbon's words: "***With the improved water quality of the Androscoggin, the potential for recreational uses of both the water and shorelines has increased.***"

Topham says: "***The return of millions of river herring to Merrymeeting Bay and improvement of water quality on the Androscoggin River are fantastic successes; we shouldn't stop there.***"

And Auburn adds: "***The state's water quality classification for the river should be increased from a Class C to a Class B by 2012.***"

The Clean Water Act set in motion a process to improve the quality of our waters that is still continuing. The initial phase changed the lower Androscoggin from an open sewer, one of the top ten polluted rivers in the country (Ex. 23), to the waters that we enjoy today, an asset to our communities for its aesthetics, economic benefits and recreational opportunities, yet the waters remain classified as Class C, Maine's lowest water quality classification. As long as classification remains lower than actual ambient water quality, deterioration is possible and to be avoided. Submitted data show the Androscoggin has been meeting Class B standards for years in large part due to former Senator John Nutting's leadership in legislative efforts including the Color, Odor, Foam Bill, 1990; Dioxin Bill, 1996; and Phosphorus Bill passed in 2006; sewer system upgrades by the cities of Lewiston and Auburn providing storm overflow protection; and the Gulf Island Pond Oxygenation Project. Our goal for the upgrade is to lock in improved water quality as is the full intent of the Clean Water Act and Main law.

What's new?

1. Expanded coalition (Exhibit 7)
2. Additional VRMP data through 2021 (now in 10/7/21 BEP Presentation attached as **Appendix 1** following Exhibit List)
3. DEP low flow sonde data (Exhibit 3 page 7)
4. Lewiston/Auburn CSO data and wastewater report (Exhibit 24, Exhibit 25)
5. Extensive supporting exhibits (see below)
6. Comprehensive aquatic life sampling (see **Appendix 2**)
7. Two new, comprehensive and critical legal analyses. Rachel Doughty (formerly EPA), Greenfire Law (Exhibit 4) and Scott Sells (Submitted electronically under separate cover)

Exhibit List-Lower Androscoggin Upgrade Proposal 3/31/20

Exhibit 1 - Submission Required Responses

Exhibit 2 - Suggested Amendment Language

Exhibit 3 - Fact Sheet/Exec Summary

Exhibit 4 - Greenfire Legal Memorandum

Exhibit 5 - CLF Legal Memorandum

Exhibit 6 - Androscoggin Community Comprehensive Plan Excerpts

Exhibit 7 - Androscoggin Upgrade Support Letters, Past & Present

Exhibit 8 - Economic Benefits of Clean Water

Exhibit 9 - USFWS Merrymeeting Bay/Lower Kennebec High Value Habitat Composite Map

Exhibit 10 - Beginning with Habitat High Value Plant & Animal Habitat Map-Bowdoinham

Exhibit 11 - Beginning with Habitat-Kennebec Estuary Focus Area Intro

Exhibit 12 - Beginning with Habitat-Kennebec Estuary Focus Area Map

Exhibit 13 - Creeper Mussel Fact Sheet

Exhibit 14 - Maine Shad Habitat Plan-MDMR

Exhibit 15 - MDMR Androscoggin Fish Restoration Program

Exhibit 16 - MDMR Historical Sea Run Trap Counts 2008-2019

Exhibit 17 - Brookfield Brunswick 2019 Fishway Report

Exhibit 18 - Merrymeeting Bay/FOMB Conservation Lands Map

Exhibit 19 - USFWS Merrymeeting Bay Regional Conservation Planning Map

Exhibit 20 - Brunswick Topsham Land Trust Androscoggin Properties and Map

Exhibit 21 - Androscoggin River Greenway Trail

Exhibit 22 - Androscoggin Land Trust Preserves along or in Lower Androscoggin

Exhibit 23 - Defining a Nuisance Article

Exhibit 24 - Auburn-Lewiston CSO Charts 200-2018

Exhibit 25 - Auburn-Lewiston CWA 20 Year Master Plan Update 2019

Exhibit 26 - E. coli Geomeans 2006-2019

Exhibit 27 - DO Geomeans 2003-2019

Exhibit 28 - FOMB DEP VRMP Reports

Exhibit 29 - FOCB Quality Assurance Plan

Exhibit 30 - FOMB Auburn Boat Launch DO Data 2010-2011

Exhibit 31 - DEP Lower Androscoggin Modeling Report 2011

Exhibit 32 - Appendix D Aquatic Life from Ex. 31 Report, Annotated by FOMB

Exhibit 33 - DEP Kavanaugh Letter 10/25/19

Exhibit 34 - MDEP VRMP Sampling Protocols-2015

Exhibit 35 - Applied Biomonitoring-FOMB Androscoggin Monitoring Report 2010

Exhibit 36 - Applied Biomonitoring-FOMB Androscoggin Monitoring Report 2011

Exhibit 37 - Applied Biomonitoring-FOMB Androscoggin Combined Monitoring Report 2013

Exhibit 38 - FOMB WQ Data 1999-2019

Exhibit 39 - Topsham Hydro Pejepscot Dam 2018 Water Quality Summary from April, 2020 Relicensing Report

Exhibit 40 - Andro Dischargers Actual vs. Licensed 2012-2013

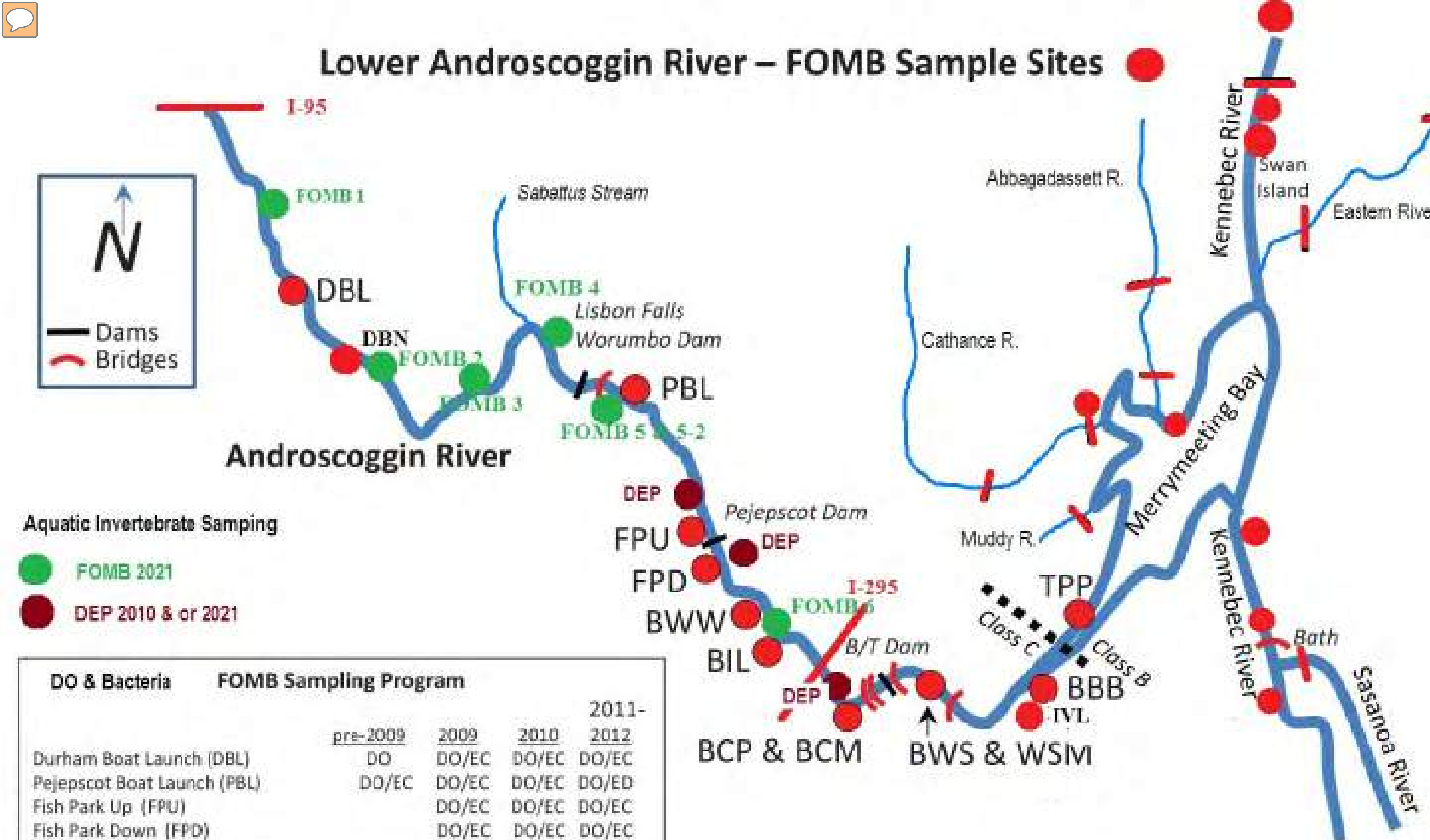
Appendix 1

FOMB BEP Presentation 10/7/21

(click on icons in upper left of slides for narrative text)

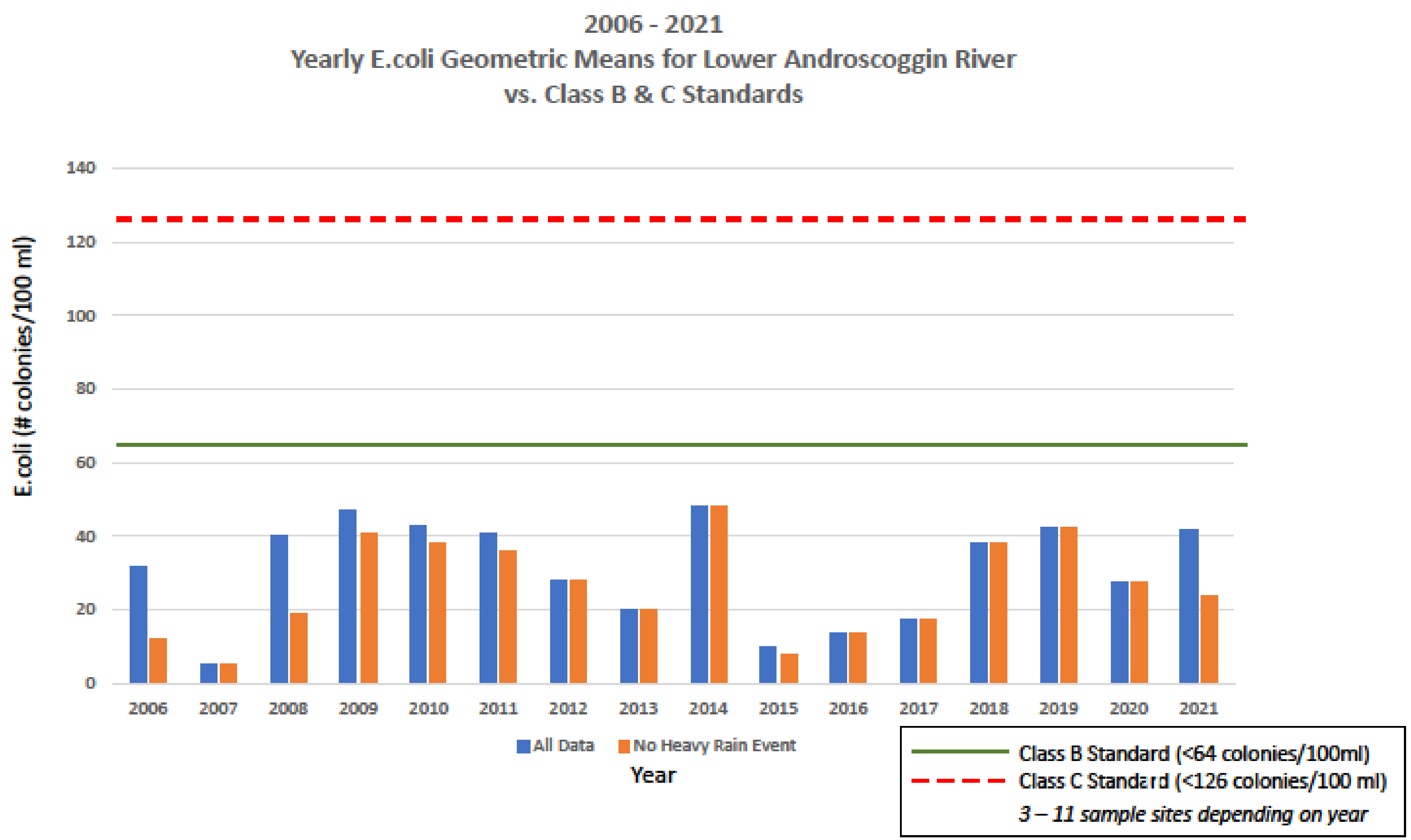

Friends of Merrymeeting Bay/Grow L+A
Lower Androscoggin Upgrade Proposal 2021
Merrymeeting Bay to Worumbo Dam: C to B

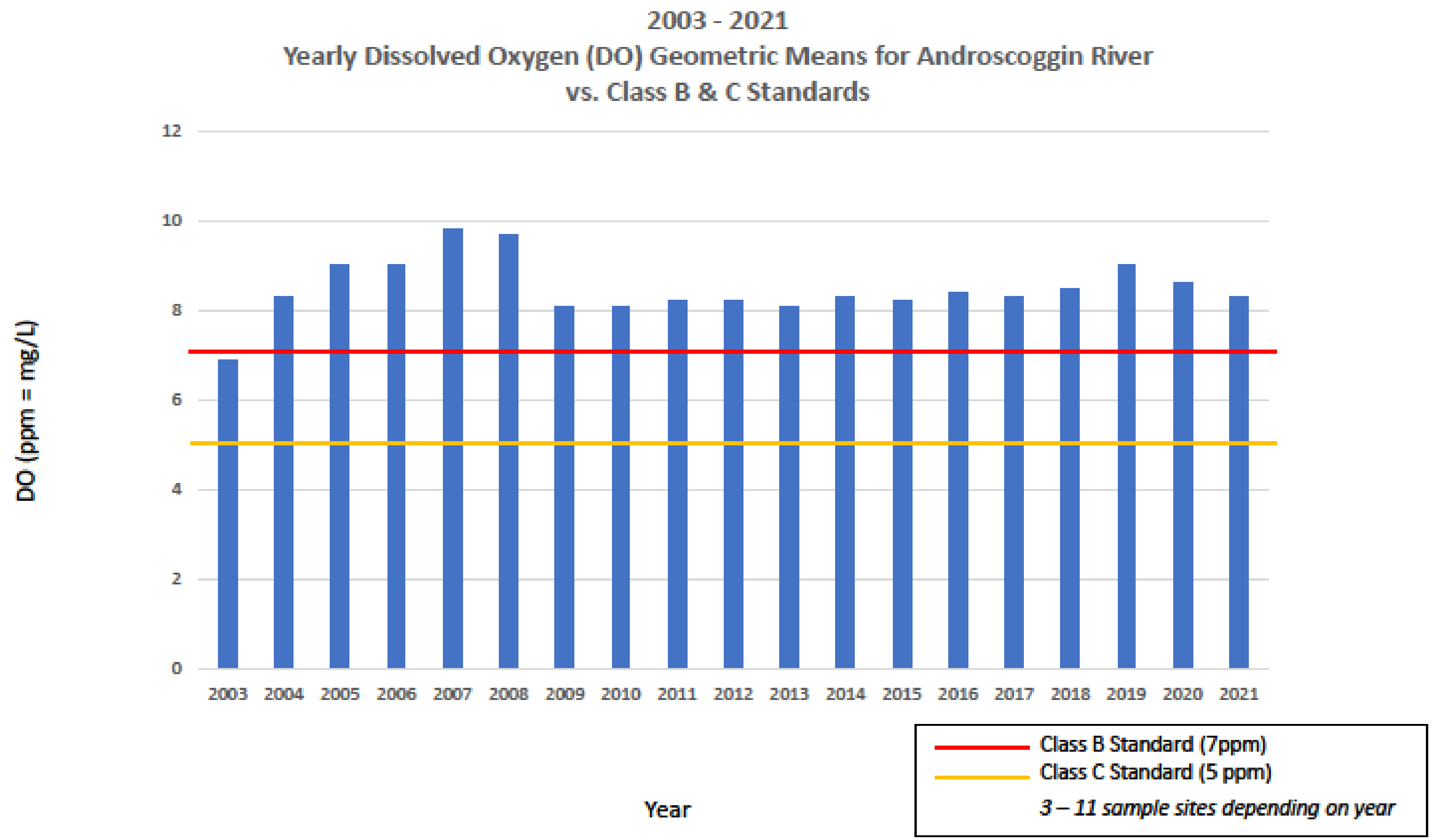

Durham Boat Launch Old [DB]
Durham New [DN]
Durham Boat Ramp
Lisbon Falls Old Gone [LF]
Sabattus Boat Ramp
FOMB 4
Lisbon Falls New [LN]
FOMB 2
FOMB 3
Durham Hand Carry
Pejepscot Boat Ramp-PBL
FOMB
Lisbon
Bowdoin
BTLT Bradley Pond
Head Tide Park
Durham
Fish Park Up-FPU Hand Carr
Brunswick Interstate Ledge-BI
FOMB 6
Topsham
CF



DO & Bacteria	FOMB Sampling Program pre-2009	2009	2010	2011-2012
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Portage (BCP)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Mooring (BCM)		DO/EC	DO/EC	na
Brunswick Water St. Boat Launch (BWS)	EC	DO/EC	DO/EC	DO/EC
Water Street Mooring (WSM)		DO/EC	DO/EC	na
Brunswick Bay Bridge (BBB)	EC	DO/EC	DO/EC	DO/EC
Topsham Pleasant Pt. (TPP)	DO	DO	DO	DO

Upstream Monitoring	pre-2009	2009	2010-2012
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO


2006 - 2021
Yearly E.coli Geometric Means for Lower Androscoggin River
vs. Class B & C Standards
E.coli (# colonies/100 ml)
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
All Data
No Heavy Rain Event
Year
Class B Standard (<64 colonies/100ml)
Class C Standard (<126 colonies/100 ml)
3 – 11 sample sites depending on year


2003 - 2021
Yearly Dissolved Oxygen (DO) Geometric Means for Androscoggin River
vs. Class B & C Standards
DO (ppm = mg/L)
12
10
8
6
4
2
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
Class B Standard (7ppm)
Class C Standard (5 ppm)
3 – 11 sample sites depending on year

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 6**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

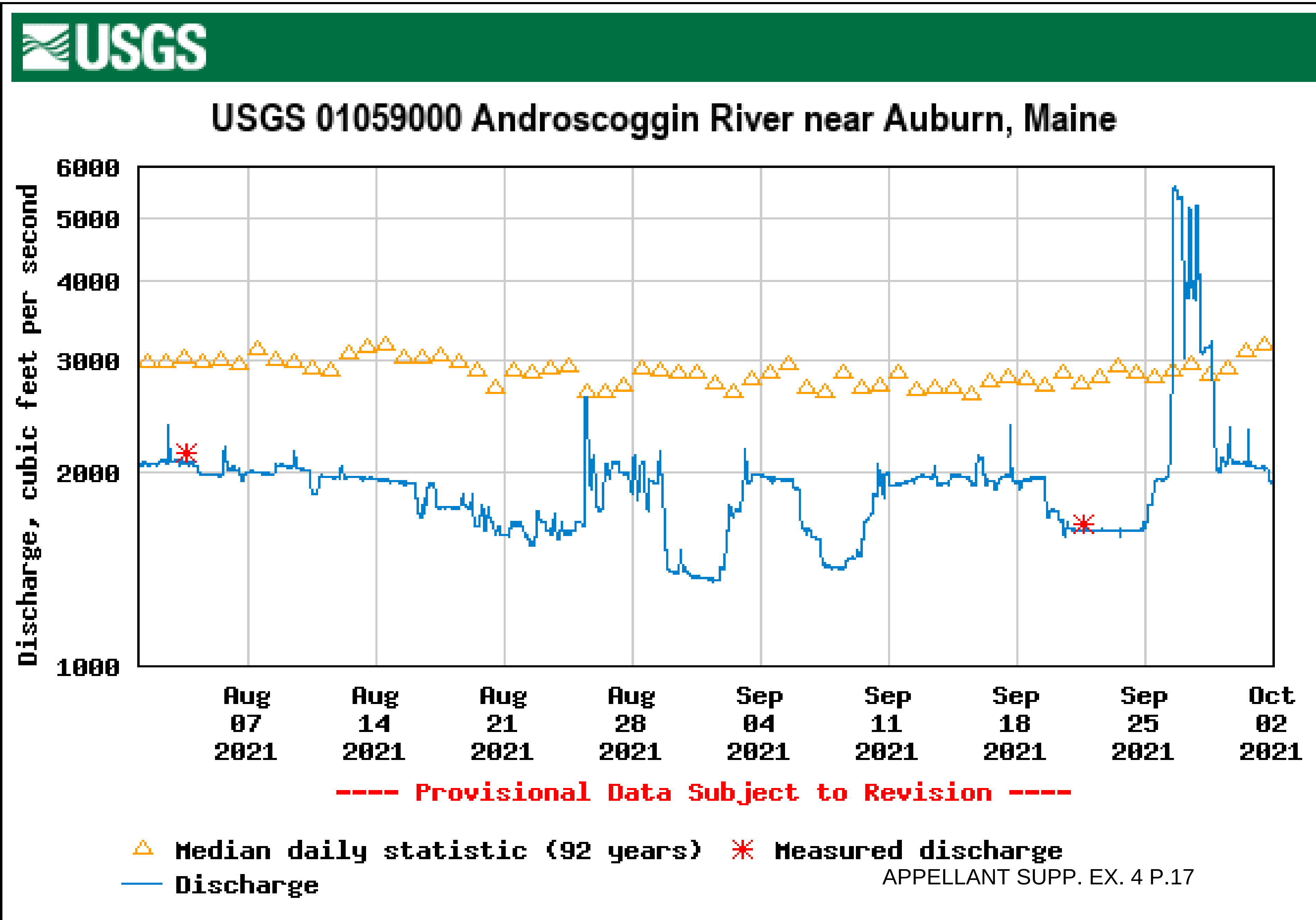
Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**C**	**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)		**Perlidae (stoneflies)**	**C**	**Other**	

Est. Total Abundance	**100**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, good richness, good #s of stoneflies and brachycentrid caddisflies drives model up.

2021 Androscoggin Flows during FOMB Aquatic Invertebrate Sampling 8/4-9/4 & 9/4-9/29/2021



APPELLANT SUPP. EX. 4 P.17

Auburn & Lewiston CSO Charts 200-2018

Section 3 CSO Improvements - Nineteen Years of Progress (2000 2018)

Tighe&Bond

FIGURE 3-6
Auburn Sewer District 2000-2018 Precipitation vs. CSO Discharge

Section 3 CSO Improvements - Nineteen Years of Progress (2000-2018)

Tighe&Bond

FIGURE 3-13
City of Lewiston 2000 2018 Precipitation vs. CSO Discharge

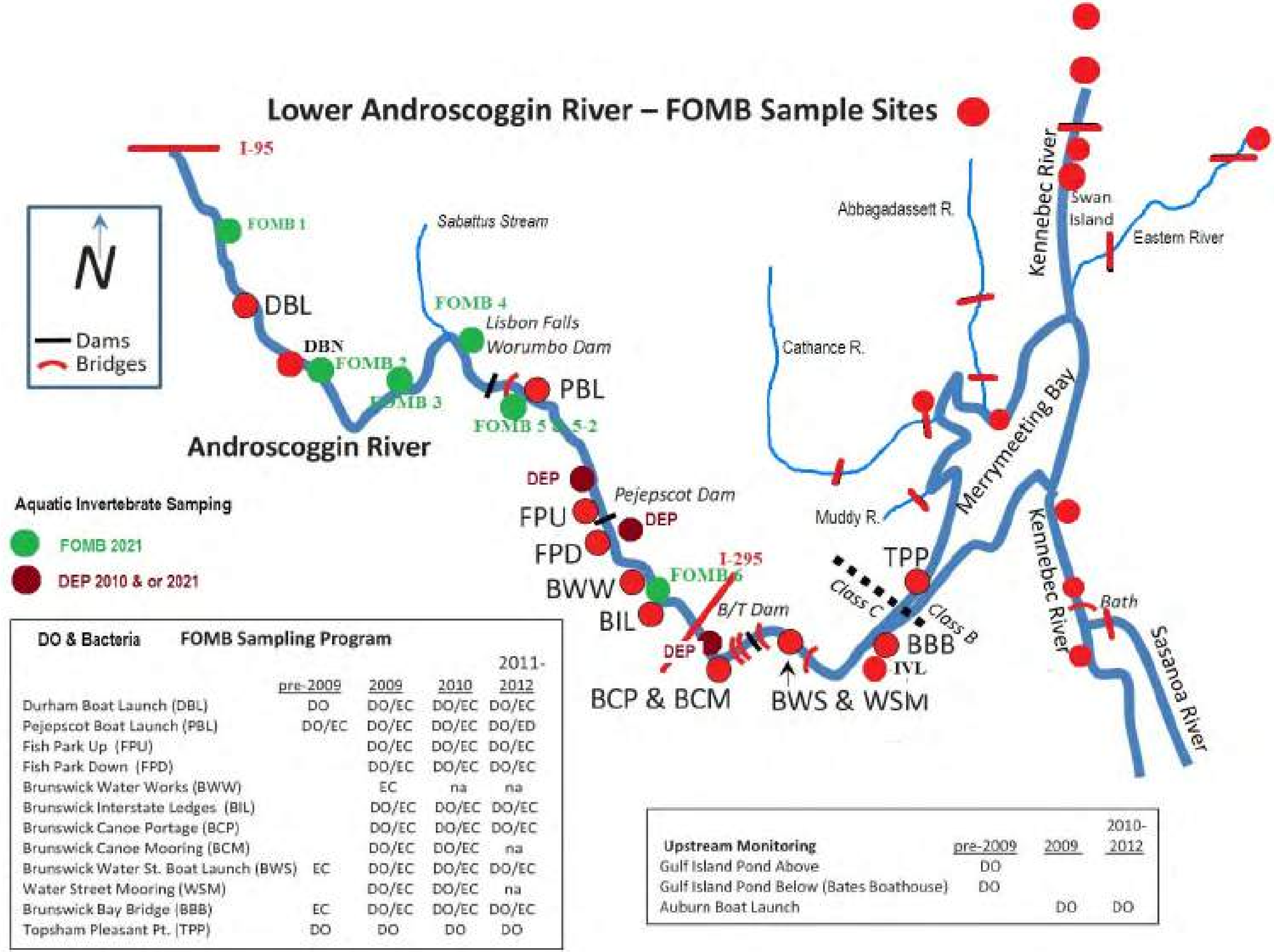
Androscoggin Dischargers: Actual Discharges vs Licensed Limitations 1/2012-2/2013 - Source: DEP					
Brunswick POTW					
	Monthly Avg. Actual/License	Daily Max. Actual/Lic.	Monthly Avg. Concentration, A/L mg/l	Daily Max. Concentration, A/L	Monthly Avg A/L
	% of Limit %Lic. Buffer		mg/litre		
Flow (MGD)	2/3.85 52% 48%	2.9 actual	No Data (ND)	ND	
BOD (lbs/day)	295/963 31% 69%	364/1605 23% 77%	13/30 43% 57%	18/50 36%	
TSS (lbs/day)	309/963 32% 68%	485/1605 30% 70%	17/30 57% 43%	23/50 46%	
E. coli (/100ml)					
Lisbon POTW					
Flow (MGD)	.62/2.03 30% 70%	ND	ND	ND	
BOD (lbs/day)	26/507 5% 95%	53/845 6% 94%	5/30 17% 83%	10/50 20% 80%	
TSS (lbs/day)	20/507 4% 96%	41/845 5% 95%	4/30 13% 87%	8/50 16% 84%	6/126 5% 95%
E. coli (/100ml)	ND	ND	ND	ND	
LAWPCA POTW					
Flow (MGD)	11 actual	21 actual	ND	ND	
BOD (lbs/day)	1307/3553 37% 63%	4579actual	14/30 47% 53%	41/50 82% 18%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	19/126 15% 85%
Livermore Falls					
Flow (MGD)	.53/2.0 27% 73%	1 actual	ND	ND	
BOD (lbs/day)	40/500 8% 92%	82/834 10% 90%	10/30 33% 67%	15/50 30% 70%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	15/126 12% 88%
Verso Pipe #001A			% of Limit %Lic. Buffer	% of Limit %Lic. Buffer	
Flow (MGD)	36 actual	41/51	ND	ND	
BOD (lbs/day)	2429/4400summer*,7400winter**	3633/8000S^, 13,875W^^	ND *55% 45%, **33% 66%	ND ^45% 55%, ^^26% 74%	
TSS (lbs/day)	6796/12,000S*, 25,000W**	8521/22,300S^, 44,600W^^	ND *57% 43%, **27% 73%	ND ^38% 62%, ^^19% 81%	
Tot. Phos. (lbs/day)	84/130 64% 36%	113 actual	.27 actual	.35 actual	
Ortho Phos. (lbs/day)	15/28 54% 46%	29.3 actual	ND	ND	
Ads. Org. Halo (AOX)	739/1495 49% 51%	801/2282 35% 65%	ND	ND	

Appendix 2

FOMB Aquatic Life Sampling 2021

Site information and Rapid Bioassessment results

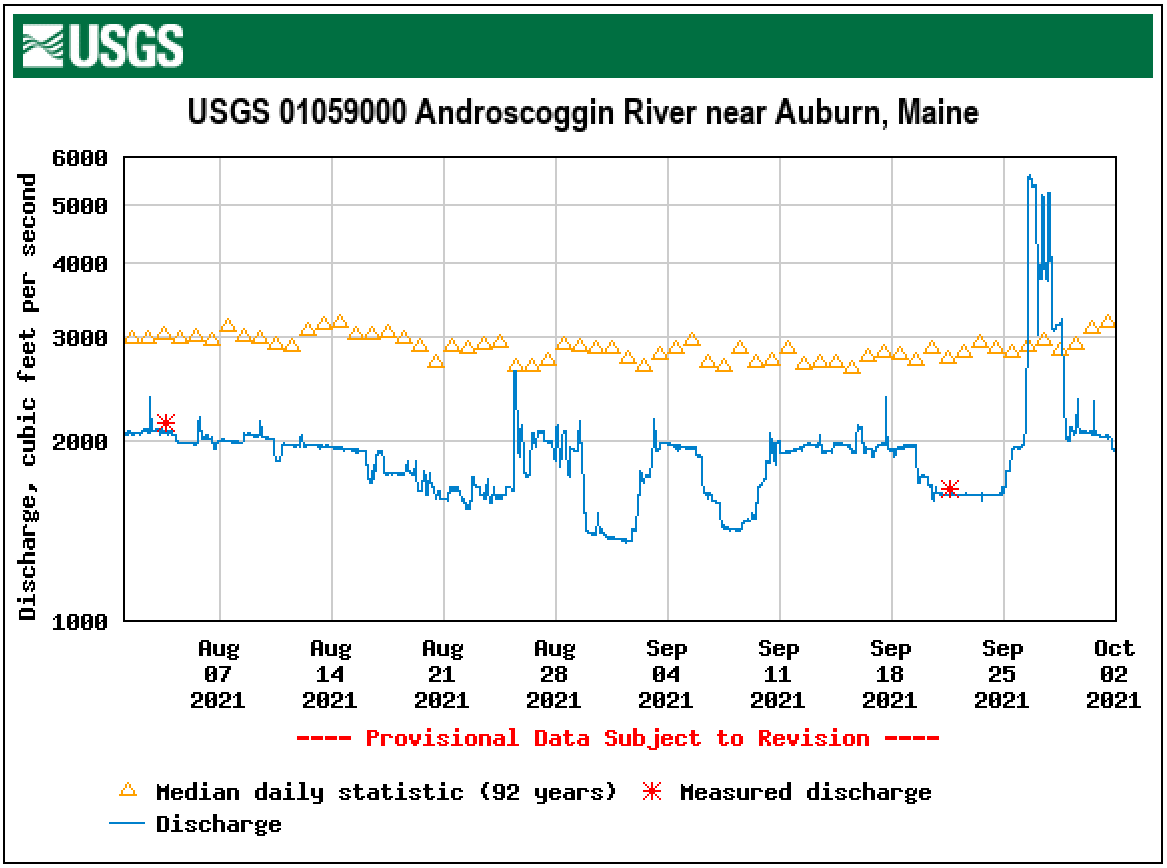
Lower Androscoggin River – FOMB Sample Sites

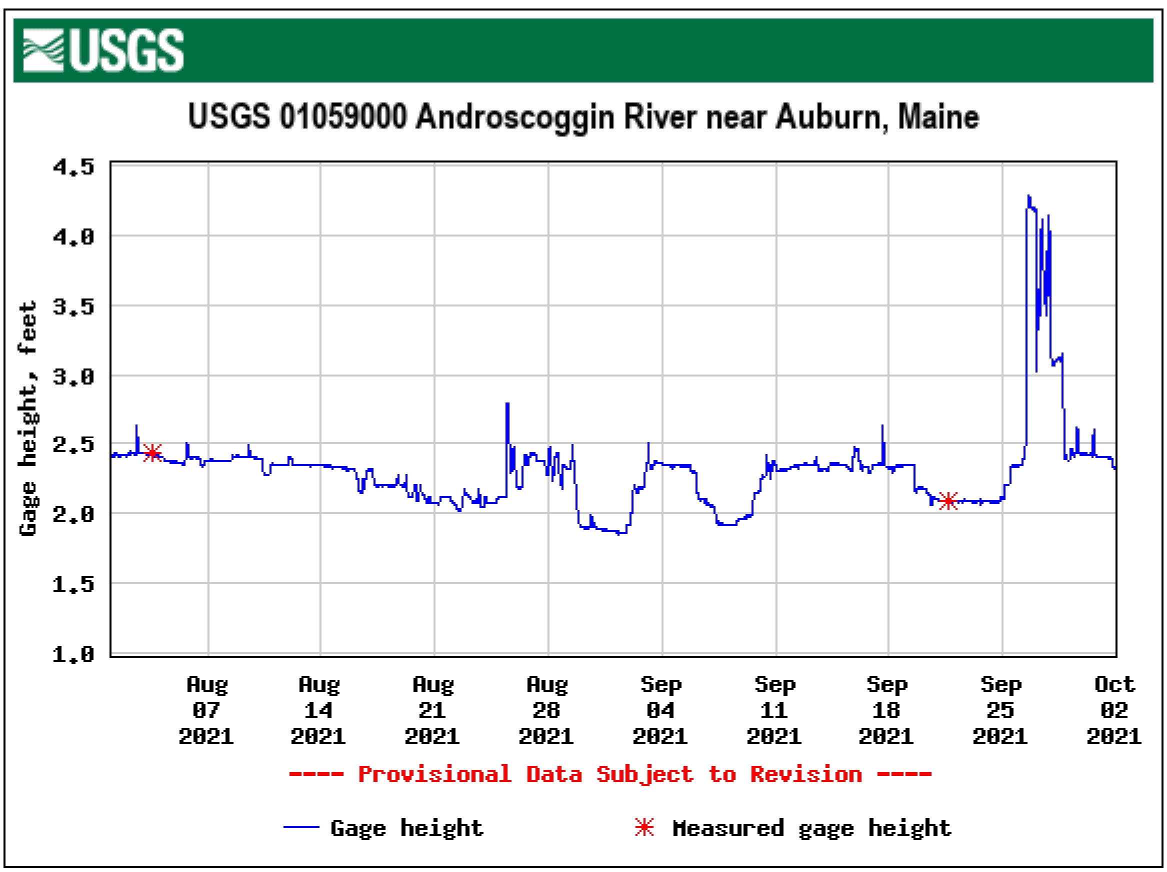


DO & Bacteria — FOMB Sampling Program	pre-2009	2009	2010	2011-2012
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Portage (BCP)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Mooring (BCM)		DO/EC	DO/EC	na
Brunswick Water St. Boat Launch (BWS)	EC	DO/EC	DO/EC	DO/EC
Water Street Mooring (WSM)		DO/EC	DO/EC	na
Brunswick Bay Bridge (BBB)	EC	DO/EC	DO/EC	DO/EC
Topsham Pleasant Pt. (TPP)	DO	DO	DO	DO

Upstream Monitoring	pre-2009	2009	2010-2012
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO

2021 Androscoggin Flows during FOMB Aquatic Invertebrate Sampling 8/4-9/4 & 9/4-9/29/2021





FOMB Andro Bug Site Information 2021

Deployments: Sites 1, 2, 3, 4 on 8/4/21; Sites 5, 6 on 8/5/21. Retrievals 1R-4R on 8/31; 5R & 6R on 9/3/21. Site 5 baskets had been disturbed and after harvesting, we redeployed them to pick up 9/30.

Site Time Coordinates (Garmin 48) DO WT Depth Vel Substrate* Wx Notes

1 12:10 44 03.471 / 070 12.019 9.5 23.3 1.8' 1.94fps 10B, 55C, 25G, 10S cirrus As far upstream as we could go from Durham Boat Launch [DBL]. Shallow rips. Bag

1R 12:15 8.4 24.8 1.3' 1.48fps **SC** 100ms clear net spinning caddis C or Non attain?

2 13:50 44 00.116 / 070 09.076 11.0 24.8 1.7' .7fps 5C, 15G, 80S -cirrus 200'NE of sandbar vicinity of DBN. Bag

2R 10:15 10.0 24.9 1.5' N/A **SC** 100ms clear Velocity not taken, lots of mussels, small fish low water, lots of bars C?

3 14:30 43 59.573 / 070 05.160 10.6 24.3 1.0' .9fps 80B, 10G, 10S clr Boulder rips midway up E/W reach above Sabattus Stream. Bag

3R 15:00 9.4 25.5 1.2' .76fps **SC** 90ms sct cumulus B?

4 15:20 44 00.524 / 070 05.160 9.4 23.6 10.3' .28fps 100S cirrus 20' line to 3 baskets. 300 yds below RR bridge, 200 yds east of eagle nest pines on island. Upper Worumbo impoundment. Dive. Basket

4R 16:20 8.9 24.9 10.5' .16fps **SC** 90ms crayfish, hardly any bugs

5 13.50 43 59.432 / 070 02.995 8.7 23.6 11.3' .5fps 50G, 40C, 10S -Rain. Mid Channel 100yds above PBL boat ramp. 2 otters seen in water by shore before launching

5R 9:35 7.9 22.0 11.5' .6fps **SC** 100ms OVC-spitting-pretty barren rocks-small crayfish, mayfly

6 15:45 43 55.980 / 070 00.067 8.3 23.3 10.4' 1.0fps 40C, 10B, 50Bedrock OVC 500' Mist 50' East of BIL ledges. Need key to access. Brunswick Park ranger Ben @ 844-1008 [off M&T], Parks Dept Manager Tom F @ 725-6656 Watch out for boom piles in river!

6R 12:00 7.9 23.2 10.2' 1.1fps SC 100ms BKN, some sun. Sparse stones, several stoneflies

* % C-Cobble, G-Gravel, S-Sand, B-Boulders

5 Redeployed overboard at 10:30. 9/3/21 Waypoint 0023. Line connecting first two cages to third with buoy line came undone. Look for cages 1 & 2 downstream of 3.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 1**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**P**	**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**	**P**	**Siphlonuridae (mayflies)**	**C**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**C**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**A**
Gastropoda (snails)	**C**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**500**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies and good proportion of mayflies drives model up. However, hyperdominance of net-spinning caddis, and snails drives model down.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 2**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**	**P**	**Heptageniidae (mayflies)**	**C**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	**P**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	**P**
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**C**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**200**		
% Insecta	**85**	**% EPT***	**60**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies, good richness, and good proportion of mayflies drives model up.
Dominance of net-spinning caddis, snails, and proportion of midges drives model down.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 3**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	**C**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)		**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**<100**		
% Insecta	**90+**	**% EPT***	**80+**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies and good proportion of mayflies drives model up. Lack of richness, lack of Heptageniid mayflies, dominance of polycentropid caddisflies drives model down.

Moody Mountain Environmental 137 Diamond Str Searsmont ME 04973 ph.207-592-8540 moodymtn@tidewater.net

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 4**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**P**	**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)	**C**	**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)	**P**	**Perlidae (stoneflies)**		**Other**	

Est. Total Abundance	**100+**		
% Insecta	**80**	**% EPT***	**30**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**??**

Brachycentrid caddisflies, Heptageniid mayflies and other mayflies drives model up. Scuds, snails and lack of stoneflies drives model down. If just a few stoneflies are found then this can be B.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 5**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**P**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**50-75**		
% Insecta	**95**	**% EPT***	**70**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, presence of stoneflies, and little dominance of net-spinning caddisflies drives model up.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 5-2**	Date Placed	**9/4/21**	Date Collected	**9/29/21**
Field Sample Method	**Baskets-Dive**			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**50-75**		
% Insecta	**95**	**% EPT***	**70**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, presence of stoneflies, and little dominance of net-spinning caddisflies drives model up.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 6**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**C**	**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)		**Perlidae (stoneflies)**	**C**	**Other**	

Est. Total Abundance	**100**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, good richness, good #s of stoneflies and brachycentrid caddisflies drives model up.

Resume- Paul C. Leeper

Owner- Moody Mountain Environmental

Environmental Biology Firm specializing in permitting and research

137 Diamond Street
Searsmont ME 04973
Ph. 207-592-8540
moodymtn@tidewater.net

EDUCATION

B.S. Biology (Aquatic Ecology), Allegheny College, PA. 1979

EMPLOYMENT

2002- Present	Moody Mountain Environmental-Owner
1980 – 2002	Eco-Analysts, Inc., Vice-President/ Partner

CERTIFICATIONS

NABS Benthic Taxonomist
Habitat Evaluation Procedures (HEP) by USFWS
Instream Flow Incremental Methodologies (IFIM) by USFWS
SCUBA

Paul started Moody Mountain Environmental, the environmental research and permitting firm located in Searsmont, Maine, in 2002. His goal is to give clients quality research and environmental permitting services in a client-friendly, cost-effective process. He uses a clear project goal oriented approach in all aquatic, marine, and wetland permitting. Prior to founding his own company, Paul worked at ECO-ANALYSTS, INC. as Vice-President and partner.

Paul specializes in aquatic, marine and wetland community analyses. He has provided expert testimony numerous times before Maine's Board of Environmental Protection (BEP) and Land Use Regulatory Commission (LURC) as well as before a Massachusetts Administrative Law Judge. He has served on Maine's Environmental Priorities Committee and Maine's DEP Biocriteria Technical Advisory Committee. He was the Aquatic Expert Consultant for the Saco River Flow Negotiations for Central Maine Power Company.

He has designed and directed numerous biomonitoring and aquatic macroinvertebrate community analyses for FERC relicensing of hydropower projects, wastewater discharges, natural resource permits, and spill responses. Among these are analyses on the Hiram, West Buxton, Bonny Eagle and Skelton projects on the Saco. Recently he has worked on the Ellsworth Project on the Union River and the Brassua Project. He is experienced in microbial source tracking and threatened and endangered mussel identification/relocation.

Paul has also been active in wetland investigations, permitting, and mitigation for many years. He has been a Wetlands Expert Consultant before BEP and LURC for the Department of Conservation Mere Point Boat Ramp Development and the Burnt Jacket Rezoning on Moosehead Lake. He has investigated numerous mapped Significant Wildlife Habitats and successfully petitioned MDIFW and DEP to remap areas based on conditions on the ground. He is experienced in vernal pool identification, the legislation and rules. He has directed numerous wetland permit projects involving delineations and wetland restoration and construction for developers and industrial clients.

Marine work includes cruise ship sampling, wetland intertidal and subtidal studies, permitting, and monitoring for piers, dredging, undersea cable installations, marinas, aquaculture leases, and discharges in New Hampshire and Maine. This work includes eelgrass (*Zostera marina)* transplanting in dredge areas and plankton studies in support of a marine hydropower project.

Resume- Paul C. Leeper

Aquatic Invertebrate Community Analyses: Has designed and directed numerous biocriteria community analyses in support of FERC hydropower licensing, Maine Natural Resources Protection Act permits, wastewater discharge licenses, and spill responses. Selected projects include:

FERC Relicensing
Androscoggin River (Riley, Jay, Otis, Livermore Projects)
Little Androscoggin (Hackett Mills & Upper & Lower Barker Projects)
Kennebec River (Harris, Wyman & Williams Projects)
Saco River (Hiram, West Buxton, Bonny Eagle & Skelton Projects)
Moxie Stream (Moxie Project)
Magalloway River (Aziscohos Project)
Dead River (Flagstaff Project)
Little Ossippee River (Ledgemere Project)
Ossippee River (Kezar Falls Project)
Union River (Ellsworth Project)
Cobbossee Stream (American Tissue Project)
Mooselookmeguntic (Upper and Middle Projects)
Penobscot River (West Enfield Project)
Passadumkeag River (Lowell Tannery Project)
Flagstaff Lake Littoral Characterization
Graham Lake Littoral Characterization
Musquacook Lake Littoral Characterization
Mooselookmeguntic Lake Littoral Characterization
Upper and Lower Richardson Littoral Characterization

Wastewater Licenses
Presumpscot (S.D. Warren Mill)
St. Croix (GP Kraft Mill)

NRPA Permits
Bald Mountain (Boliden Resources, Inc.)
Carabassett Valley (Sugarloaf/USA)

Spill Responses
Martin Stream (DeCoster Egg Farms)
Bond Brook Tributary (PCB spill)
Riggs Brook (PCB Superfund site)
Mill Stream (landfill leachate spill)
Brunswick Naval Air Station (stormwater antifreeze spill)

Submission Guidelines

Proposals for Changes to Maine Water Quality Standards Under Triennial Review

Introduction

Maine's Water Quality Standards (WQS) are one of the principal foundations for the protection of water quality in Maine in accordance with federal and state clean water laws. Maine's Water Classification Program, and the WQS contained therein, is designed to restore and maintain the chemical, physical and biological integrity of the State's waters and to preserve certain pristine state waters. A listing of existing WQS may be found on the Water Quality Standards web page maintained by the Maine Department of Environmental Protection (MEDEP).

The federal Clean Water Act (§ 303(c)(1); 40 CFR Part 131.20) requires that states periodically, but at least once every 3 years, hold public hearings for the purpose of reviewing water quality standards and, as appropriate, modifying and developing standards. Maine Statute contains similar language in 38 M.R.S. § 464.3.B., which states that the Board of Environmental Protection shall, from time to time, but at least once every 3 years, hold public hearings for the purpose of reviewing the water quality classification system and related standards and, as appropriate, recommending changes in the standards to the Legislature. This process, known as the Triennial Review, requires consultation with the public and interested state and federal agencies.

The Department is now embarking on a Triennial Review, which is expected to extend into 2022 for any required legislation. A tentative timetable is provided below. You are invited to submit proposals to the Department for changes to existing WQS, including the water quality classification of specific surface waters. Proposals for new standards may also be submitted. Please note submission guidelines as detailed below. **Proposals are due by the close of business on Tuesday, March 31, 2020.**

In addition to proposals for changes to any WQS, MEDEP also invites comments on the 2018 update to recreational water quality criteria for bacteria for fresh and estuarine and marine waters as specified in 38 M.R.S. §§ 465, 465-A and 465-B. Specifically, MEDEP invites comments on the seasonal applicability of criteria. For Classes B, C, SB and SC, the seasonality was extended from historically May 15 to September 30, to April 15 to October 31. The Department also welcomes comments on other aspects of the existing criteria, such as the magnitude or duration (over any 90-day period).

Appendix A

Designated Uses and Criteria for Maine River and Stream Classifications

***Note**: See 38 M.R.S. Article 4-A §464 Classification of Maine waters and 38 M.R.S. Article 4-A §465 Standards for classification of fresh surface waters for complete text.*

Class	Designated Uses*	Dissolved Oxygen Numeric Criteria	Bacteria (*E. coli*) Numeric Criteria	Habitat Narrative Criteria	Aquatic Life (Biological) Narrative Criteria**
Class AA	Habitat for fish and other aquatic life Drinking water after disinfection Fishing* Agriculture Recreation in/on the water Navigation	As naturally occurs	As naturally occurs but may not exceed geometric mean of 64/100 ml over 90-day interval or 236/100 ml in more than 10% of samples in any 90-day interval	Free flowing and natural	No direct discharge of pollutants***; as naturally occurs**
Class A	Habitat for fish and other aquatic life Drinking water after disinfection Fishing* Agriculture Recreation in/on the water Navigation Hydropower unless prohibited by 12 M.R.S. § 403 Industrial process/cooling water	7 ppm or 75% saturation From 10/1 to 5/14, 7-day mean concentration not less than 9.5 ppm and 1-day minimum concentration not less than 8.0 ppm in identified fish spawning areas	As naturally occurs but may not exceed geometric mean of 64/100 ml over 90-day interval or 236/100 ml in more than 10% of samples in any 90-day interval	Natural	As naturally occurs**
Class B	Habitat for fish and other aquatic life Drinking water after treatment Fishing* Agriculture Recreation in/on the water Navigation Hydropower unless prohibited by 12 M.R.S § 403 Industrial process/cooling water	7 ppm or 75% saturation From 10/1 to 5/14, 7-day mean concentration not less than 9.5 ppm and 1-day minimum concentration not less than 8.0 ppm in identified fish spawning areas	May not exceed geometric mean of 64/100 ml over 90-day interval or 236/100 ml in more than 10% of samples in any 90-day interval from 4/15 to 10/31	Unimpaired	Discharges may not cause adverse impact to aquatic life in that the receiving waters must be of sufficient quality to support all indigenous aquatic species without detrimental changes to the resident biological community.**
Class C	Habitat for fish and other aquatic Life Drinking water after treatment Fishing* Agriculture Recreation in/on the water Navigation Hydropower unless prohibited by 12 M.R.S. § 403 Industrial process/cooling water	5 ppm or 60% saturation but must maintain WQ sufficient for spawning in identified fish spawning areas 6.5 ppm (monthly average) at 22° and 24°C	May not exceed geometric mean of 100/100 ml over 90-day interval or 236/100 ml in more than 10% of samples in any 90-day interval from 4/15 to 10/31		Discharges may cause some changes to aquatic life, but the receiving waters must be of sufficient quality to support all species of indigenous fish and maintain the structure and function of the resident biological community.**

* 38 M.R.S. Article 4-A §§466.10-A and 466-A establish a sustenance fishing use as a subcategory of the applicable Fishing designated use. The sustenance fishing subcategory is applicable to certain waters as specified in 38 M.R.S. Article 4-A §§467 and 468.

** Numeric biocriteria in Maine rule Chapter 579, Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams.

*** Limited exceptions apply.

Friends of Merrymeeting Bay

P.O. Box 233, Richmond, ME 04357 www.fomb.org

Date: October 25, 2021

To: Maine Board of Environmental Protection, Mark Draper, Chair
C/o Susanne Meidel, Water Quality Standards Coordinator
Maine Department of Environmental Protection
SHS 17
Augusta, ME 04333
207-441-3612
Susanne.K.Meidel@maine.gov

From: **FOMB,** Ed Friedman, edfomb@comcast.net 666-3372

E-Filed

Subject: Lower Androscoggin Re-Classification Proposal

River/Sections: Androscoggin from Worumbo Dam to Merrymeeting Bay
Proposed Upgrade: C to B
Basis for Proposal: Actual conditions meet Class B
Documentation: Supporting data from FOMB monitoring program approved by Maine DEP and USEPA, Supplementary aquatic life sample data, MDEP sonde data, Lewiston/Auburn POTW/CSO data, USGS flow data
Data Collection Periods: DO-1999 to present; Coliform Bacteria-2006 to present
Sampling Intervals: Monthly or more: April-October
What's New: Expanded coalition plus additional VRMP data through 2021, DEP low flow sonde data, Lewiston/Auburn CSO data and wastewater report, extensive supporting exhibits, comprehensive aquatic life sampling and two new and comprehensive legal analyses.

Chair Draper, members of the Board & Ms. Meidel:

Multiple Segments for Consideration, but One Definitely Makes the Grade

Please consider these comments supporting our upgrade for the lower Androscoggin River segments between Merrymeeting Bay at the line from Pleasant Point in Topsham to North Bath extending upriver to Worumbo Dam in Lisbon Falls. As our data show, while classified as C, this section has long been actually meeting, Class B standards approximately 98% of the time. We therefore propose it be upgraded from C to B. We focus on this stretch of river because it is here we have the most complete data monitoring of dissolved oxygen (DO), bacteria and now benthic invertebrate sampling.

Excellent data exist for the Friends of Merrymeeting Bay (FOMB) Durham monitoring stations as well but collecting of regular DO samples halted there in 2018 when switching from use of Winkler Titration to only DEP meters at more select sites. Bacteria samples are still collected in Durham. In 2019 DEP deployed two sondes in this reach during low flows. One was in the Durham Boat Launch area and the other below Great Falls. DO levels remained above the Class B threshold of 7mg/l at both sites (Ex. 03 page 7).

An upgrade from Gulf Island Pond to the Bay, while desirable, may be less justified at this time due to a paucity of data. FOMB also has limited DO data from Auburn Boat Launch collected in 2010 and 2011 (Ex. 30) with geometric means of 8.8 and 10.1 respectively. Since there are some to extensive data supporting upgrades for the three river segments between Worumbo and Gulf Island Pond, we request the Board consider recommending all these segments for reclassification to B, we are adamant about Worumbo to the Bay.

FOMB has the most complete set of monitoring data for the lower reaches in this proposal. We began our monitoring program in 1999 and continue to this day with at times over twenty sampling sites on the Androscoggin, Kennebec and around Merrymeeting Bay. FOMB joined the VRMP in 2009 to further support and substantiate water classification upgrades.

Ambient Surface Waters Meet Class B Standards Virtually All of the Time & an Upgrade is Required Under the CWA & Maine Statute

Because the actual water quality of the lower Androscoggin sections described here exceeds that of their current classification, our request for a reclassification from C to B is supported by the State antidegradation policy as cited below (emphasis added):

38 M.R.S.A. § 464 (F) (4)

> *"When the **actual quality** of any classified water exceeds the minimum standards of the next highest classification, that higher water quality must be maintained and protected. **The board shall recommend** to the Legislature that water be reclassified in the next higher classification."*

In the past, MDEP has sometimes said they cannot upgrade a river classification because under worse case (permitted) 7Q10 scenarios, proposed Class B (in this case) standards might be violated. At the same time, the Department has also said because receiving waters meet the *current* classification levels, Maine cannot upgrade classifications to meet actual conditions.

This condition, while often supported by industry, quite clearly violates Maine statute and the intents both of the Clean Water Act and NPDES creating an artificial ceiling on water quality improvement. In fact, reclassification and permitting **must** be used together to improve water quality. But, in the opposite way from that in which the DEP has been operating. The Supreme Judicial Court of Maine states in Bangor Hydro Electric v. BD. OF ENV. PROT., 1991 ME, 595 A.2d 438 that the BEP must consider state water reclassification when engaged in the permitting process and that **"classification is goal oriented as required by the federal Clean Water Act".** Nowhere in statute or case law does it say classification can or must be constrained by modeling and or critical flows or discharges, point source or non-point source.

The Clean Water Act dictates a state shall revise its standards to reflect uses and water quality actually being attained. 40 C.F.R. § 131.1O. See also id. § 131.6(d); 38 M.R.S.A. § 464(4)(F). Thus, the Board's analysis must be based on *existing* water quality – not hypothetical modeling, with point sources operating at maximum licensed discharge. Indeed, the Board is specifically prohibited from considering maximum licensed loads because both state and federal regulations prohibit consideration of waste discharge or transport as a designated use. 40 C.F.R. § 131.10 (a); 38 M.R.S.A. § 464(4)(F)(l)(d).

The CWA & Maine Classification Standards are Aspirational in Nature

Moreover, from the DEP Submission Guidelines:

> **Maine's Water Quality Classification System is goal-based.**
> *When proposing an upgrade in classification, recommend waters that either presently attain or with reasonable application of improved treatment or Best Management Practices (BMPs), could reasonably be expected to attain, the standards and criteria of a higher proposed class.*

Widespread Public Support for Clean Water with its Economic, Environmental and Recreation Benefits

It has been nearly 50 years since the passage of the Clean Water Act and the changes that it brought about have been profound. Bates Mill in Lewiston ceased being a textile mill that completely exploited the Androscoggin River by taking its water and power and returning dyes, bleaches and untreated human waste from overboard discharge. The Bates Mill Complex is now the site of Baxter Brewing Co., TD Bank, Androscoggin Savings Bank offices and The Symquest Group, Fishbones Casual Fine Dining Restaurant, and Museum L-A: The Story of Work and Community in Lewiston-Auburn. The other river communities of Durham, Lisbon, Brunswick and Topsham have all embraced the newer, cleaner river in various economic and recreational ways. No one wants to turn back the clock.

The language in various comprehensive plans (Ex. 6) tell the story:

In Lisbon's words: "***With the improved water quality of the Androscoggin, the potential for recreational uses of both the water and shorelines has increased.***"

Topham says: "***The return of millions of river herring to Merrymeeting Bay and improvement of water quality on the Androscoggin River are fantastic successes; we shouldn't stop there.***"

And Auburn adds: "***The state's water quality classification for the river should be increased from a Class C to a Class B by 2012.***"

The Clean Water Act set in motion a process to improve the quality of our waters that is still continuing. The initial phase changed the lower Androscoggin from an open sewer, one of the top ten polluted rivers in the country (Ex. 23), to the waters that we enjoy today, an asset to our communities for its aesthetics, economic benefits and recreational opportunities, yet the waters remain classified as Class C, Maine's lowest water quality classification. As long as classification remains lower than actual ambient water quality, deterioration is possible and to be avoided. Submitted data show the Androscoggin has been meeting Class B standards for years in large part due to former Senator John Nutting's leadership in legislative efforts including the Color, Odor, Foam Bill, 1990; Dioxin Bill, 1996; and Phosphorus Bill passed in 2006; sewer system upgrades by the cities of Lewiston and Auburn providing storm overflow protection; and the Gulf Island Pond Oxygenation Project. Our goal for the upgrade is to lock in improved water quality as is the full intent of the Clean Water Act and Main law.

What's new?

1. Expanded coalition (Exhibit 7)
2. Additional VRMP data through 2021 (now in 10/7/21 BEP Presentation attached as **Appendix 1** following Exhibit List)
3. DEP low flow sonde data (Exhibit 3 page 7)
4. Lewiston/Auburn CSO data and wastewater report (Exhibit 24, Exhibit 25)
5. Extensive supporting exhibits (see below)
6. Comprehensive aquatic life sampling (see **Appendix 2**)
7. Two new, comprehensive and critical legal analyses. Rachel Doughty (formerly EPA), Greenfire Law (Exhibit 4) and Scott Sells (Submitted electronically under separate cover)

Exhibit List-Lower Androscoggin Upgrade Proposal 3/31/20

Exhibit 1 - Submission Required Responses

Exhibit 2 - Suggested Amendment Language

Exhibit 3 - Fact Sheet/Exec Summary

Exhibit 4 - Greenfire Legal Memorandum

Exhibit 5 - CLF Legal Memorandum

Exhibit 6 - Androscoggin Community Comprehensive Plan Excerpts

Exhibit 7 - Androscoggin Upgrade Support Letters, Past & Present

Exhibit 8 - Economic Benefits of Clean Water

Exhibit 9 - USFWS Merrymeeting Bay/Lower Kennebec High Value Habitat Composite Map

Exhibit 10 - Beginning with Habitat High Value Plant & Animal Habitat Map-Bowdoinham

Exhibit 11 - Beginning with Habitat-Kennebec Estuary Focus Area Intro

Exhibit 12 - Beginning with Habitat-Kennebec Estuary Focus Area Map

Exhibit 13 - Creeper Mussel Fact Sheet

Exhibit 14 - Maine Shad Habitat Plan-MDMR

Exhibit 15 - MDMR Androscoggin Fish Restoration Program

Exhibit 16 - MDMR Historical Sea Run Trap Counts 2008-2019

Exhibit 17 - Brookfield Brunswick 2019 Fishway Report

Exhibit 18 - Merrymeeting Bay/FOMB Conservation Lands Map

Exhibit 19 - USFWS Merrymeeting Bay Regional Conservation Planning Map

Exhibit 20 - Brunswick Topsham Land Trust Androscoggin Properties and Map

Exhibit 21 - Androscoggin River Greenway Trail

Exhibit 22 - Androscoggin Land Trust Preserves along or in Lower Androscoggin

Exhibit 23 - Defining a Nuisance Article

Exhibit 24 - Auburn-Lewiston CSO Charts 200-2018

Exhibit 25 - Auburn-Lewiston CWA 20 Year Master Plan Update 2019

Exhibit 26 - E. coli Geomeans 2006-2019

Exhibit 27 - DO Geomeans 2003-2019

Exhibit 28 - FOMB DEP VRMP Reports

Exhibit 29 - FOCB Quality Assurance Plan

Exhibit 30 - FOMB Auburn Boat Launch DO Data 2010-2011

Exhibit 31 - DEP Lower Androscoggin Modeling Report 2011

Exhibit 32 - Appendix D Aquatic Life from Ex. 31 Report, Annotated by FOMB

Exhibit 33 - DEP Kavanaugh Letter 10/25/19

Exhibit 34 - MDEP VRMP Sampling Protocols-2015

Exhibit 35 - Applied Biomonitoring-FOMB Androscoggin Monitoring Report 2010

Exhibit 36 - Applied Biomonitoring-FOMB Androscoggin Monitoring Report 2011

Exhibit 37 - Applied Biomonitoring-FOMB Androscoggin Combined Monitoring Report 2013

Exhibit 38 - FOMB WQ Data 1999-2019

Exhibit 39 - Topsham Hydro Pejepscot Dam 2018 Water Quality Summary from April, 2020 Relicensing Report

Exhibit 40 - Andro Dischargers Actual vs. Licensed 2012-2013

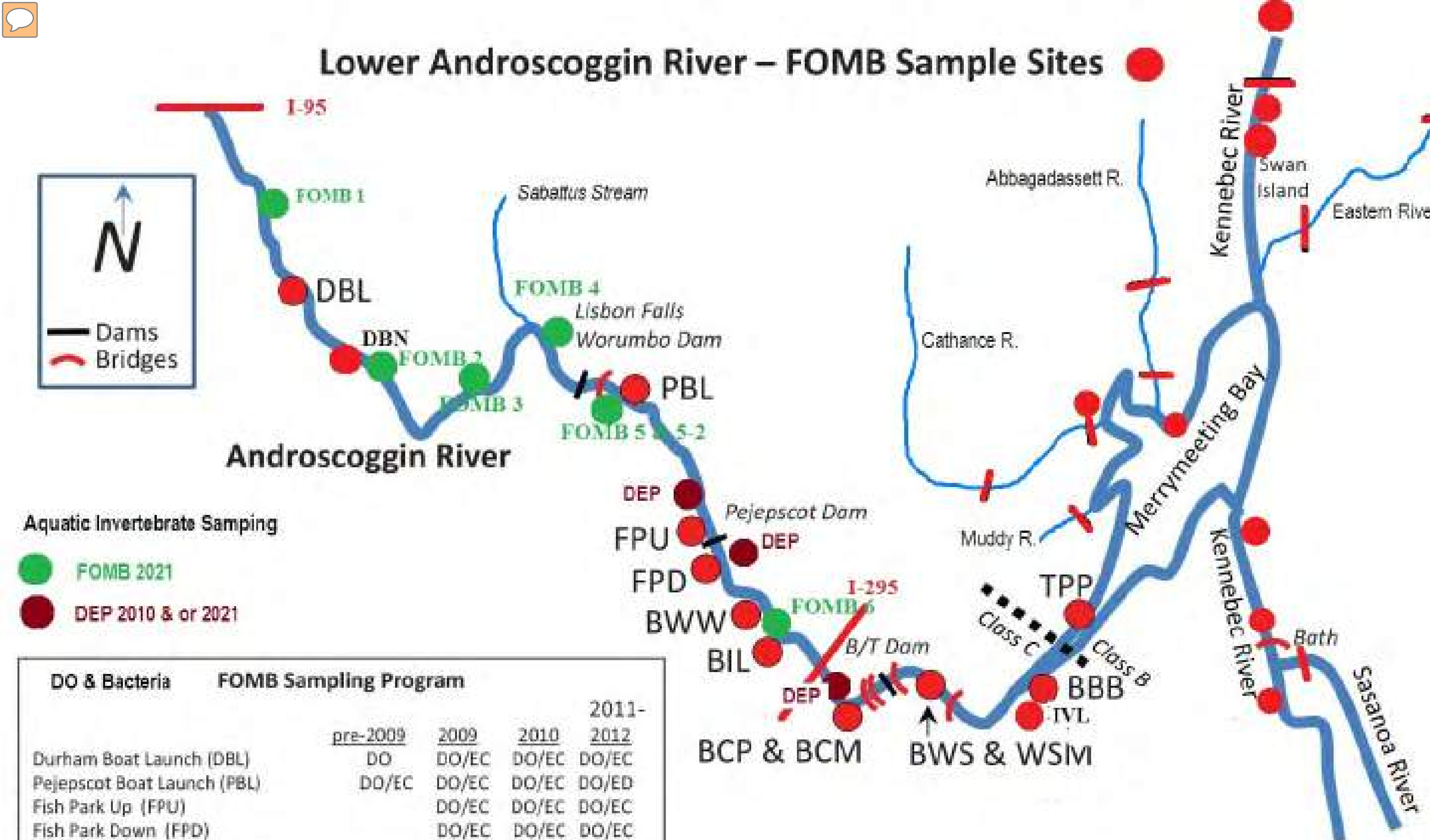
Appendix 1

FOMB BEP Presentation 10/7/21

(click on icons in upper left of slides for narrative text)


Friends of Merrymeeting Bay/Grow L+A
Lower Androscoggin Upgrade Proposal 2021
Merrymeeting Bay to Worumbo Dam: C to B

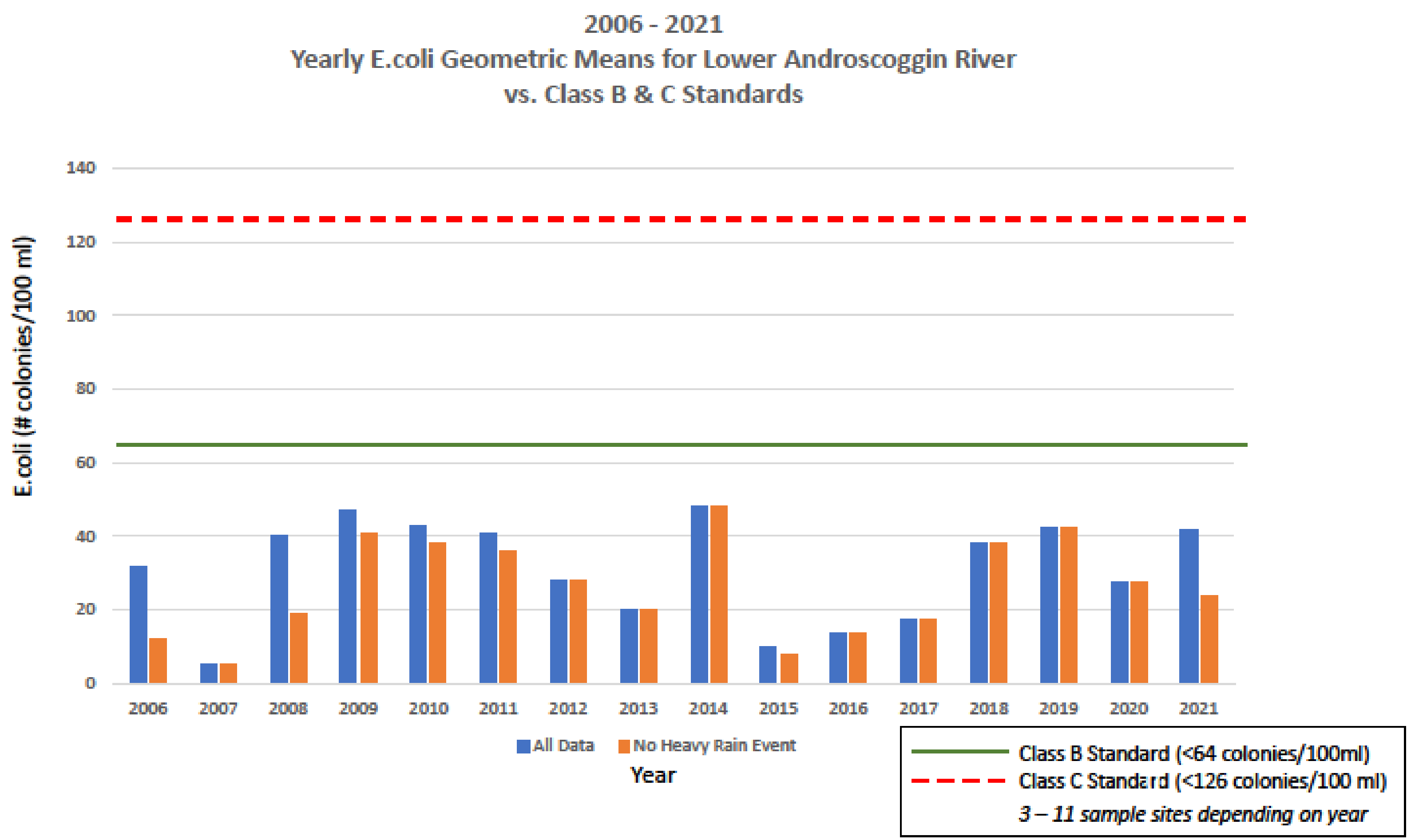

Durham Boat Launch Old [DB]
Durham New [DN]
Durham Boat Ram
FOMB 2
FOMB 3
Durham Hand Carry
Lisbon
Sabattus Boat Ramp
Lisbon Falls Old Gone [LF]
FOMB 4
Lisbon Falls New [LN
Pejepscot Boat Ramp-PBL
BTLT Bradley Pond
Bowdoin
Head Tide Park
Fish Park Up-FPU Hand Carr
Brunswick Interstate Ledge-BI
FOMB 6
Durham
Topsham



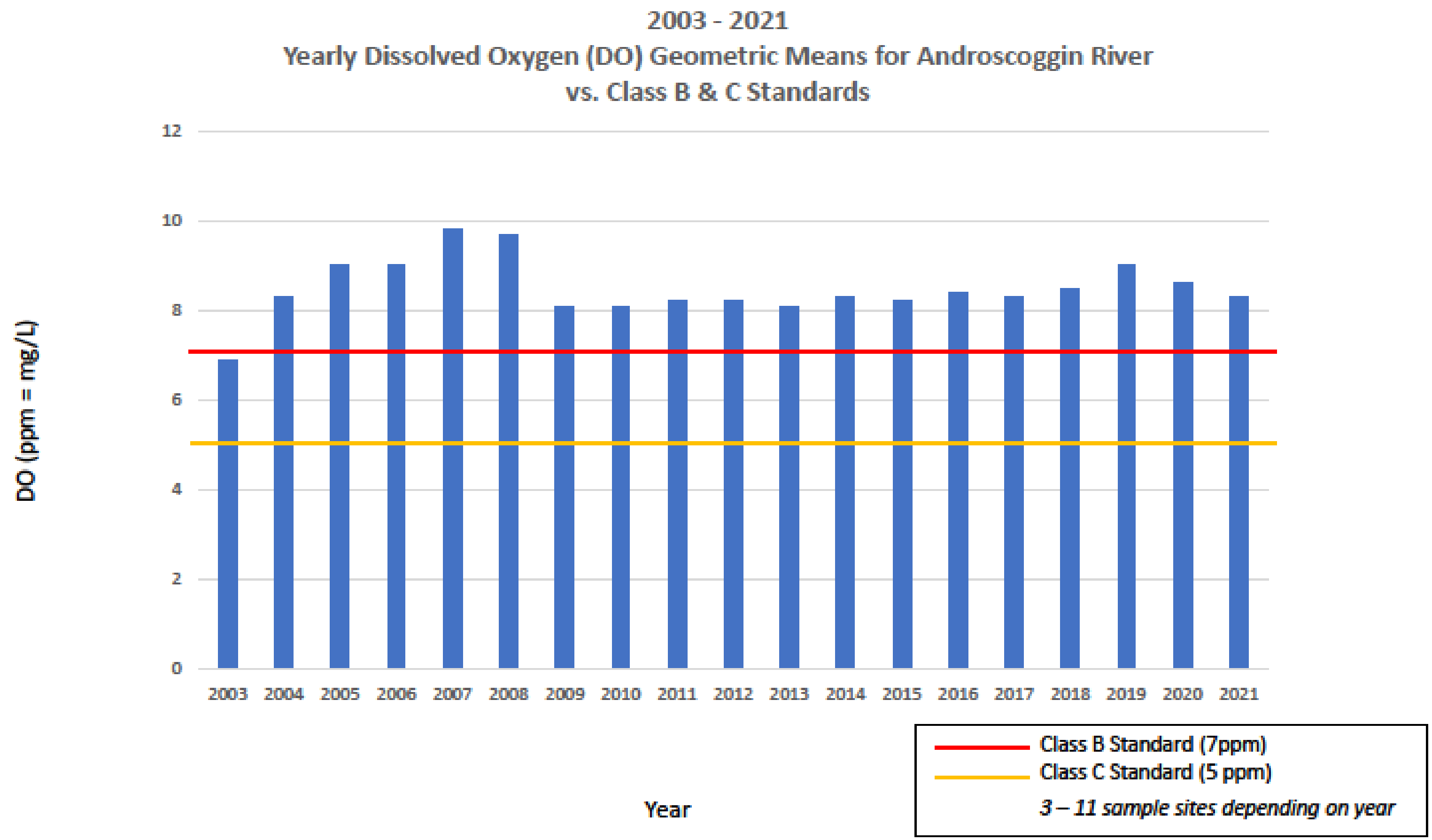
DO & Bacteria **FOMB Sampling Program**

	pre-2009	2009	2010	2011-2012
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Portage (BCP)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Mooring (BCM)		DO/EC	DO/EC	na
Brunswick Water St. Boat Launch (BWS)	EC	DO/EC	DO/EC	DO/EC
Water Street Mooring (WSM)		DO/EC	DO/EC	na
Brunswick Bay Bridge (BBB)	EC	DO/EC	DO/EC	DO/EC
Topsham Pleasant Pt. (TPP)	DO	DO	DO	DO

Upstream Monitoring	pre-2009	2009	2010-2012
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO



2006 - 2021
Yearly E.coli Geometric Means for Lower Androscoggin River
vs. Class B & C Standards
E.coli (# colonies/100 ml)
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
All Data
No Heavy Rain Event
Year
Class B Standard (<64 colonies/100ml)
Class C Standard (<126 colonies/100 ml)
3 – 11 sample sites depending on year



2003 - 2021
Yearly Dissolved Oxygen (DO) Geometric Means for Androscoggin River
vs. Class B & C Standards
DO (ppm = mg/L)
12
10
8
6
4
2
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
Class B Standard (7ppm)
Class C Standard (5 ppm)
3 – 11 sample sites depending on year

RAPID BIOASSESSMENT SURVEY

Data Sheet

(modified EPA Protocol I)

Location- **Andy**	**Site- 6**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

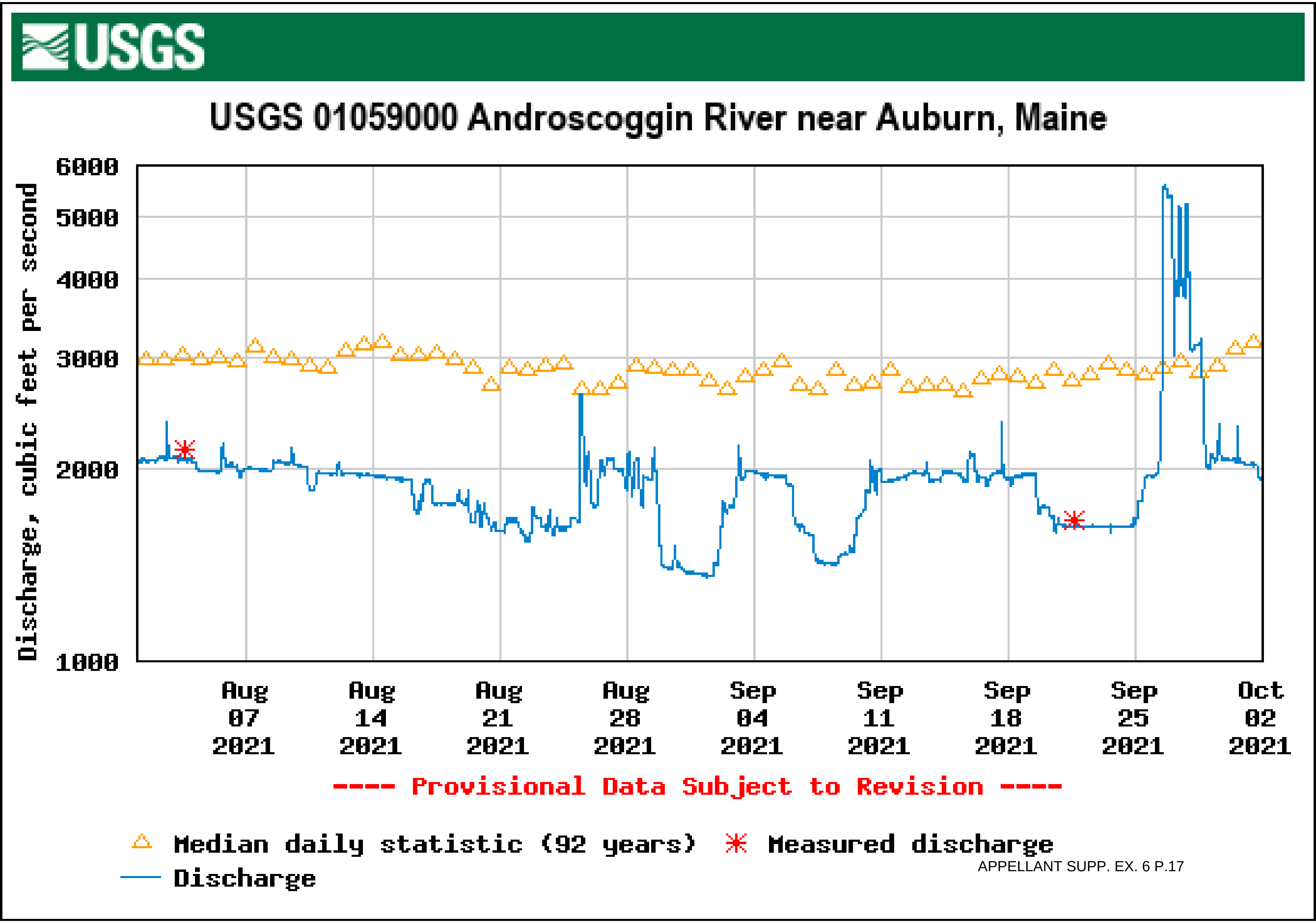
Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**C**	**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)		**Perlidae (stoneflies)**	**C**	**Other**	

Est. Total Abundance	**100**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, good richness, good #s of stoneflies and brachycentrid caddisflies drives model up.

2021 Androscoggin Flows during FOMB Aquatic Invertebrate Sampling 8/4-9/4 & 9/4-9/29/2021



APPELLANT SUPP. EX. 6 P.17

Auburn & Lewiston CSO Charts 200-2018

Section 3 CSO Improvements - Nineteen Years of Progress (2000 2018) Tighe&Bond

FIGURE 3-6
Auburn Sewer District 2000-2018 Precipitation vs. CSO Discharge

Section 3 CSO Improvements - Nineteen Years of Progress (2000-2018) Tighe&Bond

FIGURE 3-13
City of Lewiston 2000 2018 Precipitation vs. CSO Discharge

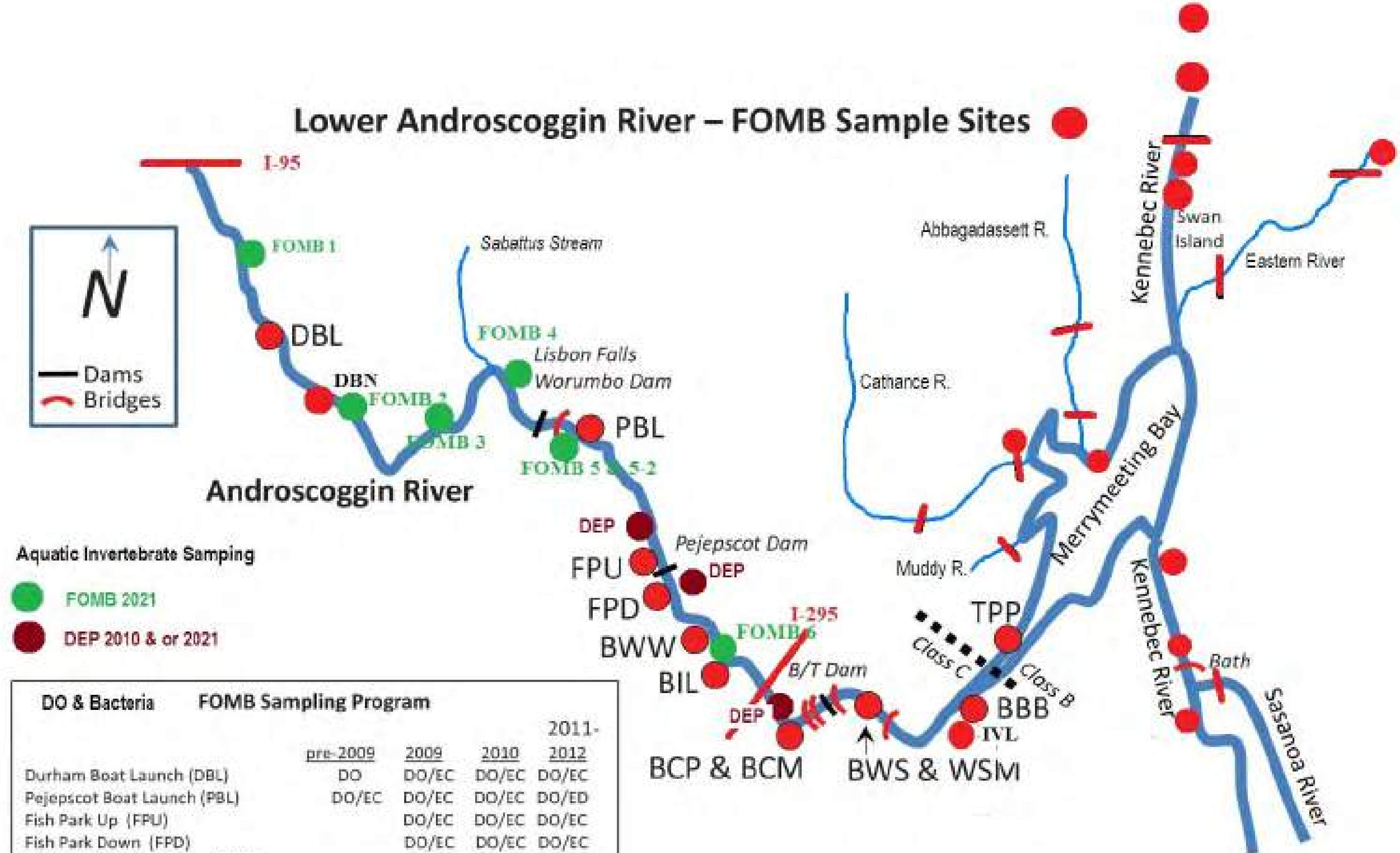
Androscoggin Dischargers: Actual Discharges vs Licensed Limitations 1/2012-2/2013 - Source: DEP					
Brunswick POTW					
	Monthly Avg. Actual/License	Daily Max. Actual/Lic.	Monthly Avg. Concentration, A/L mg/l	Daily Max. Concentration, A/L	Monthly Avg A/L
	% of Limit %Lic. Buffer		mg/litre		
Flow (MGD)	2/3.85 52% 48%	2.9 actual	No Data (ND)	ND	
BOD (lbs/day)	295/963 31% 69%	364/1605 23% 77%	13/30 43% 57%	18/50 36%	
TSS (lbs/day)	309/963 32% 68%	485/1605 30% 70%	17/30 57% 43%	23/50 46%	
E. coli (/100ml)					
Lisbon POTW					
Flow (MGD)	.62/2.03 30% 70%	ND	ND	ND	
BOD (lbs/day)	26/507 5% 95%	53/845 6% 94%	5/30 17% 83%	10/50 20% 80%	
TSS (lbs/day)	20/507 4% 96%	41/845 5% 95%	4/30 13% 87%	8/50 16% 84%	6/126 5% 95%
E. coli (/100ml)	ND	ND	ND	ND	
LAWPCA POTW					
Flow (MGD)	11 actual	21 actual	ND	ND	
BOD (lbs/day)	1307/3553 37% 63%	4579actual	14/30 47% 53%	41/50 82% 18%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	19/126 15% 85%
Livermore Falls					
Flow (MGD)	.53/2.0 27% 73%	1 actual	ND	ND	
BOD (lbs/day)	40/500 8% 92%	82/834 10% 90%	10/30 33% 67%	15/50 30% 70%	
TSS (lbs/day)	ND	ND	ND	ND	
E. coli (/100ml)	ND	ND	ND	ND	15/126 12% 88%
Verso Pipe #001A			% of Limit %Lic. Buffer	% of Limit %Lic. Buffer	
Flow (MGD)	36 actual	41/51	ND	ND	
BOD (lbs/day)	2429/4400summer*,7400winter**	3633/8000S^, 13,875W^^	ND *55% 45%, **33% 66%	ND ^45% 55%, ^^26% 74%	
TSS (lbs/day)	6796/12,000S*, 25,000W**	8521/22,300S^, 44,600W^^	ND *57% 43%, **27% 73%	ND ^38% 62%, ^^19% 81%	
Tot. Phos. (lbs/day)	84/130 64% 36%	113 actual	.27 actual	.35 actual	
Ortho Phos. (lbs/day)	15/28 54% 46%	29.3 actual	ND	ND	
Ads. Org. Halo (AOX)	739/1495 49% 51%	801/2282 35% 65%	ND	ND	

Appendix 2

FOMB Aquatic Life Sampling 2021

Site information and Rapid Bioassessment results

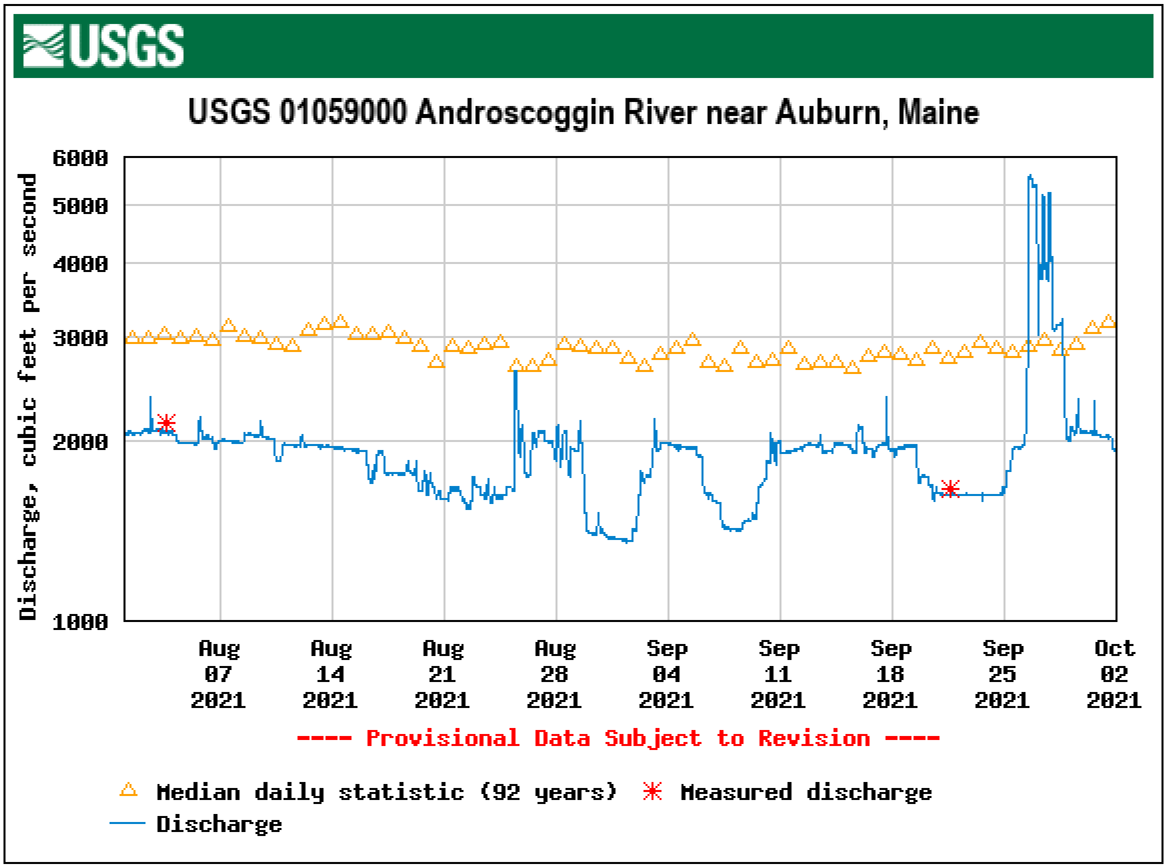
Lower Androscoggin River – FOMB Sample Sites

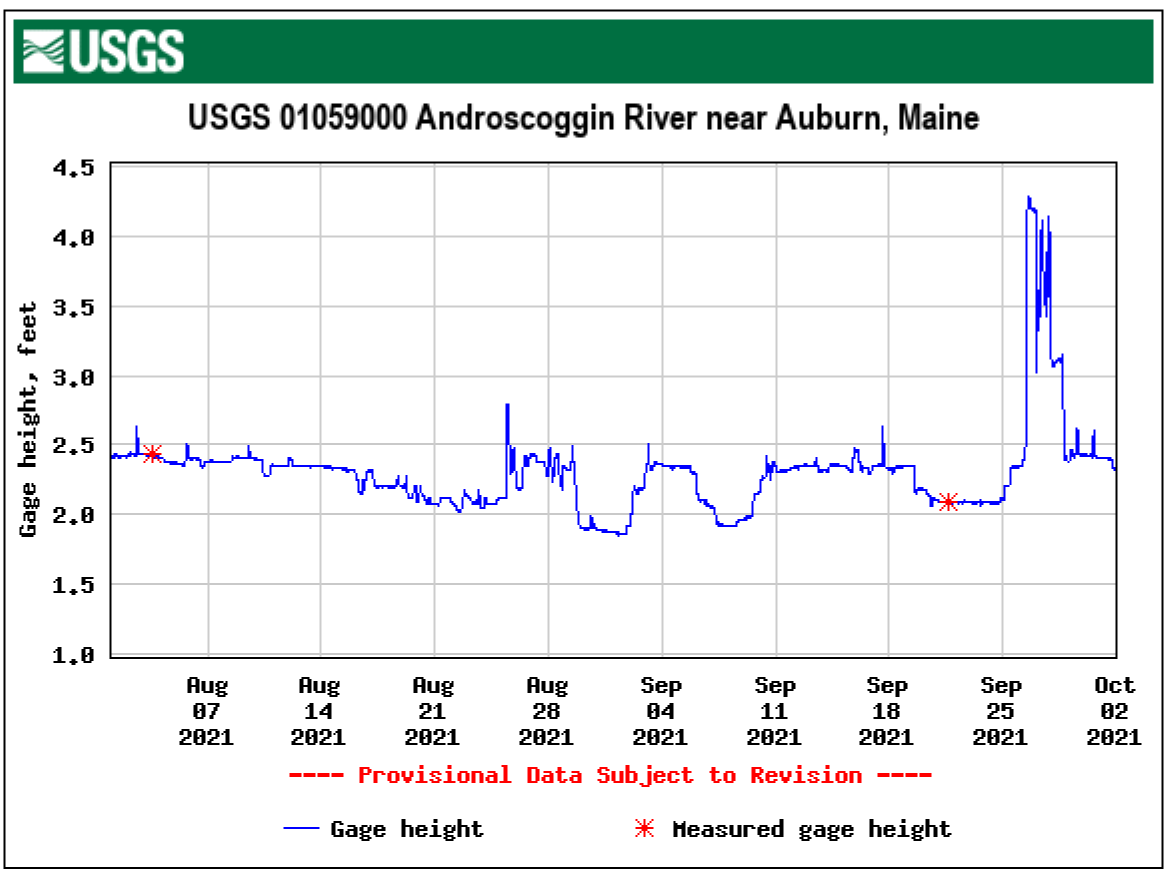


DO & Bacteria — FOMB Sampling Program	pre-2009	2009	2010	2011-2012
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Portage (BCP)		DO/EC	DO/EC	DO/EC
Brunswick Canoe Mooring (BCM)		DO/EC	DO/EC	na
Brunswick Water St. Boat Launch (BWS)	EC	DO/EC	DO/EC	DO/EC
Water Street Mooring (WSM)		DO/EC	DO/EC	na
Brunswick Bay Bridge (BBB)	EC	DO/EC	DO/EC	DO/EC
Topsham Pleasant Pt. (TPP)	DO	DO	DO	DO

Upstream Monitoring	pre-2009	2009	2010-2012
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO

2021 Androscoggin Flows during FOMB Aquatic Invertebrate Sampling 8/4-9/4 & 9/4-9/29/2021





FOMB Andro Bug Site Information 2021

Deployments: Sites 1, 2, 3, 4 on 8/4/21; Sites 5, 6 on 8/5/21. Retrievals 1R-4R on 8/31; 5R & 6R on 9/3/21. Site 5 baskets had been disturbed and after harvesting, we redeployed them to pick up 9/30.

Site Time Coordinates (Garmin 48) DO WT Depth Vel Substrate* Wx Notes

1 12:10 44 03.471 / 070 12.019 9.5 23.3 1.8' 1.94fps 10B, 55C, 25G, 10S cirrus As far upstream as we could go from Durham Boat Launch [DBL]. Shallow rips. Bag

1R 12:15 8.4 24.8 1.3' 1.48fps **SC** 100ms clear net spinning caddis C or Non attain?

2 13:50 44 00.116 / 070 09.076 11.0 24.8 1.7' .7fps 5C, 15G, 80S -cirrus 200'NE of sandbar vicinity of DBN. Bag

2R 10:15 10.0 24.9 1.5' N/A **SC** 100ms clear Velocity not taken, lots of mussels, small fish low water, lots of bars C?

3 14:30 43 59.573 / 070 05.160 10.6 24.3 1.0' .9fps 80B, 10G, 10S clr Boulder rips midway up E/W reach above Sabattus Stream. Bag

3R 15:00 9.4 25.5 1.2' .76fps **SC** 90ms sct cumulus B?

4 15:20 44 00.524 / 070 05.160 9.4 23.6 10.3' .28fps 100S cirrus 20' line to 3 baskets. 300 yds below RR bridge, 200 yds east of eagle nest pines on island. Upper Worumbo impoundment. Dive. Basket

4R 16:20 8.9 24.9 10.5' .16fps **SC** 90ms crayfish, hardly any bugs

5 13.50 43 59.432 / 070 02.995 8.7 23.6 11.3' .5fps 50G, 40C, 10S -Rain. Mid Channel 100yds above PBL boat ramp. 2 otters seen in water by shore before launching

5R 9:35 7.9 22.0 11.5' .6fps **SC** 100ms OVC-spitting-pretty barren rocks-small crayfish, mayfly

6 15:45 43 55.980 / 070 00.067 8.3 23.3 10.4' 1.0fps 40C, 10B, 50Bedrock OVC 500' Mist 50' East of BIL ledges. Need key to access. Brunswick Park ranger Ben @ 844-1008 [off M&T], Parks Dept Manager Tom F @ 725-6656 Watch out for boom piles in river!

6R 12:00 7.9 23.2 10.2' 1.1fps SC 100ms BKN, some sun. Sparse stones, several stoneflies

* % C-Cobble, G-Gravel, S-Sand, B-Boulders

5 Redeployed overboard at 10:30. 9/3/21 Waypoint 0023. Line connecting first two cages to third with buoy line came undone. Look for cages 1 & 2 downstream of 3.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 1**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**P**	**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**	**P**	**Siphlonuridae (mayflies)**	**C**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**C**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**A**
Gastropoda (snails)	**C**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**500**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies and good proportion of mayflies drives model up. However, hyperdominance of net-spinning caddis, and snails drives model down.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 2**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**	**P**	**Heptageniidae (mayflies)**	**C**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	**P**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	**P**
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**C**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**200**		
% Insecta	**85**	**% EPT***	**60**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies, good richness, and good proportion of mayflies drives model up. Dominance of net-spinning caddis, snails, and proportion of midges drives model down.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 3**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Bags-Wade			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	**C**
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)		**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**<100**		
% Insecta	**90+**	**% EPT***	**80+**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**Maybe B**

Presence of stoneflies and good proportion of mayflies drives model up. Lack of richness, lack of Heptageniid mayflies, dominance of polycentropid caddisflies drives model down.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 4**	Date Placed	**8/4/21**	Date Collected	**8/31/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**P**	**Other Ephemeroptera (mayflies)**	**P**
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)	**C**	**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**C**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)	**P**	**Perlidae (stoneflies)**		**Other**	

Est. Total Abundance	**100+**		
% Insecta	**80**	**% EPT***	**30**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**??**

Brachycentrid caddisflies, Heptageniid mayflies and other mayflies drives model up. Scuds, snails and lack of stoneflies drives model down. If just a few stoneflies are found then this can be B.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 5**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)		**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**P**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**50-75**		
% Insecta	**95**	**% EPT***	**70**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, presence of stoneflies, and little dominance of net-spinning caddisflies drives model up.

Moody Mountain Environmental 137 Diamond Str Searsmont ME 04973 ph.207-592-8540 moodymtn@tidewater.net

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 5-2**	Date Placed	**9/4/21**	Date Collected	**9/29/21**
Field Sample Method	**Baskets-Dive**			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**		**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)	**P**	**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	
Bivalvia (mussels)		**Perlidae (stoneflies)**	**P**	**Other**	

Est. Total Abundance	**50-75**		
% Insecta	**95**	**% EPT***	**70**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, presence of stoneflies, and little dominance of net-spinning caddisflies drives model up.

RAPID BIOASSESSMENT SURVEY
Data Sheet
(modified EPA Protocol I)

Location- **Andy**	**Site- 6**	Date Placed	**8/5/21**	Date Collected	**9/3/21**
Field Sample Method	Baskets-Dive			Count Method	

Absent/Not Observed	**Present**	**Common**	**Abundant**	**Dominant**

Qualitative Macrobenthos Sample List					
Turbellaria (flatworms)		**Anisoptera (dragonflies)**	**C**	**Other Ephemeroptera (mayflies)**	
Hirudinea (leeches)	**P**	**Zygoptera (damselflies)**		**Heptageniidae (mayflies)**	**P**
Oligochaeta (aquatic worms)		**Coleoptera (beetles)**		**Siphlonuridae (mayflies)**	
Isopoda (sow bugs)		**Sialidae (alderflies)**		**Other Trichoptera (caddisflies)**	
Amphipoda (scuds)		**Diptera (true flies)**		**Hydropsychidae (caddisflies)**	**P**
Decapoda (crayfish)		**Chironomidae (midges)**	**P**	**Polycentropodidae (caddisflies)**	**C**
Gastropoda (snails)	**P**	**Other Plecoptera (stoneflies)**		**Brachycentridae (caddisflies)**	**P**
Bivalvia (mussels)		**Perlidae (stoneflies)**	**C**	**Other**	

Est. Total Abundance	**100**		
% Insecta	**90**	**% EPT***	**80**
% Snails		**% Worms**	**--**
*** E=mayflies, P= stoneflies, T= caddisflies**			
Best Professional Judgement- Attains ME. Aquatic Life Class B?			**YES**

Generally low abundance, good richness, good #s of stoneflies and brachycentrid caddisflies drives model up.

Resume- Paul C. Leeper

Owner- Moody Mountain Environmental

Environmental Biology Firm specializing in permitting and research

137 Diamond Street
Searsmont ME 04973
Ph. 207-592-8540
moodymtn@tidewater.net

EDUCATION

B.S. Biology (Aquatic Ecology), Allegheny College, PA. 1979

EMPLOYMENT

2002- Present	Moody Mountain Environmental- Owner
1980 – 2002	Eco-Analysts, Inc., Vice-President/ Partner

CERTIFICATIONS

NABS Benthic Taxonomist
Habitat Evaluation Procedures (HEP) by USFWS
Instream Flow Incremental Methodologies (IFIM) by USFWS
SCUBA

Paul started Moody Mountain Environmental, the environmental research and permitting firm located in Searsmont, Maine, in 2002. His goal is to give clients quality research and environmental permitting services in a client-friendly, cost-effective process. He uses a clear project goal oriented approach in all aquatic, marine, and wetland permitting. Prior to founding his own company, Paul worked at ECO-ANALYSTS, INC. as Vice-President and partner.

Paul specializes in aquatic, marine and wetland community analyses. He has provided expert testimony numerous times before Maine's Board of Environmental Protection (BEP) and Land Use Regulatory Commission (LURC) as well as before a Massachusetts Administrative Law Judge. He has served on Maine's Environmental Priorities Committee and Maine's DEP Biocriteria Technical Advisory Committee. He was the Aquatic Expert Consultant for the Saco River Flow Negotiations for Central Maine Power Company.

He has designed and directed numerous biomonitoring and aquatic macroinvertebrate community analyses for FERC relicensing of hydropower projects, wastewater discharges, natural resource permits, and spill responses. Among these are analyses on the Hiram, West Buxton, Bonny Eagle and Skelton projects on the Saco. Recently he has worked on the Ellsworth Project on the Union River and the Brassua Project. He is experienced in microbial source tracking and threatened and endangered mussel identification/relocation.

Paul has also been active in wetland investigations, permitting, and mitigation for many years. He has been a Wetlands Expert Consultant before BEP and LURC for the Department of Conservation Mere Point Boat Ramp Development and the Burnt Jacket Rezoning on Moosehead Lake. He has investigated numerous mapped Significant Wildlife Habitats and successfully petitioned MDIFW and DEP to remap areas based on conditions on the ground. He is experienced in vernal pool identification, the legislation and rules. He has directed numerous wetland permit projects involving delineations and wetland restoration and construction for developers and industrial clients.

Marine work includes cruise ship sampling, wetland intertidal and subtidal studies, permitting, and monitoring for piers, dredging, undersea cable installations, marinas, aquaculture leases, and discharges in New Hampshire and Maine. This work includes eelgrass (*Zostera marina)* transplanting in dredge areas and plankton studies in support of a marine hydropower project.

Resume- Paul C. Leeper

Aquatic Invertebrate Community Analyses: Has designed and directed numerous biocriteria community analyses in support of FERC hydropower licensing, Maine Natural Resources Protection Act permits, wastewater discharge licenses, and spill responses. Selected projects include:

FERC Relicensing
Androscoggin River (Riley, Jay, Otis, Livermore Projects)
Little Androscoggin (Hackett Mills & Upper & Lower Barker Projects)
Kennebec River (Harris, Wyman & Williams Projects)
Saco River (Hiram, West Buxton, Bonny Eagle & Skelton Projects)
Moxie Stream (Moxie Project)
Magalloway River (Aziscohos Project)
Dead River (Flagstaff Project)
Little Ossippee River (Ledgemere Project)
Ossippee River (Kezar Falls Project)
Union River (Ellsworth Project)
Cobbossee Stream (American Tissue Project)
Mooselookmeguntic (Upper and Middle Projects)
Penobscot River (West Enfield Project)
Passadumkeag River (Lowell Tannery Project)
Flagstaff Lake Littoral Characterization
Graham Lake Littoral Characterization
Musquacook Lake Littoral Characterization
Mooselookmeguntic Lake Littoral Characterization
Upper and Lower Richardson Littoral Characterization

Wastewater Licenses
Presumpscot (S.D. Warren Mill)
St. Croix (GP Kraft Mill)

NRPA Permits
Bald Mountain (Boliden Resources, Inc.)
Carabassett Valley (Sugarloaf/USA)

Spill Responses
Martin Stream (DeCoster Egg Farms)
Bond Brook Tributary (PCB spill)
Riggs Brook (PCB Superfund site)
Mill Stream (landfill leachate spill)
Brunswick Naval Air Station (stormwater antifreeze spill)

STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

Mark C. Draper, Chair

William F. Hinkel
Executive Analyst

JANET T. MILLS
GOVERNOR

Ruth Ann Burke
Board Clerk

BOARD OF ENVIRONMENTAL PROTECTION
Meeting Minutes

December 2, 2021

The Board of Environmental Protection held a meeting on December 2, 2021, beginning at approximately 10:00 a.m. at the Marquardt State Office Building in Augusta and by remote means in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. On November 16, 2021, Chair Draper designated Board member Robert Duchesne to preside over the meeting.

Board: Robert Duchesne, Robert Sanford, and Steven Pelletier participated in-person.
James Parker participated remotely via Zoom.
Mark Draper, Susan Lessard, and Mark Dubois were absent.

Others: Melanie Loyzim, Commissioner
William Hinkel, Board Executive Analyst
Ruth Ann Burke, Board Clerk and Administrative Assistant
Scott Boak, Assistant Attorney General

I. ADMINISTRATIVE MATTERS, COMMENTS, AND NOTES

1. **Commissioner's Comments:** No comments.
2. **Chair's Comments:** No comments.
3. **Executive Analyst's Comments:** No comments.
4. **Board Calendar:** Mr. Hinkel commented that the next and last meeting if the year would be held at the Augusta Civic Center on December 16, 2021.
5. **Departmental Orders / Applications Accepted for Processing**: No comments.
6. **Requests for Board Jurisdiction:** No requests reported; no comments.

II. ADMINISTRATIVE MATTERS, COMMENTS, AND NOTES

(Note: Votes are recorded in the following order: number voting in favor of a motion – number voting against a motion – number abstaining – number absent)

1. BEP Meeting Minutes, November 18, 2021 (approval)

   By roll call vote, the Board voted (4-0-0-3) on a motion by Steven Pelletier and seconded by Robert Sanford to approve the minutes of November 18, 2021, as presented.

   The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper, Susan Lessard, and Mark Dubois were absent.

Mr. Duchesne noted that the next item on the agenda is the Board's deliberation of the Department's proposed revisions to Maine's water quality classification system and related standards for which certain Board members may not participate pursuant to Title 38 Section 341-C(8)(A). Board Chair Draper and Board members Susan Lessard and Mark Dubois were absent and did not participate in the December 2, 2021, meeting.

2. 2021 Triennial Review of Water Quality Standards, (deliberation)

   Staff: Susanne Meidel, Bureau of Water Quality
   Brian Kavanah, Bureau of Water Quality
   Rob Mohlar, Bureau of Water Quality

   The Board held a deliberative session and received from staff a briefing on the Department's proposed recommendations for changes to Maine's water quality classification system and related standards. Ms. Meidel, Mr. Kavanah, and Mr. Mohlar (water quality engineer) responded to Board member questions regarding the proposed water quality standards. Peter Rubins representing Grow L+A, Greg D'Augustine representing Maine Rivers, Will Plumley representing the Friends of the Presumpscot River, Scott Sells representing Friends of Merrymeeting Bay, and Ed Friedman representing Friends of Merrymeeting Bay offered comments on the proposed recommendations. Department staff intend to make any appropriate changes to the set of draft recommendations deliberated on December 2, 2021, and return to the Board on December 16, 2021, for a Board vote on the final recommendations of the Board that will be submitted to the Legislature, which maintains sole authority to make any changes in the classification of the waters of the State. No vote of the Board was taken on this matter at the December 2, 2021, meeting.

3. Town of Camden, Administrative Consent Agreement (approval)

   Staff: Laura Crossley, Bureau of Water Quality

   This administrative consent agreement involves violations of the Town's Maine Pollutant Discharge Elimination System permit; 38 M.R.S. § 413(1), Waste discharge licenses; and 38 M.R.S. § 414(5), Applications for licenses. The administrative consent agreement stipulates a monetary penalty of $25,511 of which $15,511 will be suspended contingent upon the implementation of an approved plan and schedule to address SSOs, including the rerouting and replacement of the force main at Sea Street, and the completion of a capacity, management, operations and maintenance plan. The Town shall pay $10,000 to the Maine Coast Heritage Trust as a Supplemental Environmental Project.

   Following a presentation by staff, the Board voted (4-0-0-3) on a motion by Steve Pelletier and seconded by James Parker to approve the administrative consent agreement, as presented. The Town did not comment on the administrative consent agreement during the Board meeting. The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper, Susan Lessard, and Mark Dubois were absent.

4. City of Brewer, Administrative Consent Agreement (approval)

   Staff: Laura Crossley, Bureau of Water Quality

   This administrative consent agreement involves violations of the City's Maine Pollutant Discharge Elimination System permit; 38 M.R.S. § 413(1), Waste discharge licenses; and 38 M.R.S. § 414(5), Applications for licenses. The administrative consent agreement stipulates a monetary penalty of $35,000.

   Following a presentation by staff, the Board voted (4-0-0-3) on a motion by Robert Sanford and seconded by James Parker to approve the administrative consent agreement, as presented. The City did not comment on the administrative consent agreement during the Board meeting. The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper, Susan Lessard, and Mark Dubois were absent.

5. Sprague Operating Resources LLC, Administrative Consent Agreement (approval)

   Staff: Pam Parker, Bureau of Water Quality

   This administrative consent agreement involves violations of 38 M.R.S. § 413(1), Waste discharge licenses. On December 2, 2020, Sprague personnel were operating a crane at their facility in Searsport to offload bales of solid recovered fuel (SRF) destined for incineration at the Penobscot Energy Recovery Company waste to energy plant. During transfer from the vessel to the pier, the lifting straps on two of the bales slipped, and the bales were dropped. One bale broke open, fell into the water, and sank immediately. The other bale fell directly into the water between the pier and the ship, remained intact, and slowly sank. The bales of SRF weighed approximately 1,250 pounds each. A significant amount of shredded plastic was discharged to the environment and was not completely recovered as part of the clean-up efforts. The administrative consent agreement stipulates a monetary penalty of $17,800.

Tim Winters representing Sprague, Peter Blair representing Conservation Law Foundation, Stephen Miller representing Islesboro Islands Trust, and Kat Taylor representing herself commented on the administrative consent agreement during the Board meeting.

Following a presentation by staff, the Board voted (3-1-0-3) on a motion by Robert Sanford and seconded by Steve Pelletier to approve the administrative consent agreement, as presented. The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper, Susan Lessard, and Mark Dubois were absent. James Parker voted against the motion.

The meeting adjourned at approximately 1:25 p.m.

STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

Mark C. Draper, Chair

William F. Hinkel
Executive Analyst

JANET T. MILLS
GOVERNOR

Ruth Ann Burke
Board Clerk

BOARD OF ENVIRONMENTAL PROTECTION
Meeting Minutes

December 16, 2021

The Board of Environmental Protection held a meeting on December 16, 2021, beginning at approximately 9:00 a.m. at the Augusta Civic Center in Augusta and by remote means in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*.

Board: Mark Draper, Robert Duchesne, Susan Lessard, Robert Sanford, and Steven Pelletier participated in-person. James Parker participated remotely via Zoom. Mark Dubois was absent.

Others: Melanie Loyzim, Commissioner
William Hinkel, Board Executive Analyst
Ruth Ann Burke, Board Clerk and Administrative Assistant
Scott Boak, Assistant Attorney General
Laura Jensen, Assistant Attorney General
Department staff as identified below

I. ADMINISTRATIVE MATTERS, COMMENTS, AND NOTES

1. **Commissioner's Comments:** Commissioner Loyzim informed the Board of organizational and staffing changes within the Bureau of Land Resources.
2. **Chair's Comments:** No comments.
3. **Executive Analyst's Comments:** Mr. Hinkel noted that on December 15, 2021, the Board Clerk circulated to Board members a memorandum from Air Quality Bureau Director Jeff Crawford regarding the Chapter 128 matter on the December 16, 2021, agenda. A revised agenda was posted with the memorandum.
4. **Board Calendar:** Mr. Hinkel recommended that the Board next meet on January 20, 2022.
5. **Departmental Orders / Applications Accepted for Processing**: No comments.
6. **Requests for Board Jurisdiction:** No requests reported; no comments.

II. APPROVAL OF BOARD MINUTES

(Note: Votes are recorded in the following order: number voting in favor of a motion – number voting against a motion – number abstaining – number absent)

1. BEP Meeting Minutes, December 2, 2021 (approval)

   By roll call vote, the Board voted (5-0-1-1) on a motion by Robert Duchesne and seconded by Robert Sanford to approve the minutes of December 2, 2021, as presented.

   The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Susan Lessard abstained.

III. CURRENT ITEMS FOR BOARD CONSIDERATION

Chair Draper noted that the next item on the agenda is the Board's consideration of recommendations for changes to the State's water classifications and related standards (2021 Triennial Review of Water Quality Standards) for which certain Board members may not participate pursuant to Title 38 Section 341-C(8)(A). Board Chair Draper designated Robert Duchesne to preside over the 2021 Triennial Review of Water Quality Standards agenda item. Chair Draper and Board member Susan Lessard recused themselves and did not participate in the subsequent deliberation or vote on this matter.

2. 2021 Triennial Review of Water Quality Standards, (approval)

   Staff: Susanne Meidel, Bureau of Water Quality
   Brian Kavanah, Bureau of Water Quality

   Department staff briefed the Board regarding changes made to the draft 2021 Triennial Review of Water Quality Standards presented to the Board for deliberation on December 2, 2021. The Board then deliberated the recommendations of the Department staff regarding the prior recommendations for the Androscoggin River and the Presumpscot River.

   By roll call vote, the Board voted (1-3-2-1) on a motion Robert Sanford and seconded by James Parker to revise the proposed recommendations involving the State's water quality classification system and related standards as presented by staff on December 16, 2021, to include a recommendation to upgrade both the Lower Androscoggin and Presumpscot Rivers from Class C to Class B. Robert Duchesne, Steve Pelletier, and James Parker voted against the motion. Consequently, the motion failed.

The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper and Susan Lessard abstained; Mark Dubois was absent.

By roll call vote, the Board next voted (4-0-2-1) on a motion by Steve Pelletier and seconded by Robert Sanford to revise the proposed recommendations involving the State's water quality classification system and related standards as presented by staff on December 16, 2021, to include a more limited recommendation (compared to the recommendation associated with the previous failed motion) to upgrade the Androscoggin River from Worumbo Dam in Lisbon Falls to Merrymeeting Bay from Class C to Class B, along with the Department staff's analysis for the benefit of the Legislature.

The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper and Susan Lessard abstained; Mark Dubois was absent.

By roll call vote, the Board voted (4-0-2-1) on a motion by Robert Sanford and seconded by James Parker to approve for submission to the Maine Legislature for its consideration, the proposed recommendations involving the State's water quality classification system and related standards presented by staff on December 16, 2021, as revised by the prior Board vote to include a recommendation to upgrade the Androscoggin River from Worumbo Dam in Lisbon Falls to Merrymeeting Bay from Class C to Class B, through a letter from the Board Chair to the Chairs of the Joint Standing Committee on Environment and Natural Resources, along with all written comments accepted by the Department, the transcript of the hearing on October 7, 2021, and the Department's response to comments as prepared by staff.

The vote was taken pursuant to 38 M.R.S. § 341-D and in accordance with the Board's *Policy Regarding Remote Participation in Board Proceedings*. Mark Draper and Susan Lessard abstained.

Following the vote, Chair Draper and Board member Susan Lessard returned to the meeting, with Mr. Draper resuming his role as Chair.

3. Chapter 128: Advanced Clean Trucks Program (deliberative session)

Staff: Jeff Crawford, Bureau of Air Quality
Lynne Cayting, Bureau of Air Quality

Mr. Crawford and Ms. Cayting briefed the Board regarding the status of the Department's Chapter 128 rulemaking effort and discussed questions and concerns that were raised earlier in the process, including during the hearing held by the Board on November 4, 2021. Department staff addressed the Board's authority to adopt the proposed rule; stakeholder participation; the flexibility of the proposed rule in terms of meeting its requirements if adopted by the Board; emission reductions and health benefits anticipated from the adoption of the proposed rule; costs related to the proposed rule; grid capacity and infrastructure development; and the availability of zero-emission vehicles. Department staff anticipates returning to the Board to seek approval to repost the proposed rule for further public comment.

No vote of the Board was taken regarding this matter.

4. <u>Chapter 147: Hydrofluorocarbon Prohibitions (adoption)</u>

   <u>Staff</u>: Jeff Crawford, Bureau of Air Quality
   Erle Townsend, Policy Development Specialist

   Mr. Crawford and Mr. Townsend provided an overview of the Department's recommendation to adopt the proposed rule Chapter 147 Hydrofluorocarbon Prohibitions, as presented with one minor change in the last sentence of subsection 4(C) of the proposed rule to clarify the intent of the exemptions. (The minor change is identified in a markup draft of the proposed rule provided to the Board in advance of the meeting.)

   Following a presentation by staff and response to questions of the Board, the Board voted (6-0-0-1) on a motion by James Parker and seconded by Robert Duchesne to adopt the proposed Chapter 147 Hydrofluorocarbon Prohibitions, as presented with the one minor change in subsection 4(C).

   The vote was taken pursuant to 38 M.R.S. § 341-D.

5. <u>Chapter 169: Stationary Generators (repost for comment)</u>

   <u>Staff</u>: Jeff Crawford, Bureau of Air Quality
   Lynn Muzzey, Bureau of Air Quality

   Mr. Crawford and Ms. Muzzey briefed the Board regarding the status of the Chapter 169 rulemaking effort. In response to public comments received earlier in the process, the Department recommends that certain changes to the proposed rule be made and that the revised proposed rule be reposted for additional comment. Staff identified that the requirement for emergency generators to meet the more stringent federal standards for non-emergency engines has been limited to generators powered by an engine with a rated output equal to or greater than 1,000 brake horsepower, as opposed to the original proposed requirement for groups of engines totaling more than 1,000 kilowatts to meet those standards.

   Following a presentation by staff and response to questions of the Board, the Board voted (6-0-0-1) on a motion by Robert Duchesne and seconded by Robert Sanford to repost the proposed Chapter 169 rule for additional comment.

The vote was taken pursuant to 38 M.R.S. § 341-D.

6. Chapter 170: Degassing of Petroleum Storage Tanks, Marine Vessels and Transport Vessels (post for hearing)

   Staff: Jeff Crawford, Bureau of Air Quality
   Lynn Muzzey, Bureau of Air Quality

   Mr. Crawford and Ms. Muzzey briefed the Board regarding a new proposed rule, Chapter 170 Degassing of Petroleum Storage Tanks, Marine Vessels and Transport Vessels and the Department's recommendation that the Board post the proposed rule for a hearing.

   Following a presentation by staff and response to questions of the Board, the Board voted (6-0-0-1) on a motion by Robert Duchesne and seconded by James Parker to post the proposed Chapter 170 rule for a hearing.

   The vote was taken pursuant to 38 M.R.S. § 341-D.

7. Chapter 171: Control of Petroleum Storage Facilities (post for hearing)

   Staff: Jeff Crawford, Bureau of Air Quality
   Lynn Muzzey, Bureau of Air Quality

   Mr. Crawford and Ms. Muzzey briefed the Board regarding a new proposed rule, Chapter 171 Control of Petroleum Storage Facilities and the Department's recommendation that the Board post the proposed rule for a hearing.

   Following a presentation by staff and response to questions of the Board, the Board voted (6-0-0-1) on a motion by Robert Duchesne and seconded by Steve Pelletier to post the proposed Chapter 171 rule for a hearing.

   The vote was taken pursuant to 38 M.R.S. § 341-D.

8. Chapter 180: Appliance Efficiency Standards (post for hearing)

   Staff: Jeff Crawford, Bureau of Air Quality
   Erle Townsend, Policy Development Specialist

   Mr. Crawford and Ms. Townsend briefed the Board regarding a new proposed rule, Chapter 180 Appliance Efficiency Standards and the Department's recommendation that the Board post the proposed rule for a hearing.

   Following a presentation by staff and response to questions of the Board, the Board voted (6-0-0-1) on a motion by Robert Duchesne and seconded by Robert Sanford to post the proposed Chapter 180 rule for a hearing.

The vote was taken pursuant to 38 M.R.S. § 341-D.

9. Board Report to the Legislature (discussion)

   Staff: William Hinkel, Board Executive Analyst

   Prior to the meeting, Mr. Hinkel circulated to Board members a copy of the Board’s draft Report to the Joint Standing Committee on Environment and Natural Resources (ENR) prepared in accordance with 38 M.R.S. § 341-D(7). Board members discussed the draft report and directed Mr. Hinkel to coordinate final revisions with Chair Draper prior to submission to the ENR in January 2022.

   No vote of the Board was taken regarding this matter.

IV. ADJOURN

The meeting adjourned at approximately 11:45 a.m.

STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION
Meeting Notice and Agenda – REVISED

What: Meeting of the Board of Environmental Protection

When: December 16, 2021, at 9:00 a.m.

Where: Augusta Civic Center, 76 Community Drive, Augusta, Maine 04330

Meeting method: Hybrid remote meeting (in-person and remote means of participation)

How to participate: Members of the public may attend and, when there is an opportunity for public input on a matter before the Board, participate in the December 16, 2021, Board meeting both in-person at the location identified above and through remote means via Zoom or telephone. Persons who have a disability and who seek reasonable accommodation to participate in the meeting should contact Board Clerk Ruth Ann Burke ruth.a.burke@maine.gov or 207-287-2811.

Join by Zoom:
https://mainestate.zoom.us/j/83059521047
Meeting ID: 830 5952 1047

Join by phone:
1-646-876-9923
Meeting ID: 830 5952 1047

I. ADMINISTRATIVE MATTERS, COMMENTS, AND NOTES

1. Commissioner's Comments
2. Chair's Comments
3. Executive Analyst's Comments
4. Calendar
5. Department Orders / Applications Accepted for Processing
6. Requests for Board Jurisdiction (no materials for this meeting)

II. APPROVAL OF BOARD MINUTES

1. Minutes of December 2, 2021 *(Approval)*

III. CURRENT ITEMS FOR BOARD CONSIDERATION

1. Triennial Water Quality *(Approval)*
   Staff Person: Susanne Meidel, Bureau of Water Quality
   - Staff Memo
   - Final Recommendations
   - Appendix B1
   - Appendix B2
   - Appendix C
   - Comments and Response to Comments

2. Chapter 128: Advanced Clean Trucks *(Deliberative Session)*
   Staff Person: Lynne Cayting & Jeff Crawford, Bureau of Air Quality
   - Staff Memo with overview
   - Next Steps Memo
   - Summary of Comments

3. Chapter 147: Hydrofluorocarbon Prohibitions *(Adoption)*
   Staff Person: Jeff Crawford, Bureau of Air Quality & Erle Townsend, Office of the Commissioner
   - Staff Memo
   - Chapter 147 with markup
   - Chapter 147 clean w/out markup
   - Basis Statement and Response to Comments

   Pursuant to 38 M.R.S. § 341-H(3-A), the Board will accept and consider at its meeting on December 16, 2021, additional public comment on the proposed Chapter 147 rule that: (a) is directly related to comments received during the formal rulemaking comment period; or (b) is in response to changes to the proposed rule. Such comments may be offered either in-person or through remote means.

4. Chapter 169: Stationary Generators *(Repost for Public Comment)*
   Staff Person: Lynn Muzzey, Bureau of Air Quality
   - Staff Memo
   - Chapter 169 with markup
   - Chapter 169 clean w/out markup

5. Chapter 170: Degassing of Petroleum Storage Tanks, Marine Vessels and Transport Vessels *(Post for Public Hearing)*
   Staff Person: Lynn Muzzey, Bureau of Air Quality
   - Staff Memo
   - Chapter 170 Posting Draft

APPELLANT SUPP. EX. 9 P.2

6. Chapter 171: Control of Petroleum Storage Facilities *(Post for Public Hearing)*
   Staff Person: Jeff Crawford, Bureau of Air Quality
   Staff Memo
   Chapter 171 Posting Draft

7. Chapter 180: Appliance Efficiency Standards *(Post for Public Hearing)*
   Staff Person: Jeff Crawford, Bureau of Air Quality
   Staff Memo
   Chapter 180 Posting Draft
   Reference Links

8. Board Report to the Legislature (*Discussion*)
   Staff Person: William Hinkel, Board Executive Analyst
   (No packet materials for this agenda item)

IV. ADJOURN

LD 1964 Public Hearing Comments at ENR

Referred to Committee on Environment and Natural Resources on Feb 10, 2022.
Latest Committee Action: Reported Out, Mar 17, 2022, OTP-AM
Latest Committee Report: Mar 17, 2022; Ought To Pass As Amended

Public HearingsMonday, February 28, 2022 9:00 AM,Cross Building, Room 216

Disclaimer: The following documents are digital reproductions of written testimony presented to joint standing committees before and during public hearings. The Legislature is not responsible for the content, accuracy, or appropriateness of any testimony posted herein and takes no position supporting or opposing views expressed in the testimony. The documents are posted solely for convenient viewing by interested persons; they are not official copies and may not represent a complete record of a hearing. Contact the committee clerk for additional information.

Public Hearing Testimony

Abbott, Daniel	Portland	(79 KB)
Adelman, Thomas	Pembroke	(76 KB)
Ahearn, Beth	Environmental Priorities Coalition	(158 KB)
Alexander, David	Gorham	(73 KB)
Anchors, Zack	Portland Paddle	(153 KB)
Anderson, Nancy	Cumberland	(35 KB)
Andrews, Penelope	Hermon	(77 KB)
Anspacher, Susan	Portland	(81 KB)
belle, sebastian	HALLOWELL	(107 KB)
Bengs, Samantha	Cape Elizabeth	(83 KB)
Bennett, Nick	NRCM	(136 KB)
Bernard, Kaitlyn	The Nature Conservancy	(134 KB)
Bosco, Susan	Portland	(81 KB)
Brzozowski , Phil	Brunswick	(35 KB)
Burrows, John	Atlantic Salmon Federation	(129 KB)
Cannon, Matt	Sierra Club Maine	(128 KB)
Chandler, John	Portland, ME	(85 KB)
Christie, Jeanne	Maine Wilderness Guides Organization	(123 KB)
Chute, James	Freeport	(35 KB)
Ciccotelli, Brett	Downeast Salmon Federation	(29169 KB)
Cichocki, Fred	Wiscasset	(35 KB)
Cobb, Wayne	Portland	(35 KB)
Conly , Kate	Edgecomb , ME	(75 KB)
Cumming, Nan	Portland Parks Conservancy	(147 KB)
DAugustine, Gregory	Greene	(55 KB)
Drake, C. Lee	Frybeburg	(73 KB)

Drinan, Paul	Westbrook	(76 KB)
Dudley, Eric	Westbrook	(227 KB)
Emery, Daniel	North Yarmouth	(79 KB)
Erickson, Janice	Westbrook	(60 KB)
Farnham, Lia	South Portland	(72 KB)
Ferris-Olson, Pam	Freeport	(78 KB)
fiori, andrew	bowdoinham	(72 KB)
Firmin, Scott	Portland Water District	(184 KB)
Follansbee, Mark	Scarborough	(78 KB)
Forman, Paul	South Portland	(79 KB)
Fox, Jennifer	Portland, Maine	(74 KB)
Franceschi, Jennie	Westbrook	(416 KB)
Friedman, Ed	Friends of Merrymeeting Bay	(1053 KB)
Frignoca, Ivy	South Portland	(719 KB)
Frignoca, Ivy	South Portland	(751 KB)
Fullam, Charlotte	Portland	(49 KB)
Furbish, Lawrence	Sanford	(49 KB)
Garrett, Peter	Winslow	(81 KB)
Hagens, Bethe	Kennebunkport	(78 KB)
Hall, Kim	Portland	(80 KB)
Hench, Laura	Freeport	(82 KB)
Hench, Laura	Freeport	(82 KB)
Higgins, George	Friends of Casco Bay and Peaks Island	(126 KB)
Hodgson, Kate	South Portland	(72 KB)
Hudson, Landis	Maine Rivers	(165 KB)
Hulst, Ann	Falmouth	(79 KB)
Jean, Carole	Portland	(70 KB)
Johnson, Cathy	Friends of Katahdin Woods and Waters	(156 KB)
Kavanah, Brian	DEP	(159 KB)
Kistenmacher, Sue	Farmingdale	(79 KB)
Knowles, William	Westbrook	(72 KB)
Kraske, Chuck	Pixelle Androscoggin LLC	(145 KB)
Kusnierz, Daniel	Penobscot Indian Nation	(175 KB)
Lane, Gordon	Sappi	(159 KB)
Lizanecz, Ryan	Maine Audubon	(134 KB)
Lizanecz, Ryan	Maine Audubon	(134 KB)
Lucas, Ben	Maine State Chamber of Commerce	(155 KB)
Luther, Doris	Hollis, Maine	(36 KB)
Lyman, Sarah	New Gloucester	(80 KB)
M Reardon, Jeffrey	Trout Unlimited	(215 KB)

Markgren, Derek	Falmouth	(70 KB)
Mason, James	Portland	(63 KB)
McIntyre, John	Presque Isle,	(35 KB)
Michaels, Laurel	Kennebunk	(69 KB)
Michaud, Tracy	Scarborough	(81 KB)
Moulton, Francis	Ashland	(75 KB)
Nemeth, Maranda	Bath	(81 KB)
Owens, Tony	Cape Elizabeth	(76 KB)
Pedreschi, Ann	Holden	(75 KB)
PEGGY, YORK	Portland	(75 KB)
Piacentini, Kirsten	Friends of Casco Bay	(79 KB)
Plavsic, Mila	Falmouth, ME	(74 KB)
Plog, Anna	Madrid Twp.	(78 KB)
Plumley, Will	Friends of the Presumpscot River	(299 KB)
Plumley, Will	Friends of the Presumpscot River	(145 KB)
Price, Alexander	Maine Jobs Council	(106 KB)
Reed, Scott	ND Paper	(244 KB)
Rubins, Peter	GROW L+A	(67 KB)
Sanders, Lucy	Arlington, MA	(65 KB)
Sanders, Tom	Resident	(72 KB)
Scholar, Sandra	Sapling Township	(80 KB)
Shaughnessy, Ciaran	National Science Foundation	(195 KB)
Shaughnessy, Michael	Friends of the Presumpscot River	(124 KB)
Sheinkopf, Laura	Belfast	(72 KB)
simmons, edward	yarmouth	(69 KB)
Smith, Barbara	Freeport	(79 KB)
Smith, David	Portland	(79 KB)
smith, ronald	freeport	(79 KB)
Smith, William Douglas	Windham	(62 KB)
Smith, William Douglas	Windham	(84 KB)
Strauch, Patrick	Maine Forest Products Coucnil	(296 KB)
Streeter, Elizabeth	Portland	(78 KB)
Stuckey, Peter	Portland	(73 KB)
Szatkowski, Victoria	Westbrook	(75 KB)
Townsend, Eliza	Appalachian Mountain Club	(656 KB)
Tupper, Mariana	Yarmouth	(71 KB)
Turner, Jessica	Friends of Casco Bay	(68 KB)
Van Duyne, Scott	Palo Alto, CA	(83 KB)
VanBurgel, David	Mercer	(74 KB)
Vistein, Geri	Morrill	(81 KB)

Watts, Helen	Bowdoin	(123 KB)
Williams, Janet	Searsport	(74 KB)
Winchester, Anne	Bristol	(77 KB)
Woods, Linda	Waterville	(104 KB)
Zuretti, Steve	Brookfield Renewable	(146 KB)

Work SessionsWednesday, March 2, 2022 11:00 AM,Cross Building, Room 216

Committee Docket

Date	Action	Result
Mar 2, 2022	Work Session Held	
Mar 2, 2022	Voted	OTP-AM
Mar 17, 2022	Reported Out	OTP-AM

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

TESTIMONY OF

BRIAN KAVANAH, DIRECTOR
BUREAU OF WATER QUALITY
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

SPEAKING IN SUPPORT OF L.D. 1964

AN ACT TO UPDATE CERTAIN WATER QUALITY STANDARDS AND TO RECLASSIFY CERTAIN WATERS OF THE STATE

SPONSORED BY SENATOR BRENNER

BEFORE THE JOINT STANDING COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

DATE OF HEARING:

February 28, 2022

Senator Brenner, Representative Tucker, and members of the Committee, I am Brian Kavanah, Director of the Bureau of Water Quality at the Department of Environmental Protection. I am speaking in support of L.D. 1964.

This bill is the final step in the Triennial Review process. The Triennial Review, required by the Clean Water Act and Maine law (38 M.R.S.§464.3.B.), is a comprehensive review, and potential revision, of Maine’s water quality standards. The process was started by the Department in January 2020 with a request to a wide range of interested parties to submit proposals for changes to Maine's water quality standards. That was followed by an assessment of the proposals by Department staff (in consultation with outside parties as appropriate), draft recommendations by staff, a public comment period on the staff draft recommendations, and revised draft staff recommendations that were presented to the Board of Environmental Protection (Board). The Board then conducted a public hearing and comment period, a deliberative session, and finally a vote that resulted in the Board's recommendations to the Legislature in a formal report entitled, *Board of Environmental Protection Recommendations to the Legislature for Certain Changes to Water Quality Classifications and Related Standards 2021 Triennial Review,* and in this L.D. 1964. Ultimately, the Environmental Protection Agency must give final approval to any changes to water quality standards made by the Maine Legislature as part of this process.

Maine's water quality standards describe what uses, such as recreation in or on the water, or fishing, are appropriate for which waterbodies, and which criteria and antidegradation measures are in place to protect those uses. There are a variety of criteria that may be numeric or narrative. Examples of numeric criteria include dissolved oxygen, pH, and bacteria. Examples of narrative criteria include characterization of habitat and aquatic life.

L.D. 1964 is extensive with 51 Sections. I'll briefly summarize the sections with the intent that this summary can serve as a guide to the structure of the bill. I will also highlight particularly important sections. You should also note that the Board's report has detailed information regarding the water quality revisions proposed in the bill.

Sections 1, 3, 4, 5, 8, & 17 are drafting and procedural recommendations made by the ENR analyst and are not part of the triennial review process but are supported by the Department.

Sections 22 & 23 correct location drafting errors.

Sections 43, 44 and 46 are typographical corrections of water body names.

Several sections of the bill will implement changes requested or required by the Environmental Protection Agency to ensure Maine's water quality standards are consistent with the Clean Water Act. These are sections 2 and 47, and a portion of sections 6, 14, 15, and 16.

Several sections of the bill are based on recommendations from the Department to revise water quality standards to make them more consistent with EPA recommendations, to reflect the latest science, and to clarify statutory intent. These are sections 6, 7 and 11-16. However, the Department is recommending that the last sentence of Section 13 regarding aquatic life in GPA waters be struck. This new language was an addition that Department staff had recommended, however it came to our attention very recently that this addition could have unintended consequences and we have not had the opportunity at this point to fully explore the issue. The Department and the Board did not receive any specific comments on this issue through the triennial review process, and the Board did not discuss this issue during their deliberative sessions. We plan to develop revised language (in consultation with EPA) that may be submitted for legislation next session.

Several sections of the bill add a new reporting unit for bacteria testing as recommended by Idexx lab. These sections are 9-16 and 18.

Several sections of the bill propose to upgrade water classifications in certain water bodies. These are sections 19-21, 24-42, 45, and 47-51. These upgrades would move the waterbodies to the next highest classification. Three of these sections upgrade the classifications from C to B (Sections 19, 41 & 47). Ten of these sections upgrade the classifications from B to A (Sections 20, 21, 24, 39, 40, 42, & 48-51). Fourteen of these sections upgrade the classifications from A to AA (Sections 24-31, 33-36, 38, & 45). (Section 32 is drafting required to facilitate the upgrade in Section 33.)

These upgrades were recommended by a variety of interested parties, some by the Department, and ultimately all those included in this bill were recommended by the Board to the Legislature.

One upgrade in particular is worth noting. Section 19 upgrades the classification for the lower Androscoggin River, from Worumbo Dam to Merrymeeting Bay, from Class C to Class B. As you know, L.D. 676, *An Act to Reclassify Part of the Androscoggin River to Class B*, was carried over from last session to allow the Triennial Review process to proceed so that the ENR Committee could be informed by the Board's recommendation on this issue. Senator Claxton recently informed the committee of his intention to amend L.D. 676 to be used for a different purpose, with the understanding that the committee would consider the lower Androscoggin River upgrade as part of this Triennial Review bill.

The Board, after considering all of the public comments on this issue, and the Department's recommendation to not support this upgrade, voted 4-0 to recommend to the Legislature that the section of the lower Androscoggin River from Worumbo Dam in Lisbon Falls to Merrymeeting Bay be upgraded to Class B. This section is significantly shorter than the section that was proposed in L.D. 676, as it starts at Worumbo Dam in Lisbon Falls rather than Gulf Island Dam which is approximately 19 miles upriver in the northern tip of Lewiston. Additional information on this issue is provided in the Board's report to the Legislature[1], on pages 48-51.

Since the Board's deliberative session and vote on this issue, the Department has had additional time to assess the potential changes that may be required to waste discharge licenses upriver of this smaller section recommended by the Board. While the larger segment that was originally proposed in L.D. 676 required reductions in the license limits for the three paper mills in the upper Androscoggin, and for the Lewiston Auburn Water Pollution Control Authority (LAWPCA), this smaller segment recommended by the Board does not, in the Department's judgement, require reductions in license limits. This is due primarily to the decoupling of this section from the complexities of Gulf Island Pond, which allowed for a different approach to assess potential impacts from dischargers, and a limited degree of additional reaeration and BOD decay capacity provided by the 19-mile segment between Gulf Island Dam and Worumbo Dam.

In summary, L.D. 1964, is the result of an extensive public process. It contains a variety of recommendations from the Board of Environmental Protection that would update Maine's water quality standards to make them more consistent with the Clean Water Act and to reclassify certain water bodies consistent with the latest data and highest use of these waters.

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[1] *Board of Environmental Protection Recommendations to the Legislature for Certain Changes to Water Quality Classifications and Related Standards 2021 Triennial Review*

I would be happy to answer any questions now or at the work session.

Thank you.

State of Maine Legislature

Summary of LD 1964

https://www.mainelegislature.org/LawMakerWeb/summary.asp?ID=280082684

Bill Info

LD 1964 (SP 690)

"An Act To Update Certain Water Quality Standards and To Reclassify Certain Waters of the State"

Status Summary

Reference Committee	**Environment and Natural Resources**
Last House Action	**3/24/2022 - PASSED TO BE ENACTED**. **ROLL CALL NO. 483** (Yeas 129 - Nays 0 - Absent 19 - Excused 0 - Vacant 3) Sent for concurrence. ORDERED SENT FORTHWITH.
Last Senate Action	**3/29/2022 - PASSED TO BE ENACTED**, in concurrence. Roll Call Ordered Roll Call Number 654 Yeas 33 - Nays 0 - Excused 1 - Absent 0
Last Engrossed by House on	**3/22/2022**
Last Engrossed by Senate on	**3/22/2022**
Governor Action	**Signed by the Governor**
Chapter	**551**
Final Law Type	**Public Law**
Date	**3/31/2022**

Summary

Actions

Bill Text and Other Docs

Committee Info

Title & Section

Amendments

Sponsors

Roll-calls

Subje

APPROVED	CHAPTER
MARCH 31, 2022	551
BY GOVERNOR	PUBLIC LAW

STATE OF MAINE

IN THE YEAR OF OUR LORD

TWO THOUSAND TWENTY-TWO

S.P. 690 - L.D. 1964

An Act To Update Certain Water Quality Standards and To Reclassify Certain Waters of the State

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 38 MRSA §361-A, sub-§1-L, as enacted by PL 2017, c. 319, §1, is repealed.

Sec. 2. 38 MRSA §363-D, as enacted by PL 1993, c. 579, §1, is amended to read:

§363-D. Waiver or modification of protection and improvement laws

The commissioner or the commissioner's designee may waive or modify any of the provisions of this chapter if that waiver or modification promotes or assists any oil spill response activity conducted in accordance with the national contingency plan, a federal contingency plan, the state marine oil spill contingency plan, or as otherwise directed by the federal on-scene coordinator, the commissioner or commissioner's designee. A waiver issued by the commissioner under this section must be in writing.

This section does not apply to state or federal water quality standards applicable to any waters of the State, including, but not limited to, designated uses, criteria to protect existing and designated uses and antidegradation policies.

Sec. 3. 38 MRSA §464, sub-§2, ¶C, as enacted by PL 1985, c. 698, §15, is amended to read:

C. ~~The~~ Pursuant to subsection 3, paragraph B, the board may recommend changes in classification it ~~deems~~ considers necessary to the Legislature.

Sec. 4. 38 MRSA §464, sub-§2-A, ¶E, as enacted by PL 1993, c. 344, §1, is amended to read:

E. If the board adopts a proposal to enact a designated use under paragraph A, subparagraph (1) or to remove a designated use or adopt a subcategory of a designated use under paragraph A, subparagraph (2), it shall ~~forward that proposal~~ submit to the joint standing committee of the Legislature having jurisdiction over environment and natural resources matters ~~at~~ during the next regular session of the Legislature a report that includes that recommendation and the joint standing committee may report out legislation to implement that recommendation. The board may not ~~forward~~ propose any other recommendation to the Legislature under this subsection. The Legislature has sole authority to make changes in the designated uses of the waters of the State, including the creation of a subcategory of a designated use.

Sec. 5. 38 MRSA §464, sub-§3, as amended by PL 2015, c. 124, §6, is further amended to read:

3. Reports to the Legislature. The ~~department~~ commissioner or the board, as applicable, shall periodically report to the Legislature as ~~governed by the following provisions~~ follows.

A. ~~The commissioner shall submit to~~ During the first regular session of each Legislature, the commissioner shall submit to the joint standing committee of the Legislature having jurisdiction over environment and natural resources matters a report on the quality of the State's waters ~~which~~ that describes existing water quality, identifies waters that are not attaining their classification and states what measures are necessary for the attainment of the standards of their classification.

B. The board shall, from time to time, but at least once every 3 years, hold public hearings for the purpose of reviewing the water quality classification system and related standards and, as appropriate, recommending changes in the standards ~~to the Legislature~~. After conducting the review, the board shall submit to the joint standing committee of the Legislature having jurisdiction over environment and natural resources matters a report describing the board's findings and any recommendations for changes to the water quality classification system and related standards and the joint standing committee may report out legislation to implement those recommendations.

C. ~~The commissioner shall report to~~ During the first regular session of each Legislature, the commissioner shall submit to the joint standing committee of the Legislature having jurisdiction over environment and natural resources matters a report on the status of licensed discharges.

Sec. 6. 38 MRSA §464, sub-§4, ¶A, as amended by PL 2017, c. 319, §2, is further amended by amending subparagraph (5) to read:

(5) Discharge of pollutants to any water of the State that violates sections 465, 465-A and 465-B, except as provided in section 451; causes the ~~"~~pH~~"~~ of fresh waters to fall outside of the ~~6.0 to 8.5~~ 6.5 to 9.0 range; or causes the ~~"~~pH~~"~~ of estuarine and marine waters to fall outside of the 7.0 to 8.5 range;

Sec. 7. 38 MRSA §464, sub-§4, ¶F, as amended by PL 1991, c. 66, Pt. B, §1, is further amended by amending subparagraph (2) to read:

(2) Where high quality waters of the State constitute an outstanding national resource, that water quality must be maintained and protected. For purposes of this paragraph, the following waters are considered outstanding national resources: those water bodies in national and state parks and wildlife refuges and in the Katahdin Woods and Waters National Monument; those water bodies in public reserved lands; and those water bodies classified as Class AA and SA waters pursuant to section 465, subsection 1; section 465-B, subsection 1; and listed under sections 467, 468 and 469.

Sec. 8. 38 MRSA §464, sub-§4, ¶F, as amended by PL 1991, c. 66, Pt. B, §1, is further amended by amending subparagraph (4) to read:

(4) When the actual quality of any classified water exceeds the minimum standards of the next highest classification, that higher water quality must be maintained and protected. ~~The~~ Pursuant to subsection 3, paragraph B, the board shall recommend to the Legislature that that water be reclassified in the next higher classification.

Sec. 9. 38 MRSA §465, sub-§1, ¶B, as amended by PL 2017, c. 319, §4, is further amended to read:

B. The aquatic life, dissolved oxygen and bacteria content of Class AA waters must be as naturally occurs, except that the number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval.

Sec. 10. 38 MRSA §465, sub-§2, ¶B, as amended by PL 2017, c. 319, §5, is further amended to read:

B. The dissolved oxygen content of Class A waters may not be less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 parts per million and the one-day minimum dissolved oxygen concentration may not be less than 8.0 parts per million in identified fish spawning areas. The aquatic life and bacteria content of Class A waters must be as naturally occurs, except that the numbers of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval.

Sec. 11. 38 MRSA §465, sub-§3, ¶B, as amended by PL 2017, c. 319, §6, is further amended to read:

B. Class B waters must be of sufficient quality to support all aquatic species indigenous to those waters without detrimental changes in the resident biological community. The dissolved oxygen content of Class B waters may not be less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 parts per million and the one-day minimum dissolved oxygen concentration may not be less than 8.0 parts per million in identified fish spawning areas. Between April 15th and October 31st, the number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval.

Sec. 12. 38 MRSA §465, sub-§4, ¶B, as amended by PL 2017, c. 319, §8, is further amended to read:

B. Class C waters must be of sufficient quality to support all species of fish indigenous to those waters and to maintain the structure and function of the resident biological community. The dissolved oxygen content of Class C water may not be less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes must be maintained. In order to provide additional protection for the growth of indigenous fish, the following standards apply.

(1) The 30-day average dissolved oxygen criterion of a Class C water is 6.5 parts per million using a temperature of 22 degrees centigrade or the ambient temperature of the water body, whichever is less, if:

(a) A license or water quality certificate other than a general permit was issued prior to March 16, 2004 for the Class C water and was not based on a 6.5 parts per million 30-day average dissolved oxygen criterion; or

(b) A discharge or a hydropower project was in existence on March 16, 2005 and required but did not have a license or water quality certificate other than a general permit for the Class C water.

This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004.

(2) In Class C waters not governed by subparagraph (1), dissolved oxygen may not be less than 6.5 parts per million as a 30-day average based upon a temperature of 24 degrees centigrade or the ambient temperature of the water body, whichever is less. This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004.

The department may negotiate and enter into agreements with licensees and water quality certificate holders in order to provide further protection for the growth of indigenous fish. Agreements entered into under this paragraph are enforceable as department orders according to the provisions of sections 347-A to 349.

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 <u>or MPN</u> per 100 milliliters over a 90-day interval or 236 CFU <u>or MPN</u> per 100 milliliters in more than 10% of the samples in any 90-day interval. The board shall adopt rules governing the procedure for designation of spawning areas. Those rules must include provision for periodic review of designated spawning areas and consultation with affected persons prior to designation of a stretch of water as a spawning area.

Sec. 13. 38 MRSA §465-A, sub-§1, ¶B, as amended by PL 2017, c. 319, §10, is further amended to read:

B. Class GPA waters must be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorus content and other appropriate criteria. Class GPA waters must have a stable or decreasing trophic state, subject only to natural fluctuations, and must be free of culturally induced algal blooms that impair their use and enjoyment. The number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 29 CFU <u>or MPN</u> per 100 milliliters over a 90-day interval or 194 CFU <u>or MPN</u> per 100 milliliters in more than 10% of the samples in any 90-day interval.

Sec. 14. 38 MRSA §465-B, sub-§1, ¶B, as amended by PL 2017, c. 319, §11, is further amended to read:

B. The estuarine and marine life, dissolved oxygen and bacteria content of Class SA waters must be as naturally occurs, except that the number of enterococcus bacteria in these waters may not exceed a geometric mean of 8 CFU or MPN per 100 milliliters in any 90-day interval or 54 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval. The number of total coliform bacteria or other specified indicator organisms in samples representative of the waters in shellfish harvesting areas may not exceed the criteria recommended under the National Shellfish Sanitation Program, United States Food and Drug Administration as set forth in its publication "Guide for the Control of Molluscan Shellfish" (2019 revision) or any successor publication.

Sec. 15. 38 MRSA §465-B, sub-§2, ¶B, as amended by PL 2017, c. 319, §12, is further amended to read:

B. Class SB waters must be of sufficient quality to support all estuarine and marine species indigenous to those waters without detrimental changes in the resident biological community. The dissolved oxygen content of Class SB waters may not be less than 85% of saturation. Between April 15th and October 31st, the number of enterococcus bacteria in these waters may not exceed a geometric mean of 8 CFU or MPN per 100 milliliters in any 90-day interval or 54 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval. The number of total coliform bacteria or other specified indicator organisms in samples representative of the waters in shellfish harvesting areas may not exceed the criteria recommended under the National Shellfish Sanitation Program, United States Food and Drug Administration as set forth in its publication "Guide for the Control of Molluscan Shellfish" (2019 revision) or any successor publication.

Sec. 16. 38 MRSA §465-B, sub-§3, ¶B, as amended by PL 2017, c. 319, §13, is further amended to read:

B. Class SC waters must be of sufficient quality to support all species of fish indigenous to those waters and to maintain the structure and function of the resident biological community. The dissolved oxygen content of Class SC waters may not be less than 70% of saturation. Between April 15th and October 31st, the number of enterococcus bacteria in these waters may not exceed a geometric mean of 14 CFU or MPN per 100 milliliters in any 90-day interval or 94 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval. The number of total coliform bacteria or other specified indicator organisms in samples representative of the waters in restricted shellfish harvesting areas may not exceed the criteria recommended under the National Shellfish Sanitation Program, United States Food and Drug Administration as set forth in its publication "Guide for the Control of Molluscan Shellfish" (2019 revision) or any successor publication.

Sec. 17. 38 MRSA §466, sub-§2-C is enacted to read:

2-C. CFU. "CFU" means colony-forming units.

Sec. 18. 38 MRSA §466, sub-§8-B is enacted to read:

8-B. MPN. "MPN" means most probable number.

Sec. 19. 38 MRSA §467, sub-§1, ¶A, as affected by PL 1989, c. 890, Pt. A, §40 and amended by Pt. B, §68, is further amended to read:

A. Androscoggin River, main stem, including all impoundments.

(1) From the Maine-New Hampshire boundary to its confluence with the Ellis River - Class B.

(2) From its confluence with the Ellis River to ~~a line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction~~ Worumbo Dam in Lisbon Falls - Class C.

(3) From Worumbo Dam in Lisbon Falls to a line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction - Class B.

Sec. 20. 38 MRSA §467, sub-§1, ¶B, as amended by PL 2003, c. 317, §1, is further amended by amending subparagraph (2) to read:

(2) Little Androscoggin River, tributaries - Class B unless otherwise specified.

(a) Outlet of Thompson Lake in Oxford - Class C.

(b) Andrews Brook in Woodstock - Class A.

~~(c) Black Brook in Woodstock - Class A.~~

~~(d) Cushman Stream in Woodstock - Class A.~~

~~(e) Meadow Brook in Woodstock - Class A.~~

(f) Bog Brook and tributaries in Minot, Oxford and Hebron - Class A.

(g) Twitchell Brook and its tributaries in Greenwood and Albany Township - Class A.

(h) Tributaries upstream of the confluence with Twitchell Brook in Greenwood - Class A.

Sec. 21. 38 MRSA §467, sub-§1, ¶D, as amended by PL 2019, c. 333, §1, is further amended by amending subparagraph (6) to read:

(6) Nezinscot River, east and west branches above their confluence in Buckfield and their tributaries - Class A.

Sec. 22. 38 MRSA §467, sub-§1, ¶D, as amended by PL 2019, c. 333, §1, is further amended by enacting a new subparagraph (10) to read:

(10) Cushman Stream in Woodstock, an unnamed tributary to Meadow Brook at Cushman Hill Road - Class A.

Sec. 23. 38 MRSA §467, sub-§1, ¶D, as amended by PL 2019, c. 333, §1, is further amended by enacting a new subparagraph (11) to read:

(11) Meadow Brook in Woodstock - Class A.

Sec. 24. 38 MRSA §467, sub-§4, ¶G, as repealed and replaced by PL 1989, c. 228, §2, is amended by amending subparagraph (2) to read:

(2) Sandy River, tributaries - Class B unless otherwise specified.

(a) All tributaries entering above the Route 142 bridge in Phillips - Class A unless otherwise specified.

(a-1) South Branch Sandy River and its tributaries - Class AA.

(a-2) Cottle Brook and its tributaries - Class AA.

(b) Wilson Stream, main stem, below the outlet of Wilson Pond - Class C.

(c) Mount Blue Stream and its tributaries - Class A.

(d) Orbeton Stream above Toothaker Pond Road and its tributaries - Class AA.

Sec. 25. 38 MRSA §467, sub-§5, ¶B, as amended by PL 2017, c. 137, Pt. B, §4, is further amended by amending subparagraph (7) to read:

(7) Fletcher Brook ~~in Township 36 Middle Division~~ and its tributaries - Class AA.

Sec. 26. 38 MRSA §467, sub-§5, ¶B, as amended by PL 2017, c. 137, Pt. B, §4, is further amended by amending subparagraph (8) to read:

(8) Magazine Brook ~~in Township 43 Middle Division~~ - Class AA.

Sec. 27. 38 MRSA §467, sub-§5, ¶B, as amended by PL 2017, c. 137, Pt. B, §4, is further amended by amending subparagraph (10) to read:

(10) Chain Lakes Stream ~~in Day Block Township~~, also known as Chain Lake Stream - Class AA.

Sec. 28. 38 MRSA §467, sub-§6-A, ¶B, as amended by PL 2017, c. 137, Pt. B, §6, is further amended by amending subparagraph (12) to read:

(12) Little Narraguagus River in Township 22 Middle Division and Township 28 Middle Division - Class AA.

Sec. 29. 38 MRSA §467, sub-§7, ¶B, as amended by PL 2019, c. 333, §4 and c. 463, §7, is further amended by enacting a new subparagraph (2), division (f) to read:

(f) All tributaries entering the East Branch Penobscot River from the west, any portion of which is located within the boundaries of the Katahdin Woods and Waters National Monument - Class AA.

Sec. 30. 38 MRSA §467, sub-§7, ¶B, as amended by PL 2019, c. 333, §4 and c. 463, §7, is further amended by enacting a new subparagraph (2), division (g) to read:

(g) Those segments of any tributary of the Sebois River that are located within the boundaries of the Katahdin Woods and Waters National Monument - Class AA.

Sec. 31. 38 MRSA §467, sub-§7, ¶B, as amended by PL 2019, c. 333, §4 and c. 463, §7, is further amended by enacting a new subparagraph (2), division (h) to read:

(h) Dry Brook, East Branch and West Branch Mud Brook and other tributaries located in T.3, R.7, W.E.L.S. that enter the East Branch Penobscot River from the east, any portion of which is located within the boundaries of the Katahdin Woods and Waters National Monument - Class AA.

Sec. 32. 38 MRSA §467, sub-§7, ¶C, as amended by PL 2019, c. 333, §5, is further amended by amending subparagraph (1), division (d) to read:

(d) From the McKay powerhouse to ~~its confluence with Ambajejus Lake~~ a point located 1,000 feet downstream - Class A.

Sec. 33. 38 MRSA §467, sub-§7, ¶C, as amended by PL 2019, c. 333, §5, is further amended by enacting a new subparagraph (1), division (d-1) to read:

(d-1) From a point located 1,000 feet downstream of the McKay powerhouse to its confluence with Ambajejus Lake - Class AA.

Sec. 34. 38 MRSA §467, sub-§7, ¶C, as amended by PL 2019, c. 333, §5, is further amended by amending subparagraph (2), division (a) to read:

(a) Those segments of any tributary that are located within the boundaries of Baxter State Park or the Katahdin Woods and Waters National Monument - Class AA.

Sec. 35. 38 MRSA §467, sub-§7, ¶C, as amended by PL 2019, c. 333, §5, is further amended by amending subparagraph (2), division (b) to read:

(b) Those tributaries ~~above~~ entering between Ripogenus Dam and the confluence with ~~the Debsconeag Deadwater, any portion of which is located within the boundaries of Baxter State Park~~ Ambajejus Lake - Class AA.

Sec. 36. 38 MRSA §467, sub-§7, ¶C, as amended by PL 2019, c. 333, §5, is further amended by enacting a new subparagraph (2), division (e) to read:

(e) Nahmakanta Stream and its tributaries including tributaries to Nahmakanta Lake and upstream lakes - Class AA.

Sec. 37. 38 MRSA §467, sub-§7, ¶E, as amended by PL 2009, c. 163, §5, is further amended by amending subparagraph (2), division (e) to read:

(e) Pleasant River, West Branch tributaries - Class A unless otherwise specified.

Sec. 38. 38 MRSA §467, sub-§7, ¶E, as amended by PL 2019, c. 333, §5, is further amended by enacting a new subparagraph (2), division (e-1) to read:

(e-1) Houston Brook and its tributaries - Class AA.

Sec. 39. 38 MRSA §467, sub-§7, ¶E, as amended by PL 2009, c. 163, §5, is further amended by amending subparagraph (2), division (k) to read:

(k) Schoodic Stream and its tributaries - Class A.

Sec. 40. 38 MRSA §467, sub-§7, ¶E, as amended by PL 2009, c. 163, §5, is further amended by amending subparagraph (2), division (l) to read:

(l) Scutaze Stream and its tributaries - Class A.

Sec. 41. 38 MRSA §467, sub-§7, ¶F, as amended by PL 2017, c. 137, Pt. B, §7, is further amended by repealing subparagraph (1).

Sec. 42. 38 MRSA §467, sub-§7, ¶F, as amended by PL 2017, c. 137, Pt. B, §7, is further amended by amending subparagraph (12) to read:

(12) Medunkeunk Stream and its tributaries - Class A.

Sec. 43. 38 MRSA §467, sub-§9, ¶A, as amended by PL 1999, c. 277, §12, is further amended by amending subparagraph (3) to read:

(3) From U.S. Route 202 to Saccarappa Falls, also known as Sacarappa Falls - Class B.

Sec. 44. 38 MRSA §467, sub-§9, ¶A, as amended by PL 1999, c. 277, §12, is further amended by amending subparagraph (4) to read:

(4) From Saccarappa Falls, also known as Sacarappa Falls, to tidewater - Class C.

Sec. 45. 38 MRSA §467, sub-§15, ¶F, as amended by PL 2019, c. 463, §13, is further amended by amending subparagraph (6) to read:

(6) Southwest Branch, from a point located 5 miles downstream of the international boundary to its confluence with the ~~Baker~~ Northwest Branch - Class AA.

Sec. 46. 38 MRSA §468, sub-§1, ¶C, as amended by PL 2017, c. 137, Pt. B, §11, is further amended by amending subparagraph (2) to read:

(2) ~~Finnard~~ Finnerd Brook - Class B.

Sec. 47. 38 MRSA §468, sub-§1, ¶J, as enacted by PL 2009, c. 163, §17, is repealed.

Sec. 48. 38 MRSA §468, sub-§2, ¶O, as enacted by PL 2019, c. 333, §10, is amended by enacting a new subparagraph (2) to read:

(2) Tributaries to Donnell Pond - Class A.

Sec. 49. 38 MRSA §468, sub-§2, ¶P, as enacted by PL 2019, c. 333, §10, is amended by enacting a new subparagraph (2) to read:

(2) Tributaries to Donnell Pond - Class A.

Sec. 50. 38 MRSA §468, sub-§2, ¶Q is enacted to read:

Q. Township 9 Southern Division.

(1) Tributaries to Donnell Pond - Class A.

Sec. 51. 38 MRSA §468, sub-§2, ¶R is enacted to read:

R. Franklin.

(1) Tributaries to Donnell Pond - Class A.