

Water Quality Data Analysis and Review Lower Androscoggin River Monitoring Years 2011 - 2012

To Upgrade the Lower Section of River From Class C to Class B, Public Law 163
LD 845 An Act to Change the Classification of the Lower Androscoggin River

Prepared by Friends of Merrymeeting Bay & Applied Biomonitoring
March 29, 2012

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**Androscoggin River
2011 & 2012 Water Quality Data Analysis and Review
To Upgrade the Lower Section of River from Class C to Class B
March 29, 2013**

Executive Summary

Clean rivers enhance the local economy and vitality of the communities surrounding them. A clean, healthy river attracts people, new businesses, and increases property value. A clean river is good for business, the environment and quality of life. An upgrade of the Androscoggin will enhance the surrounding communities, not causing an adverse impact on current industrial uses along the river since Class B conditions have been met for years in the course of “business as usual.”

DEP classification proposal submission guidelines state:

“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.”

Friends of Merrymeeting Bay (FOMB) conduct Androscoggin water quality monitoring in cooperation with DEP partly under the auspices of their Volunteer River Monitoring Program (VRMP).

The 2011 and 2012 data for *E. coli* and dissolved oxygen (DO) were acquired monthly. Results confirmed those of 2010 and prior years; ambient river conditions consistently exceed Class B standards for *E. coli* and DO.

Data continue to support FOMB’s proposed upgrade from Class C to Class B of the lower Androscoggin between Worumbo Dam and an extension of the Bath-Brunswick line across Merrymeeting Bay. Intensive sampling by DEP in 2010, supported current and past FOMB results.

FOMB requests the Committee in accordance with both statute and goal-based or aspirational DEP guidelines and the Clean Water Act, recommend a classification upgrade of this river segment to the full legislature and the legislature reclassify it as Class B.

38 M.R.S.A. § 464 (4) (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.”

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Introduction

Clean rivers enhance the local economy and vitality of the communities surrounding them. A clean, healthy river attracts people, new businesses, and increases property value. A clean river is good for business, the environment and quality of life. An upgrade of the Androscoggin will not have an adverse impact on current industrial uses along the river since Class B conditions have been met for years in the course of “business as usual.”

DEP classification proposal submission guidelines state:

“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.”

In accordance with LD 330 Section 24 passed in 2009, intensive and additional water quality data were collected on the lower Androscoggin from April-October of 2009 in an effort to better substantiate a classification upgrade proposal for boosting the lower river to Class B from Class C. This effort was conducted by Friends of Merrymeeting Bay (FOMB) in cooperation with DEP partly under the auspices of their Volunteer River Monitoring Program (VRMP). Sampling occurred every two weeks in 2009 and data during a damp summer with above median flows supported an upgrade to Class B.

Class B standards are defined primarily by three sets of numeric criteria, dissolved oxygen (DO) in mg/l (ppm), saturated dissolved oxygen in percent and *E. coli* bacteria in colony counts/100ml. There are also more qualitative habitat and aquatic life criteria typically evaluated by the presence, variety and type of macro-invertebrates to colonize a rock-filled basket over time. Of primary concern are the numeric criteria because the legislature has recognized the special nature of hydropower impoundments when it comes to habitat and aquatic life criteria and understands typical Class A or B community structures may not be achieved due to the impoundment while the segment still may receive the A or B classifications. With this in mind it is clear an absence of Class B type macro-invertebrates in some samples cannot prevent an upgrade.

According to Maine statutes, modeling has no bearing on the classification process §464 (4) (F) (4) which is based solely on actual ambient river conditions. In contrast to classification, modeling does play a role in relicensing (§464 (4) (D) when dischargers are to meet the river classification under minimum seven-day low flow conditions expected to take place once every ten years (known as 7Q10). The purposeful policy reason for the difference in requirements for classification and relicensing is so that water quality conditions may slowly be improved or ratcheted up. This is the goal-oriented purpose both of the Clean Water Act and Maine statute.

38 M.R.S.A. § 464 (4) (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 our multi-year sampling efforts, *E. coli* parameters for Class B have always been met. As for the several hundred DO measurements taken over the years, only in a very few isolated instances has the measured DO dropped slightly (0.1 to 0.5) below the Class B standard. Since 2010, the first year we measured oxygen saturation, all saturation levels met the Class B standard. With reasonable application of improved treatment or BMPs we can reasonably expect 100% compliance with Class B standards and criteria. The *E. coli* and dissolved oxygen data continue to support, and we recommend, a goal-based or aspirational upgrade of water quality classification from Class C to Class B for the lower Androscoggin between Worumbo Dam and Merrymeeting Bay.

Approach

FOMB and Friends of Casco Bay with whom we coordinate, conduct water sampling from April to October. However, data presented here are, for the most part, limited to those collected from May to September, the period of interest to the DEP. This is the period covered by municipal waste water treatment disinfection, chlorination and de-chlorination, the period of highest human contact and the period of lowest dissolved oxygen conditions. Storm flow or CSO events are more likely outside of this period and are not included when evaluating classification standards.

In 2011, dissolved oxygen (mg/L), DO saturation (%) and *E. coli* (# colonies/100 ml) water quality data were collected between April and October. In 2012, water quality data were collected between May and October. In both years, data were collected from the eight locations in the Androscoggin River:

Above Worumbo dam:

Durham Boat Launch (DBL)

Between Pejepscot and Worumbo dams:

Pejepscot Boat Launch (PBL)

Fish Park Up [above dam] (FPU)

Between Brunswick-Topsham and Pejepscot dams:

Fish Park Down [below dam] (FPD)

Brunswick Interstate Ledges (BIL)

Brunswick Canoe Portage (BCP)

Above Merrymeeting Bay at Pleasant Point:

Brunswick Water St. Boat Launch (BWS)

Brunswick Bay Bridge (BBB)

In both 2011 and 2012, as in earlier years, only DO data were also collected at Topsham Pleasant Point (TPP) for informational purposes about Merrymeeting Bay DO levels in this area. These data were collected at varying times and tides on target days using the Winkler Titration method. This Topsham site falls within a river segment already classified as B. DO data (all values exceeding 7 ppm) were also collected in 2011 and 2012 at the Auburn Boat Launch (ABL), the upper most sampling site on the Androscoggin, in the same manner as at TPP.

However, these data are not included here because the site is well out of the proposed upgrade area.

In 2009 and 2010, additional sampling was conducted at Brunswick Canoe Mooring (BCM) [off BCP] and Water St. Mooring (WSM) [off BWS] to determine if there were differences in conditions between shore and mid-stream conditions. Regression analysis of the paired 2009 and 2010 data (for both DO and *E. coli*) show excellent correlations between the shore and mid-stream sampling locations. Both BWS and WSM are tidewater sites, and therefore, it is not surprising that no significant difference in monitoring results were found. Readings at BCM and BCP indicate thorough mixing above tide as well. Because these results suggested it is not necessary to collect data at both the shore and mid-stream locations for water quality measurements, measurements were only collected from shore sites in 2011 and 2012.

This distribution of sampling sites provides excellent coverage of the study area. Two sites are in tidewater above Merrymeeting Bay at Pleasant Point (BBB and BWS). Three sites are in the impoundment between the Brunswick-Topsham and Pejepscot dams (BCP, BIL, FPD), and two sites are in the short impoundment between Pejepscot and Worumbo dams (FPU, PBL). Durham Boat Launch remains the lower most site between Worumbo and Auburn Boat Launch where we have another monitor. Several of these sites have been sampled for *E.coli* since 2006 and for DO since 1999. These data, along with collection dates/times, weather conditions, and other notations, were tabularized then analyzed to determine if the waterways meet the criterion to be reclassified as Class B. The main criteria for reclassification are:

	Dissolved Oxygen instantaneous reading (ppm); percent saturation	<i>E. coli</i> (colonies /100 ml) instantaneous reading; geometric mean
Class B Criteria	7; 75%	236; 64
Class C Criteria	5; 60%	236; 126

The following data comparisons were made:

1. *E. coli* v. Class B standard
 - 2011 and 2012 data
 - historical trends (2006 through 2012)
 - Comparison of all sites
 - Yearly geometric means
2. DO v. standards (instantaneous reading and percent dissolved oxygen) for Class B
 - 2011 and 2012 data
 - historical trends (2003 through 2012)
 - Comparison of all sites
 - Yearly geometric means

Results –E. coli

The *E. coli* graphs show the instantaneous values and the geometric means for both the 2011 and 2012 sampling seasons. The geometric means were calculated using all data. There were only two heavy rain events within 48 hours of data collection. Both occurred on June 12, 2011; one at BWS and the other at BBB. The graphs for these sites identify the “heavy rain” data points and shows geometric means calculated with and without the values. The instantaneous data show excellent compliance with the criterion for both 2011 and 2012. No sites were out of compliance during the months of May through September with respect to instantaneous measurements.

Similarly, none of the geometric means were out of compliance. All *E. coli* data collected during the 2011 and 2012 are provided.

Historical *E. coli* data, used to evaluate trends over time, were available for three sites: Pejepscot Boat Launch, Brunswick Water Street Boat Launch, and Brunswick Bay Bridge. Four types of graphs were prepared for these data:

- (1) the instantaneous data for each site (one site per page),
- (2) instantaneous data for all sites graphed together,
- (3) the geometric means for each site over times (all sites on one page),
- (4) a summary graph showing the geometric mean by year.

The means were calculated using all available data for each monitoring year. These graphs show the majority of the instantaneous data are in compliance, with minor exceptions occurring in 2006, 2009, and 2010. None of the geometric means by station and year are out of compliance. Similarly, all of the geometric means (for both all data, and no rain event data) determined for the years 2006 through 2012 are in compliance with both the Class C and Class B criteria.

Results – Dissolved Oxygen

The DO graphs show both the instantaneous values and the percent saturation data for both the 2011 and 2012 sampling seasons. The instantaneous data show excellent compliance with the criterion. None of the instantaneous DO measurements or the percent saturation data in either sampling year are out of compliance.

All DO data collected for these sites during 2011 and 2012 are provided. Historical DO data, used to evaluate trends over time, were available for three sites: Durham Boat Launch, Pejepscot Boat Launch, and Topsham Pleasant Point. Note that the 2011 and 2012 Topsham Pleasant Point data were collected after the recommended time of 0800. [Note: Topsham Pleasant Pt., Brunswick Bay Bridge and Brunswick Water St. and Mooring sites are all in tidewater. These sites may not be nearly so affected by diurnal DO fluctuations as sites above Brunswick/Topsham dam may be. At these shallow tidal sites, DO could be reduced more by higher temperatures warming the water during the day, particularly at low tide, than by the more typical night-time sag.] Topsham Pleasant Pt. data are provided because this site has already been upgraded to a Class B waterway and they make a good comparison to the sites under evaluation. These graphs show nearly all instantaneous data for each site are in compliance. The exceptions occur at Durham Boat Launch (out of the upgrade area), with three non-compliance events occurring in 2003, one in fall of 2009, and one in 2010. A comparison of the DBL and PBL to a current Class B site (TPP) shows that since 2003, dissolved oxygen concentrations at these three sites have been consistently similar.

The graph comparing averages for all data by year shows that since 2003, the lower Androscoggin River has been in compliance with both Class C and Class B criteria.

Habitat and Aquatic Life Criteria

These criteria were evaluated for the first time in 2010 by DEP using rock baskets deployed for a month in three locations—at our Brunswick Canoe Mooring and just above and just below the Pejepscot dam. The BCM site and the site above the dam are impoundment sites while the site downstream of Pejepscot is a shallow riffle environment. As these are all run-of-the-river dams, their “impoundments” do not extend very far upstream. After identifying the macro-invertebrates who have colonized the baskets, the DEP then uses a model to predict the water Classification.

Some colonizers are more tolerant of low oxygen than others and species diversity and numbers can vary with the local habitat and chemical conditions.

While macro-invertebrates can provide quite valuable information on water quality, impoundments create very unique situations often characterized by higher levels of silt, and lower flows. The legislature recognizing this, has created in statute (§464-10) exceptional requirements for hydropower impoundments. In Class C impoundments, if Class A and B habitat and aquatic life criteria are not met but reasonable changes resulting in improvements to these criteria can be made without significantly affecting existing energy generation capacity, these changes **must** be achieved and maintained.

In existing Class A or B impoundments, as long as habitat and aquatic life criteria meet Class C standards (sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community), habitat characteristics and aquatic life criteria of Classes A and B **are deemed to be met.**

The DEP found organisms more typical of Class C in their two impoundment sites as might be expected while the riffle site (station 954) had organisms meeting a modeled Class B environment. Clearly with only three data points on a long section of river there is limited knowledge gained. We do know the impoundment type of environments as represented by the DEP station numbers 956 and 955 are but a small percentage of the segment proposed for the upgrade. Because of the language in §464-10, these results have no direct bearing on whether or not to upgrade the proposed section of river, leaving us only with the three numeric criteria: DO, % saturation and *E. coli* to consider.

Sampling Protocols

In 2012 and all past sampling years FOMB volunteers have trained annually in cooperation with Friends of Casco Bay (FOCB) utilizing DO training and sampling protocols from the FOCB EPA Quality Assurance Program Plan (QAPP). Since 2009, FOMB Androscoggin volunteers also participated in and qualified under the DEP Volunteer River Monitoring Program (VRMP) trainings. Under the VRMP Sampling Assurance Plan (SAP), FOMB also followed VRMP Quality Assurance/Quality Control (QA/QC) protocols for sampling and lab procedures in analysis of bacteria samples.

Sampling is accomplished at all sites by wading, using an extension pole or a throw bottle. Winkler titration kits or YSI85 meters are used for DO and the meter can also measure saturation. We use the IDEXX Colilert system for *E. coli*.

Standard QA/QC procedures included duplicate sampling by all monitors, lab splits and lab blanks. Multiple split bacteria sample analyses were conducted with Brunswick Wastewater Treatment Plant. Splits showed no significant differences.

Discussion

Water quality data collected since 2003 for the lower Androscoggin River clearly show a trend of improved quality. Since 2003 the data have met the Class C criteria, and the data collected in both 2011 and 2012 show excellent compliance with Class B standards. Excluding heavy precipitation events, *E. coli* data show excellent compliance with Class B standards, even without excluding the heavy rain events experienced in 2011. There were no heavy rain events in 2012. Isolated exceptions over the years could indicate unusual anthropogenic sources (i.e. mechanical failure or spill) or as was the case in 2009, record high temperatures. DO samples meet or exceed the Class B standard in all but two or three isolated samples (during record-

breaking heat or unusually low flows) where they fall just 0.1 to 0.5 below the standard. DO saturation meets the Class B standard all of the time. Ambient river conditions are very clearly exceeding Class B minimums. As we noted to the Board on 10/2/08:

“The water quality of the Androscoggin sections proposed for an upgrade, exceeds the current classification standards and meet those of Class B. This request to upgrade from C to B is supported by the State antidegradation statute:

38 M.R.S.A. § 464 (4) (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.”

Clean rivers enhance the local economy and vitality of the communities surrounding them. A clean, healthy river attracts people, new businesses, and increases property value. An upgrade of the Androscoggin will economically benefit the communities of the area and will not adversely impact current industrial uses considering Class B conditions have been met for years in the course of “business as usual.” While higher discharge limits exist for a number of licensees, these artificially high numbers can not be used to create a ceiling on water quality improvements that prevents reclassification to higher levels already obtained by actual conditions.

In 2010 we had the low river flows and high air and water temperatures the DEP has been saying were necessary to get a true picture of river quality under adverse conditions. As stated previously, neither 7Q10 conditions nor discharge modeling are part of classification or reclassification considerations-only actual water conditions. As a wastewater plant operator remarked to us last year, usually the river conditions yielding poor DO levels yield the lowest bacteria levels and when conditions support highest levels of bacteria, they also create the highest levels of oxygen. FOMB data have shown Class B compliance for *E. coli* and DO under high and low flows, cool and hot temperatures and various tidal stages.

That licensees are not discharging at licensed limits is irrelevant according to current water quality law. As mentioned above, these limits are artificially high (and should be lowered) but regardless, two conditions could cause maximum discharges: 1) Drastic increases in municipal growth which are not going to happen anytime soon under current economic conditions and 2) Extreme storm flows, in which case high *E. coli* levels under CSO conditions are not counted against classification while DO levels will be quite high from the increased aeration and typically cooler water and air temperatures.

In 1999 the DEP used FOMB DO data to support an upgrade of the Kennebec. At that time *E. coli* criteria were not met by the Augusta Wastewater Treatment Plant. Still, Class B conditions were considered close enough to be “reasonably attainable”. The DEP and BEP chose to recommend an upgrade and essentially gave the plant until 2009 to meet the standards for Class B. FOMB data show this section of the Androscoggin nearly always well within Class B. If the Committee or Board’s concerns are eliminating the occasional outlier data, this certainly seems to be reasonably attainable with minimal cost and effort--perhaps more so than the Kennebec at the time of that upgrade.

The following paragraph is a legal analysis, part of an upgrade recommendation submitted to the BEP and written by the Conservation Law Foundation on 10/2/2008:

The following paragraph is a legal analysis, part of an upgrade recommendation submitted to the BEP and written by the Conservation Law Foundation on 10/2/2008:

The Department's refusal to recommend an upgrade violates the legal standard in the Clean Water Act that a state shall revise its standards to reflect uses and water quality actually being attained. 40 C.F.R. §131.10(i). See also id. §131.6(d); 38 M.R.S.A. §464(4)(F). Thus, the Committee's [or Board's] analysis must be based on existing water quality-not hypothetical modeling with point sources operating at maximum licensed discharge. Indeed, the Committee [or 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)(1)(d).

In fact, note the Departments continued bias against the Androscoggin as illustrated in their report on 2011 sampling [Chapter 5-1]. The following is illustrative of how they studiously avoid in charts and text, mentioning the river actually meets Class B conditions. Bolding is FOMB.

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 (7.0 mg/l). Site BWS was similar with lowest readings in mid-July (8.3 mg/l) and mid-August (7.7). 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 5.0mg/l [or Class B standard of 7 mg/l]. Dissolved oxygen saturation ranged from 82%-115% and did not go below the Class C standard of 60% [or Class B standard of 75%].

Recommendations

1. Modeling, maximum loading and 7Q10 conditions cannot by statute be used to determine classification. **Classifications must by statute be based on actual water quality.** There is no substitute for years of field data in determining ambient river conditions. Outlier data should not determine water classification. **We recommend the BEP and legislature properly use classification statutes not re-licensing statutes to determine the Androscoggin upgrade reclassification.**
2. A cleaner Androscoggin is supported by riverside communities because it is good for business, the environment and improves quality of life for all. **We recommend the BEP and legislature utilize along with statutory requirements, the goal-based or aspirational nature of Maine's Water Quality Classification System and US Clean Water Act.**
3. The Department's Classification Upgrade Proposal submission guidelines state:

“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.”

Intense sampling of the lower Androscoggin shows water conditions have mostly met Class B DO standards since 2004. The most recent data clearly support the reclassification of this waterway. All data collected since 2006 support an upgrade that

will be good for the economy, environment and quality of life. **We recommend a statute and goal-based upgrade of water quality classification from Class C to Class B for the lower Androscoggin between Worumbo Dam and Merrymeeting Bay.**

4. A Legal Opinion: Excerpt from Conservation Law Foundation BEP Comments 10/2/2008

The Lower Androscoggin River:

CLF strongly disagrees with the Department's recommendation and rationale for not upgrading this river segment. The Department has stated that proponents must provide water quality data and modeling showing "the likelihood of attainment of Class B water quality criteria at maximum licensed loads." See Reclassification Memorandum at 29. This makes no logical, legal or economic sense. First, no one operates at maximum licensed loads; rather a large buffer is generally built into all permits to avoid violations. Thus, DEP is requesting an impossible and unnecessary showing.

Second, the Department's recommendation violates the legal standard in the Clean Water Act that a state shall revise its standards to reflect uses and water quality actually being attained. 40 C.F.R. § 131.10(i). 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)(1)(d).

Third, as many of the dischargers in this watershed have already recognized, water quality upgrades are generally good for surrounding communities. As has been shown over and over again, clean water is an economic boon. Examples abound throughout New England, including the recent revival of Boston Harbor, the Portland Waterfront, the Auburn Riverfront, and the resurgence of Merrymeeting Bay and the Kennebec River. The Androscoggin River deserves the same.

CLF believes that the data, including both dissolved oxygen levels and recreational uses, shows that existing uses in the lower Androscoggin have improved over time and that the river currently attains the higher bacteria and dissolved oxygen standards set forth in the Class B designation. As noted by the Department, it has no reason to question the data; indeed, it has relied upon data supplied by the proponent in prior reclassifications. Therefore, barring a showing that the data is invalid, the Board must recommend upgrading this section.

Acknowledgements

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Appendices

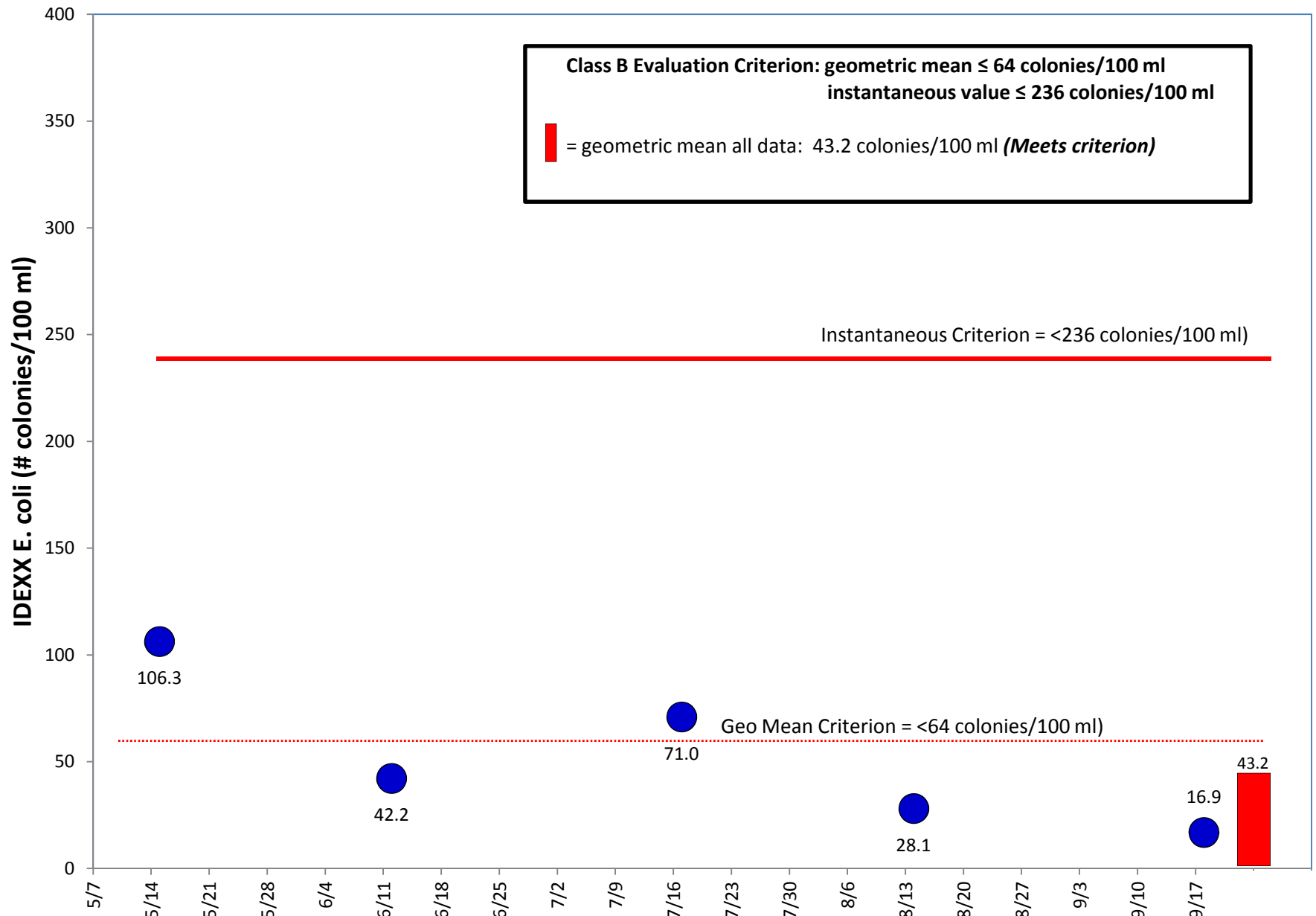
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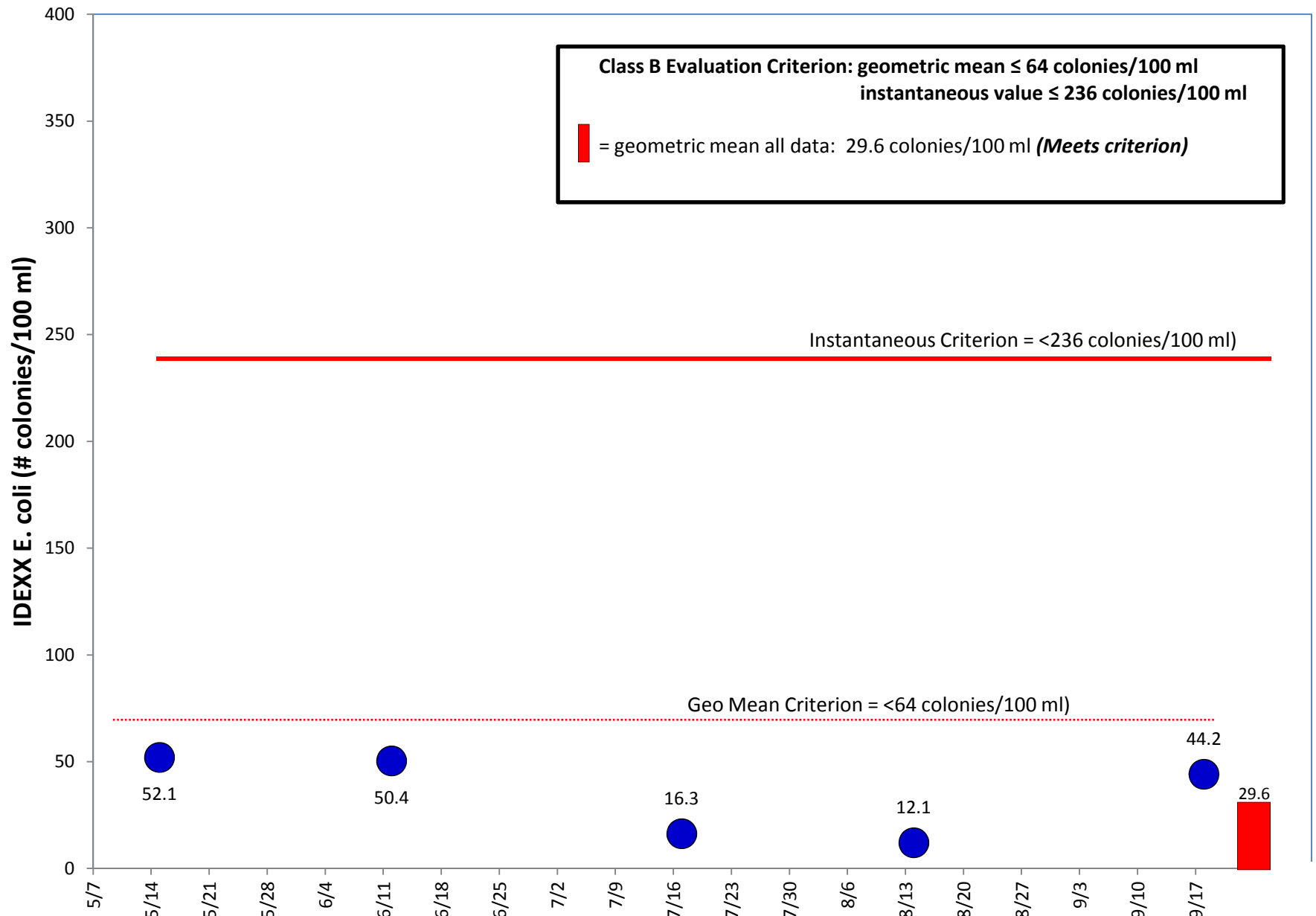
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2011

E. coli 2011 by Station
May to September

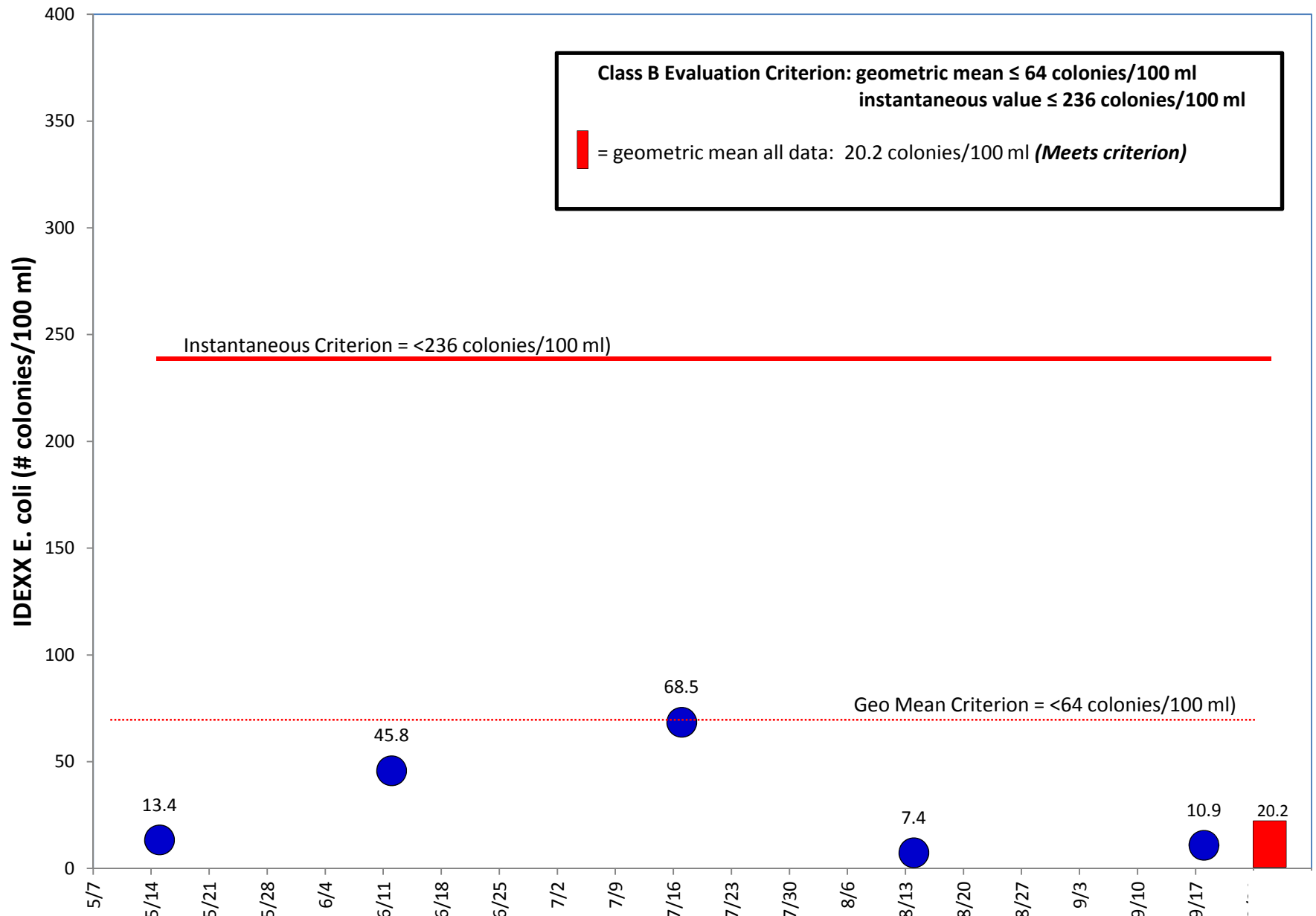
Lower Androscoggin River 2011 *E. coli* (IDEXX) Durham Boat Launch (May - Sep)



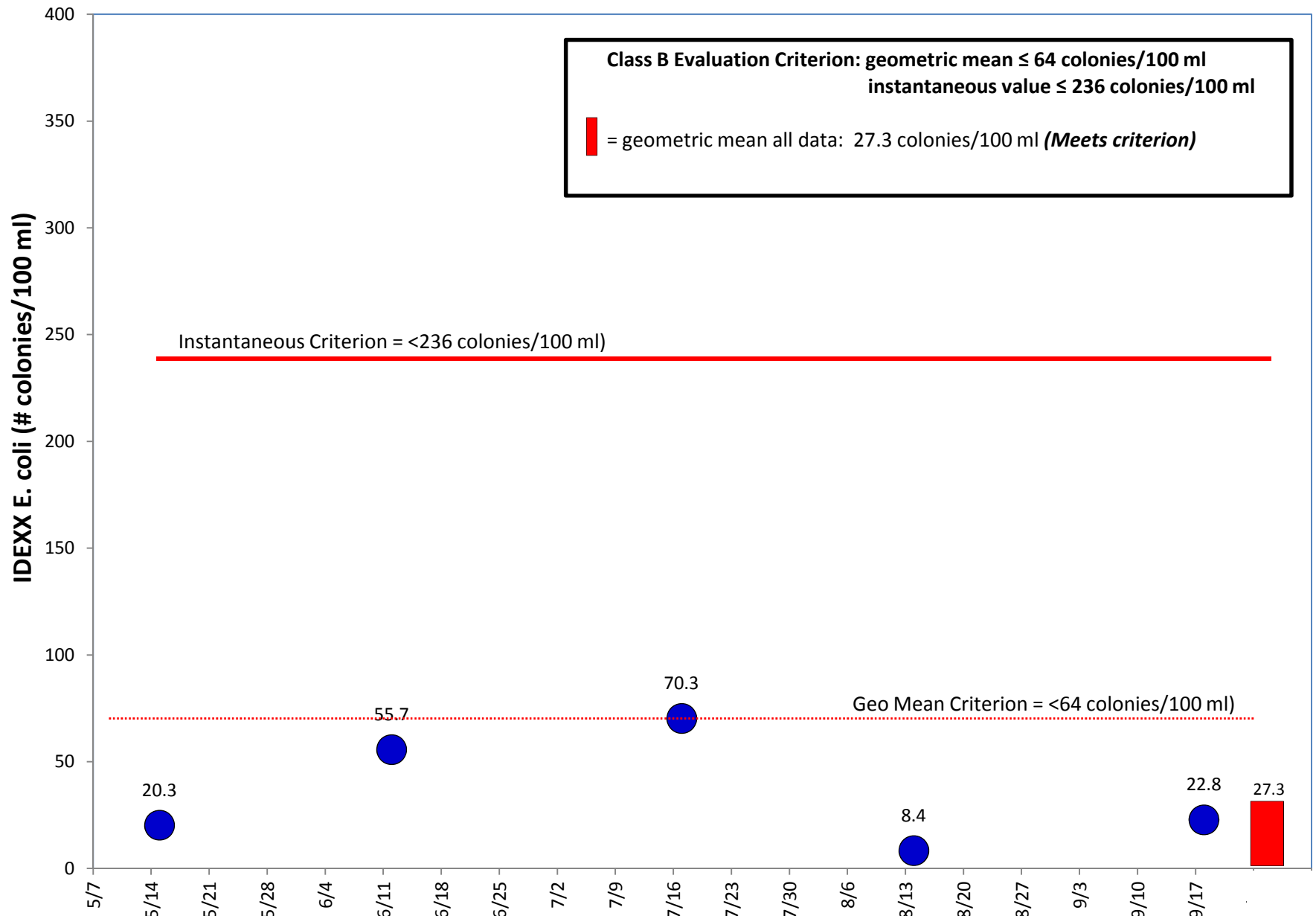
Lower Androscoggin River 2011 *E. coli* (IDEXX) Pejepscot Boat Launch (May - Sep)



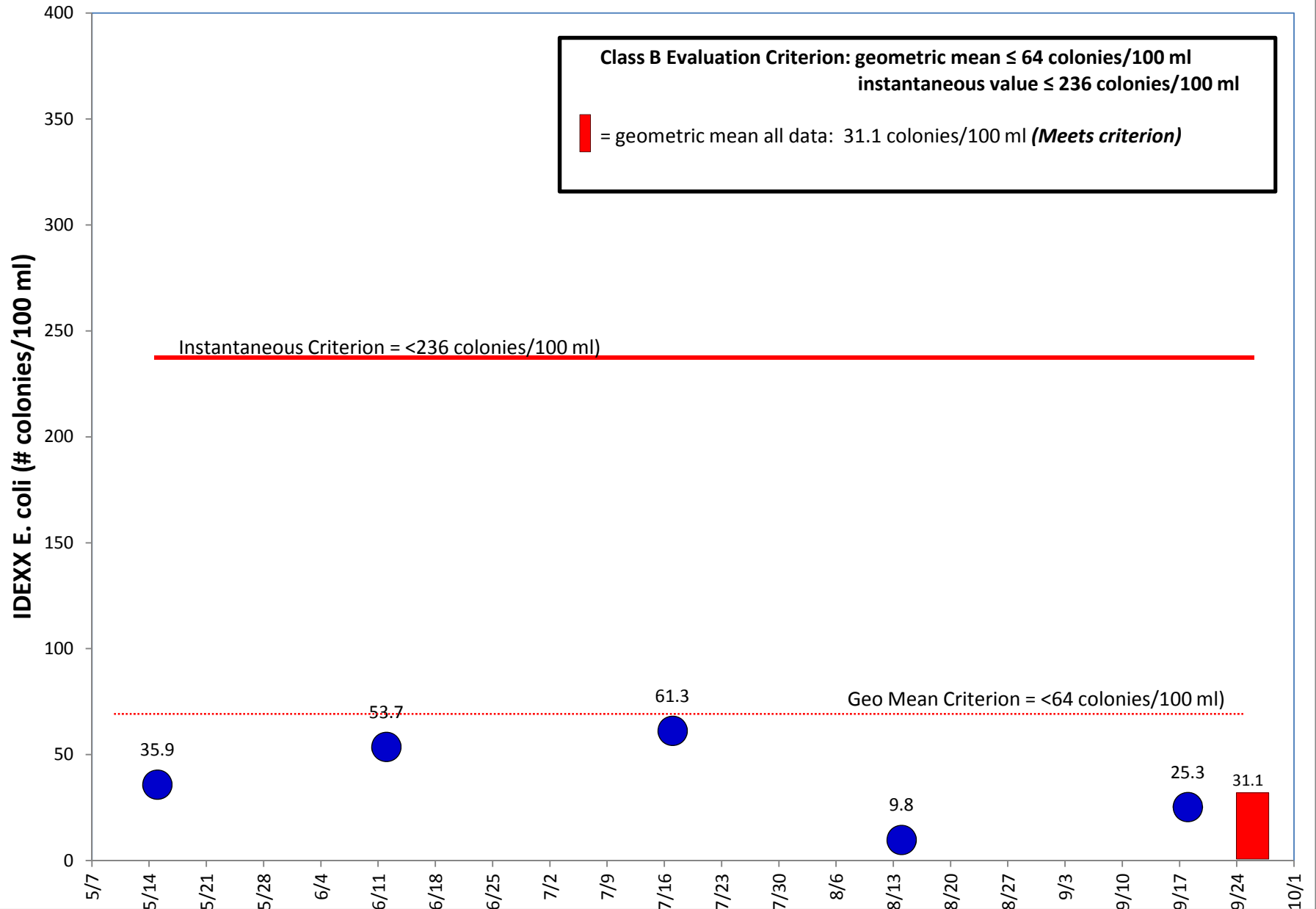
Lower Androscoggin River 2011 *E. coli* (IDEXX) Fish Park Above Dam (May - Sep)



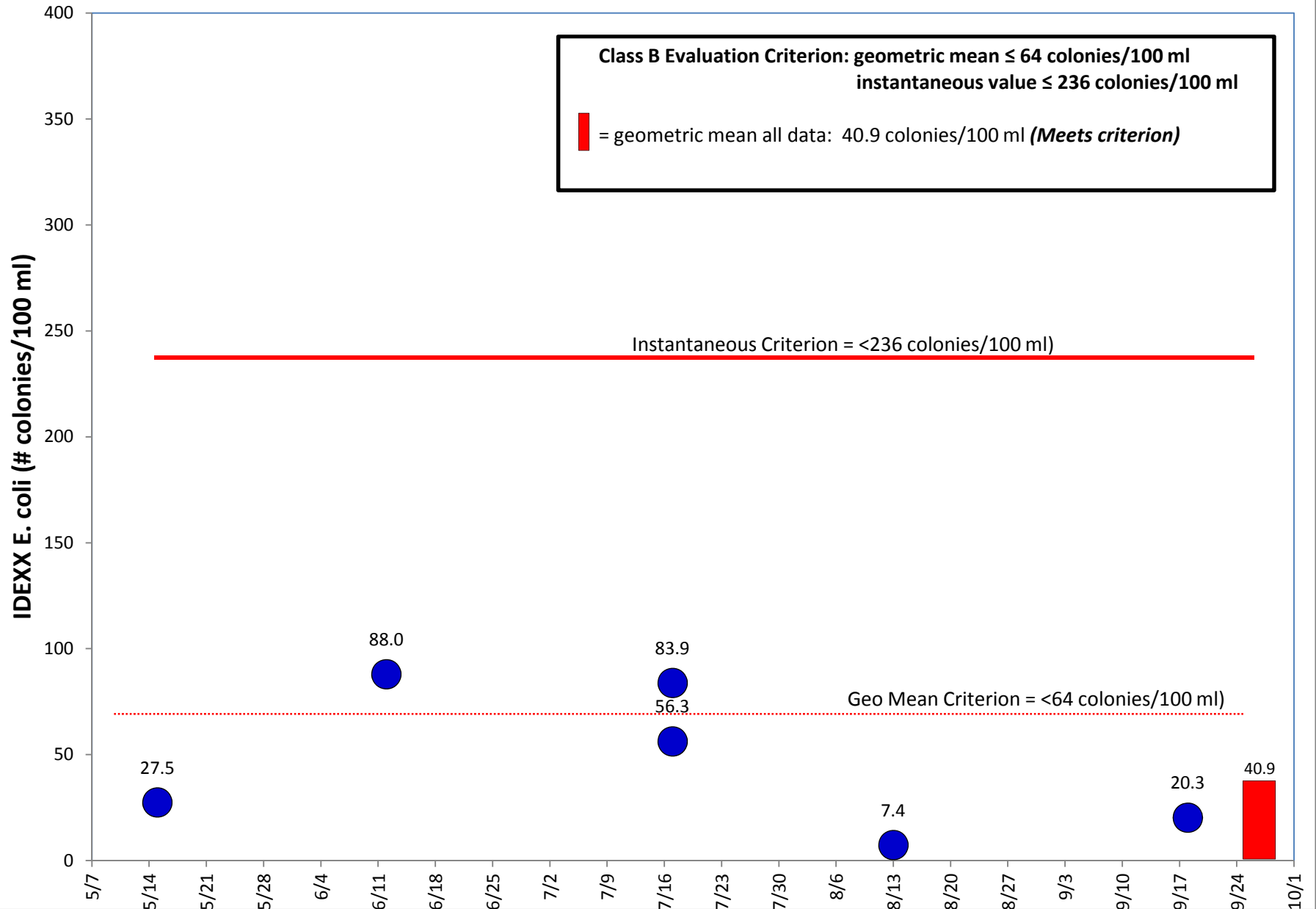
Lower Androscoggin River 2011 *E. coli* (IDEXX) Fish Park Below Dam (May - Sep)



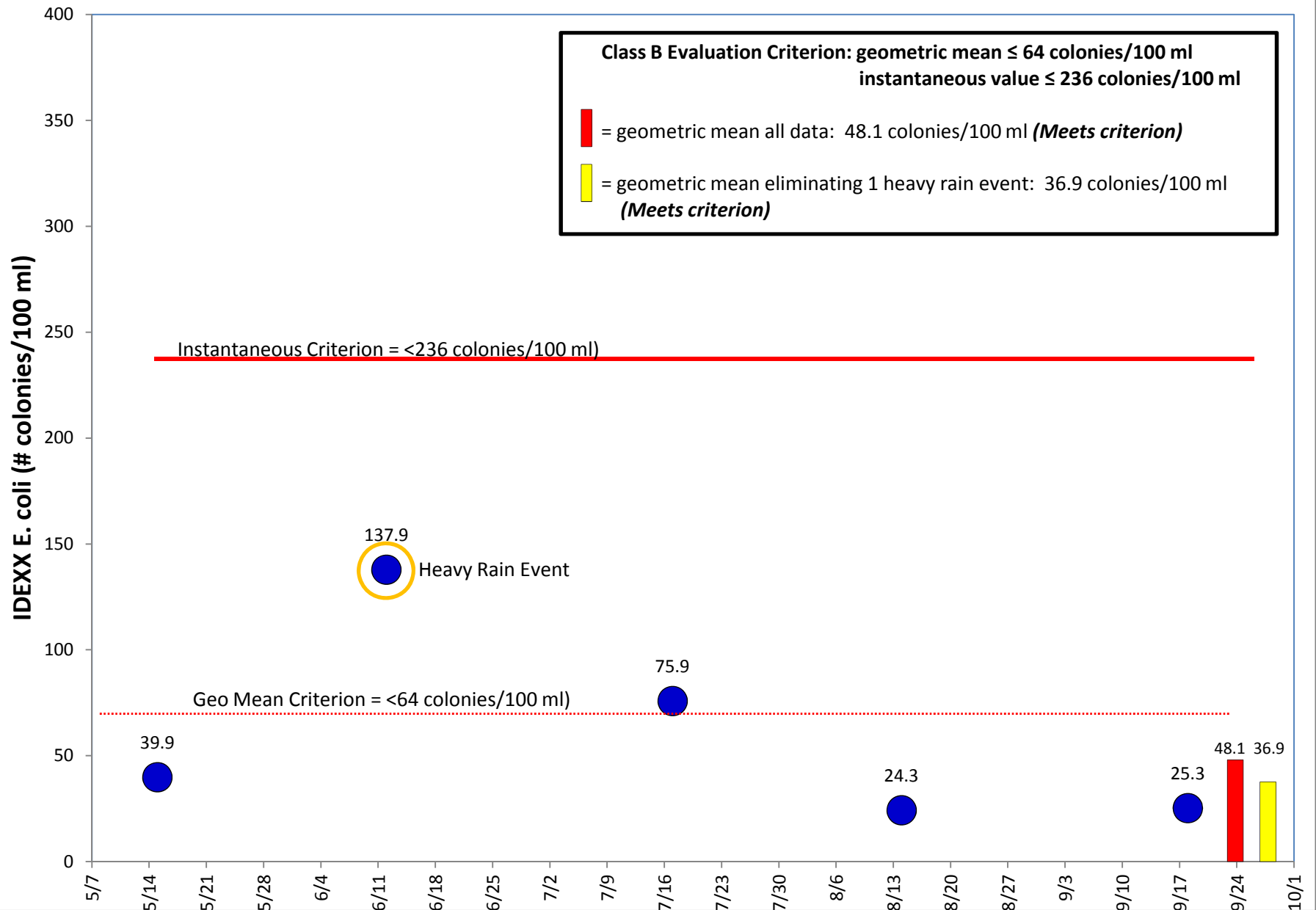
Lower Androscoggin River 2011 *E. coli* (IDEXX) Brunswick Interstate Ledges (May - Sep)



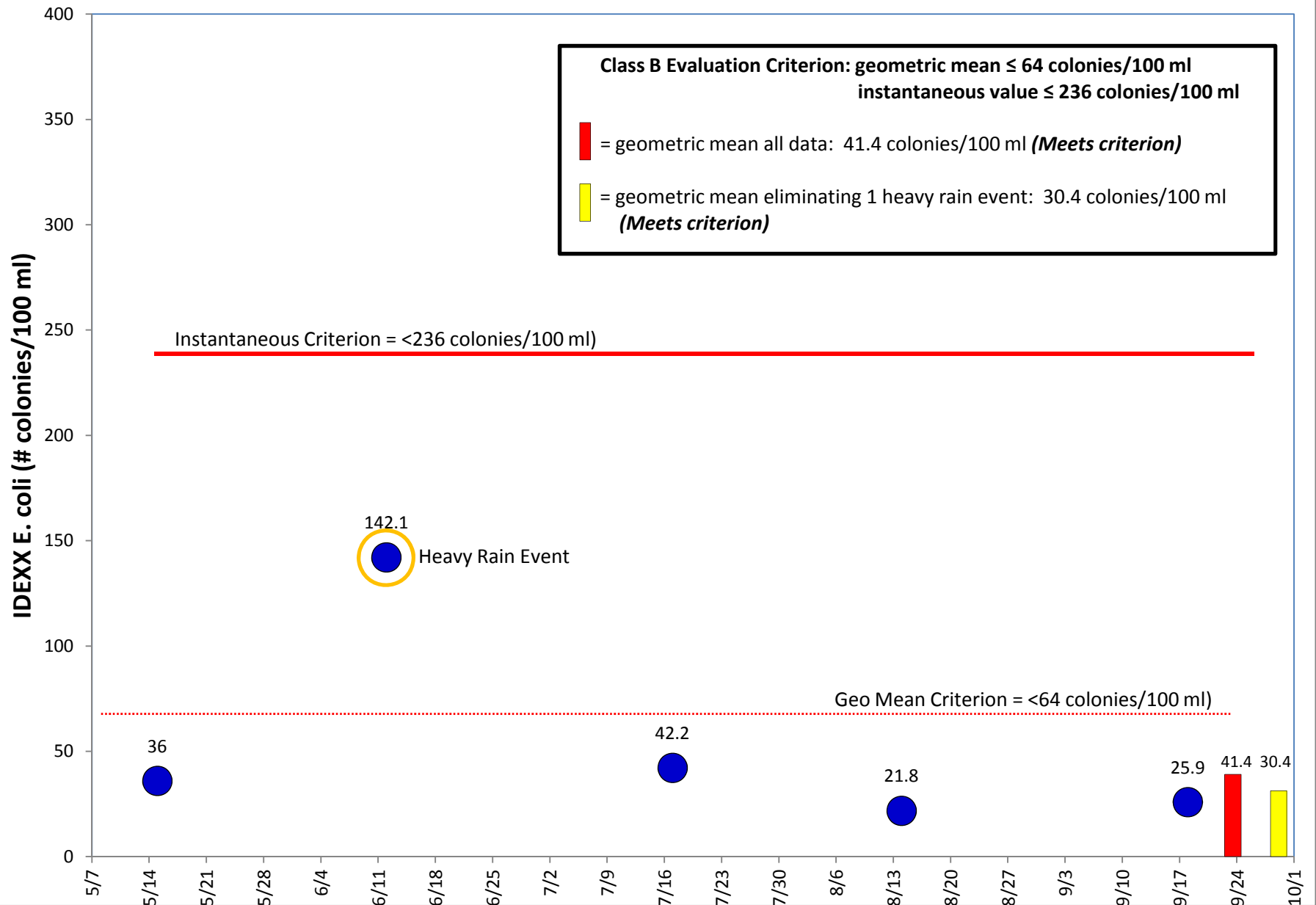
Lower Androscoggin River 2011 *E. coli* (IDEXX) Brunswick Canoe Portage (May - Sep)



Lower Androscoggin River 2011 *E. coli* (IDEXX) Brunswick Water St. Boat Launch (May - Sep)

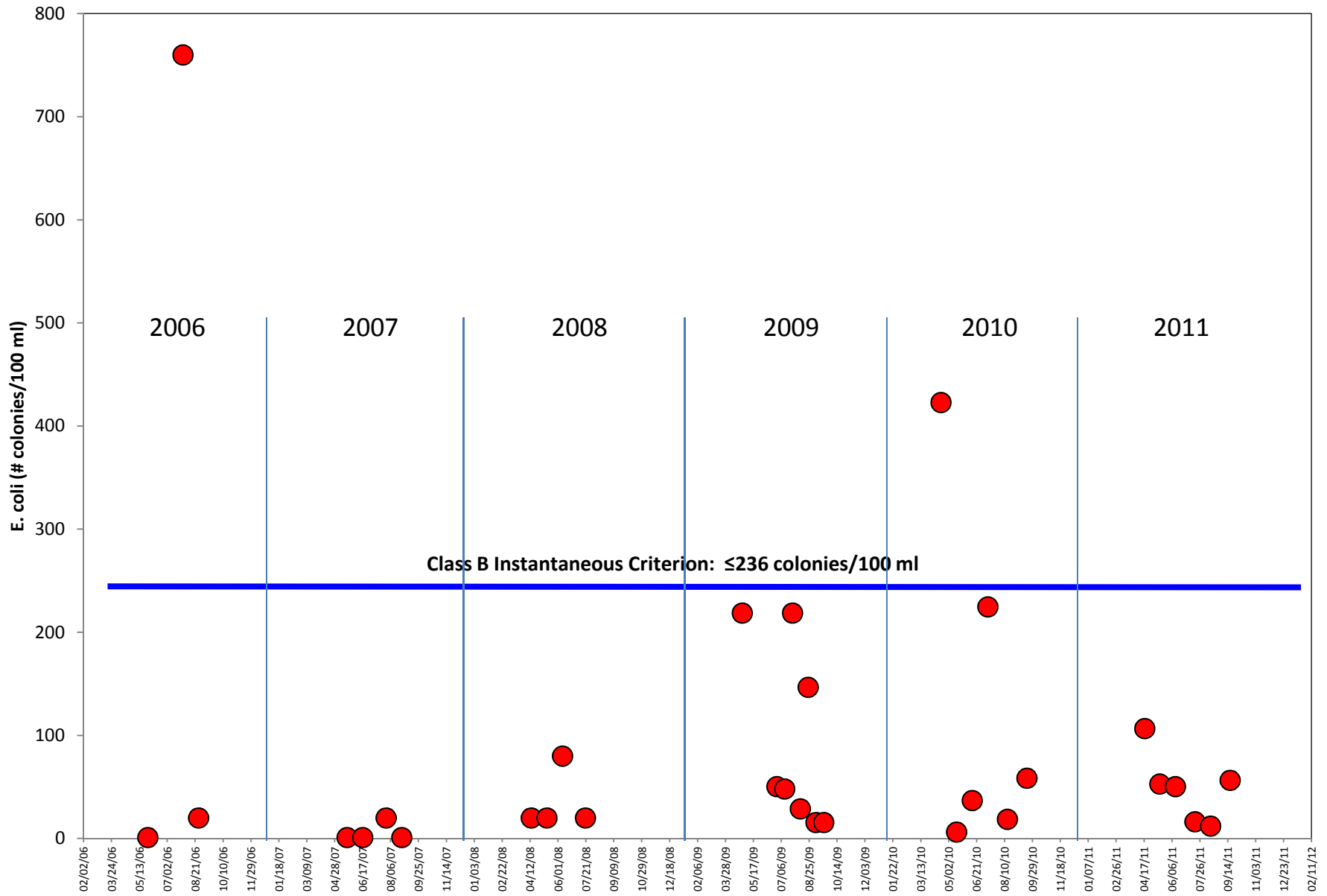


Lower Androscoggin River 2011 *E. coli* (IDEXX) Brunswick Bay Bridge (May - Sep)

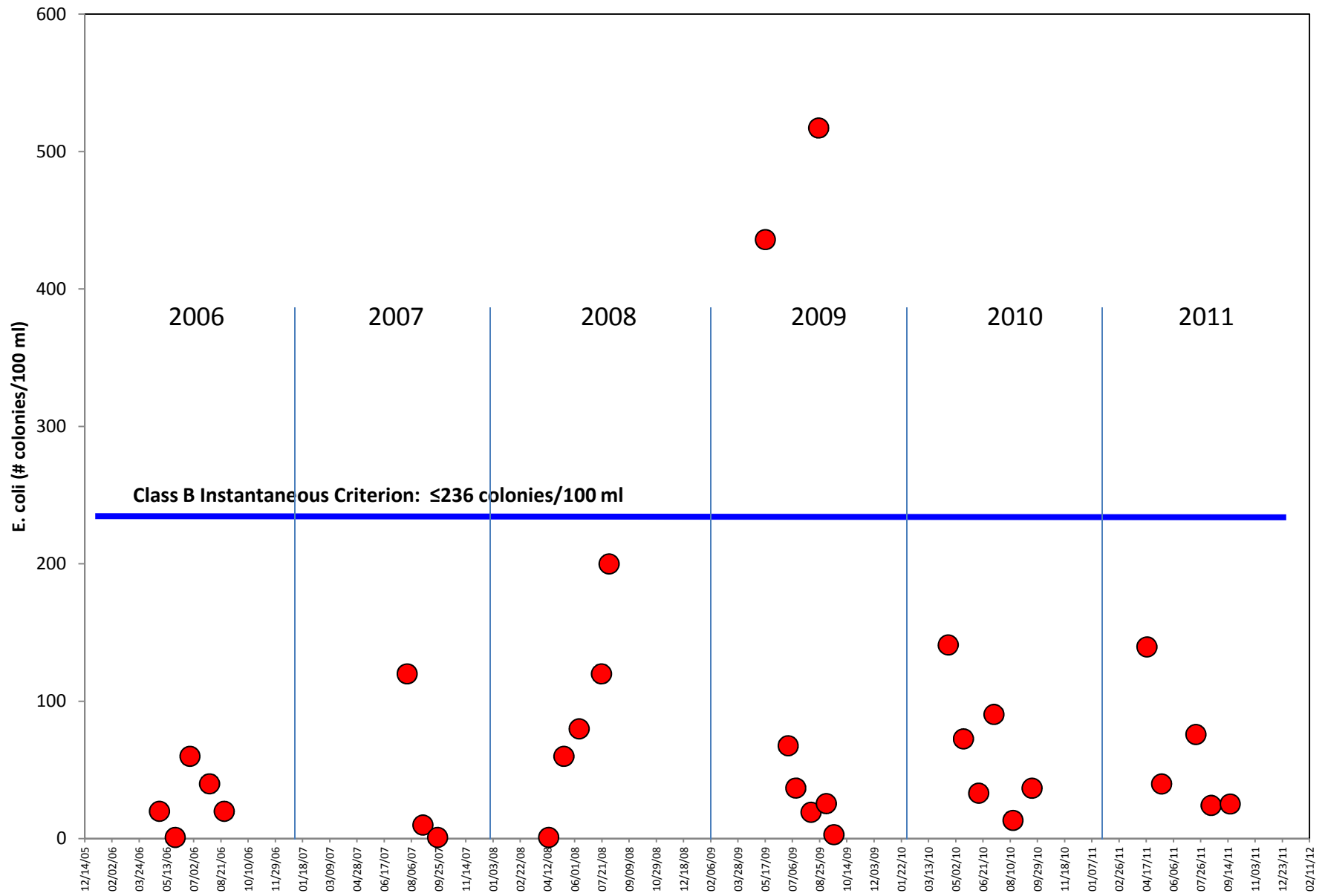


E. coli 2006 - 2011 Long-term Stations
Historical Trends
April to September

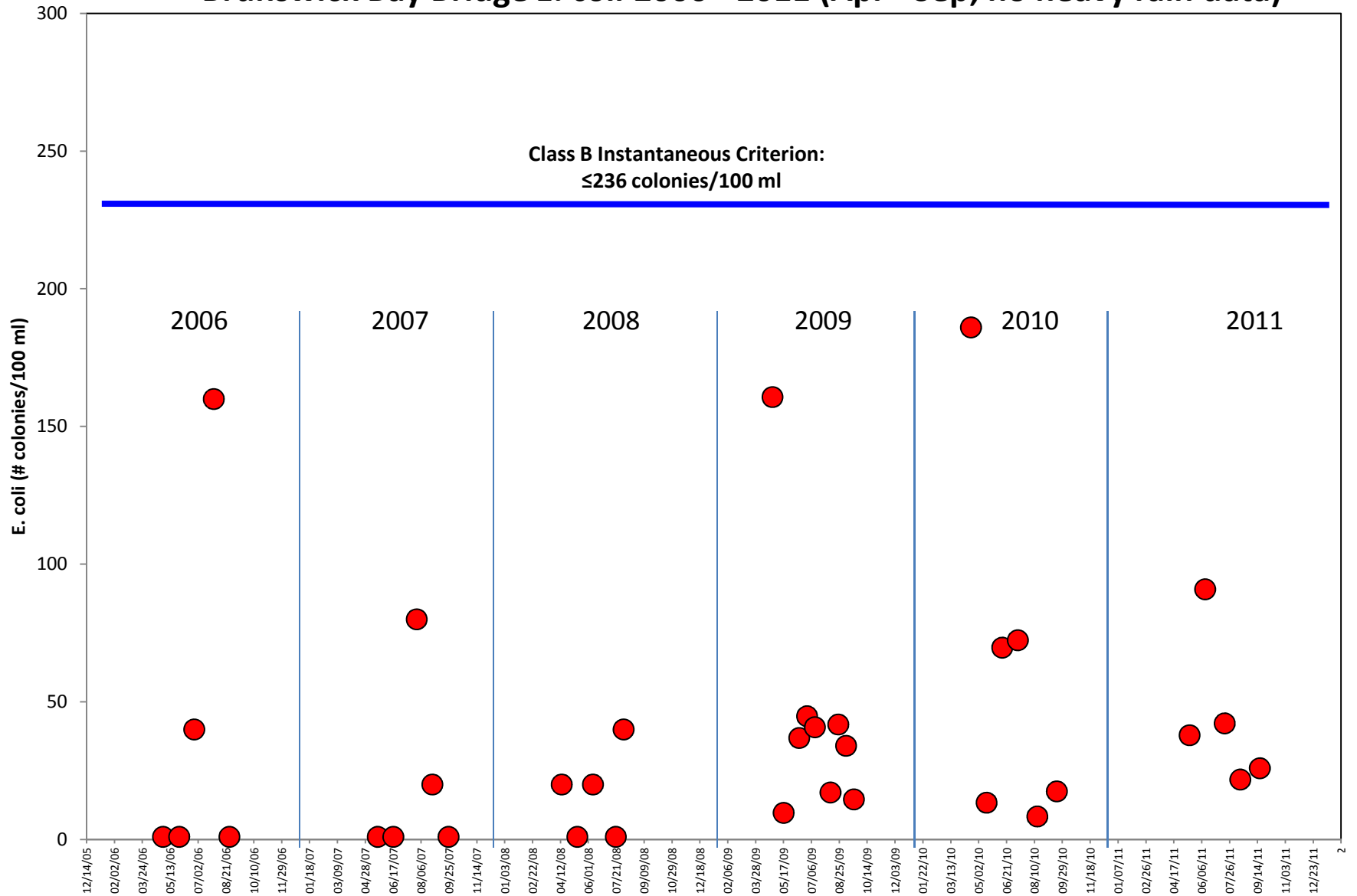
Pejepscot Boat Landing *E. coli* 2006 - 2011 (Apr - Sep; no heavy rain data)



Brunswick Water Street Boat Launch *E. coli* 2006 - 2011 (Apr - Sep; no heavy rain data)

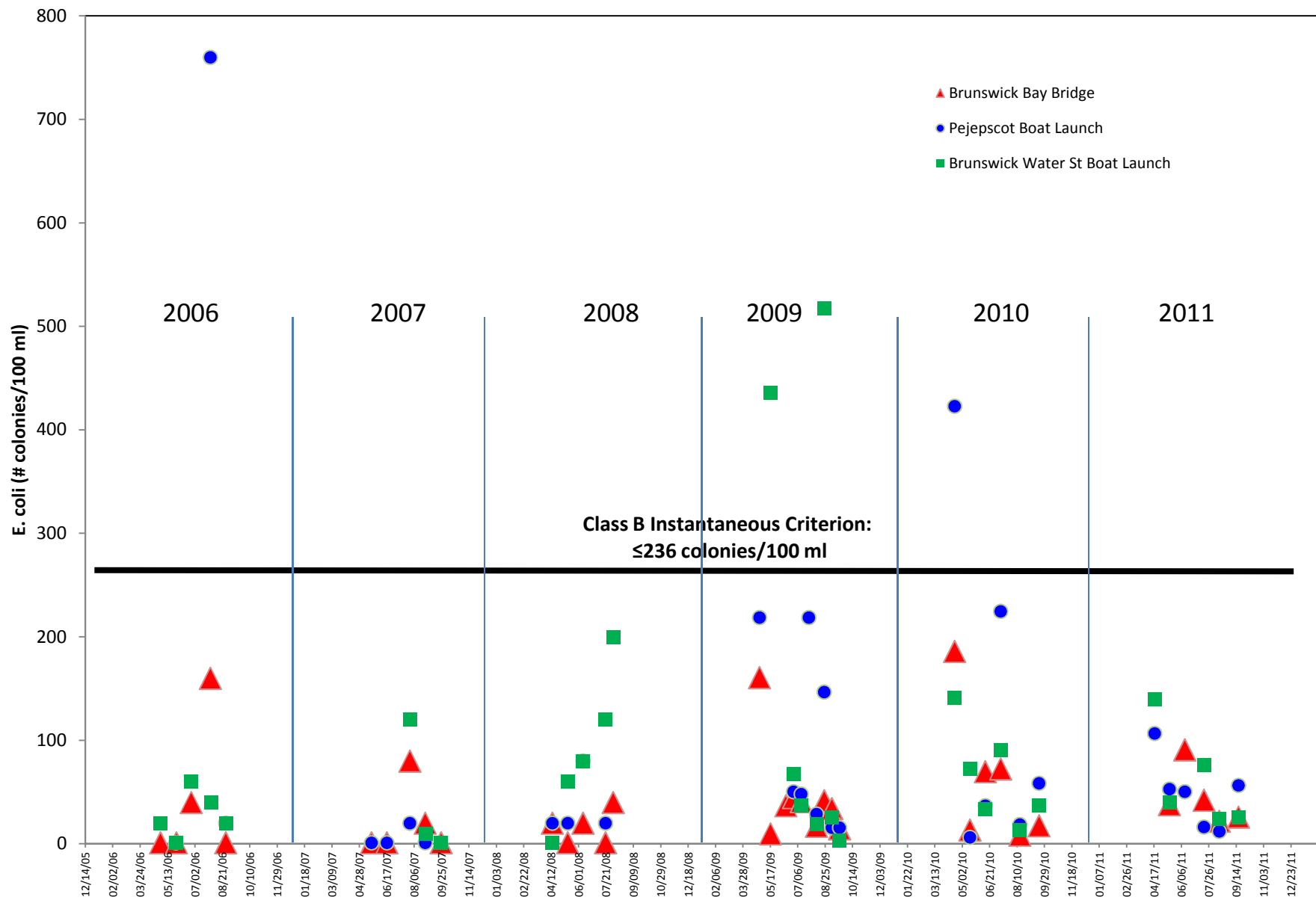


Brunswick Bay Bridge *E. coli* 2006 - 2011 (Apr - Sep; no heavy rain data)



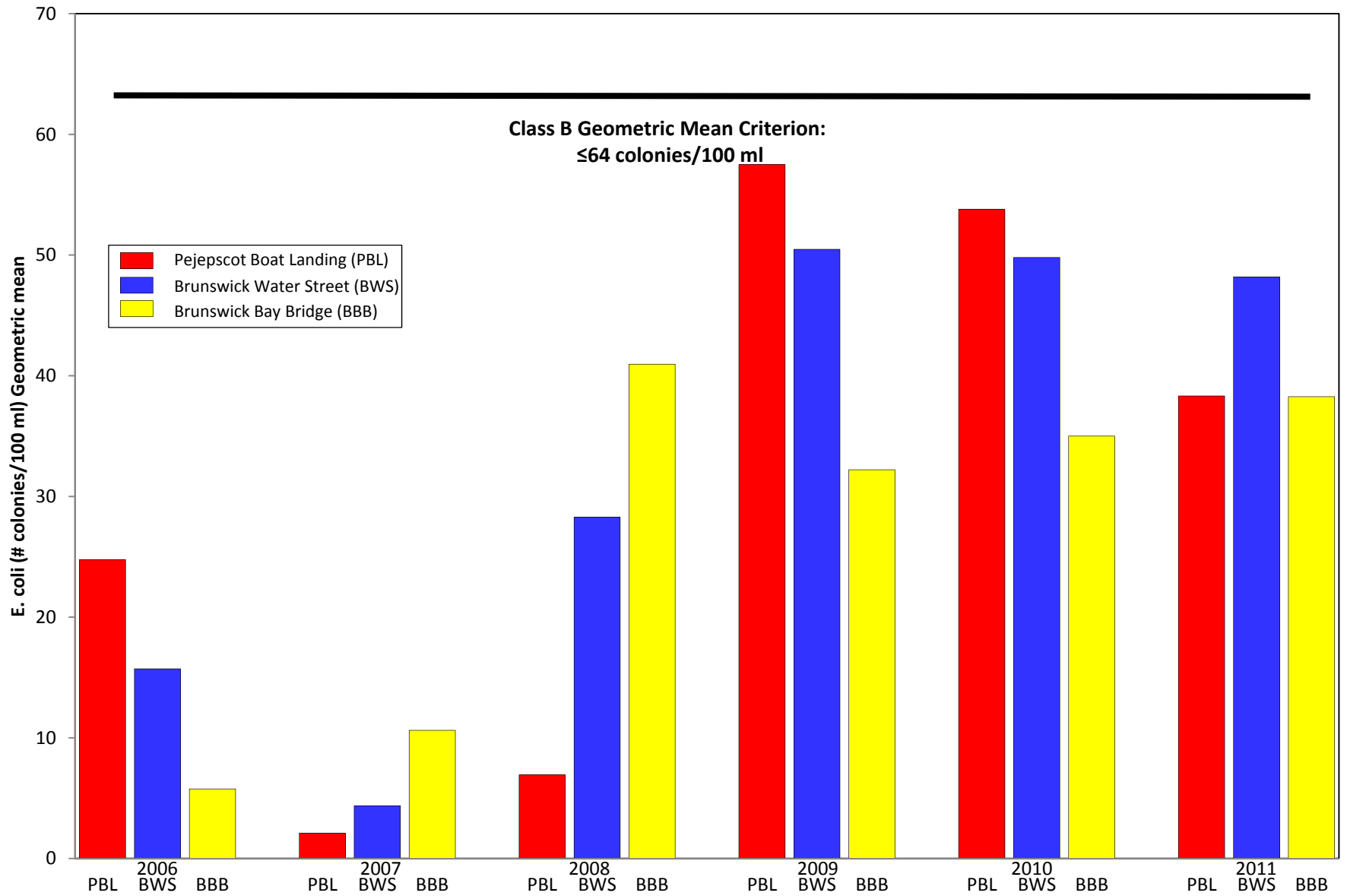
E. coli 2006 - 2011 Long-term Stations Combined
Historical Trends
April to September

Lower Androscoggin River - E. coli 2006 to 2011 (Apr - Sep; no heavy rain data)

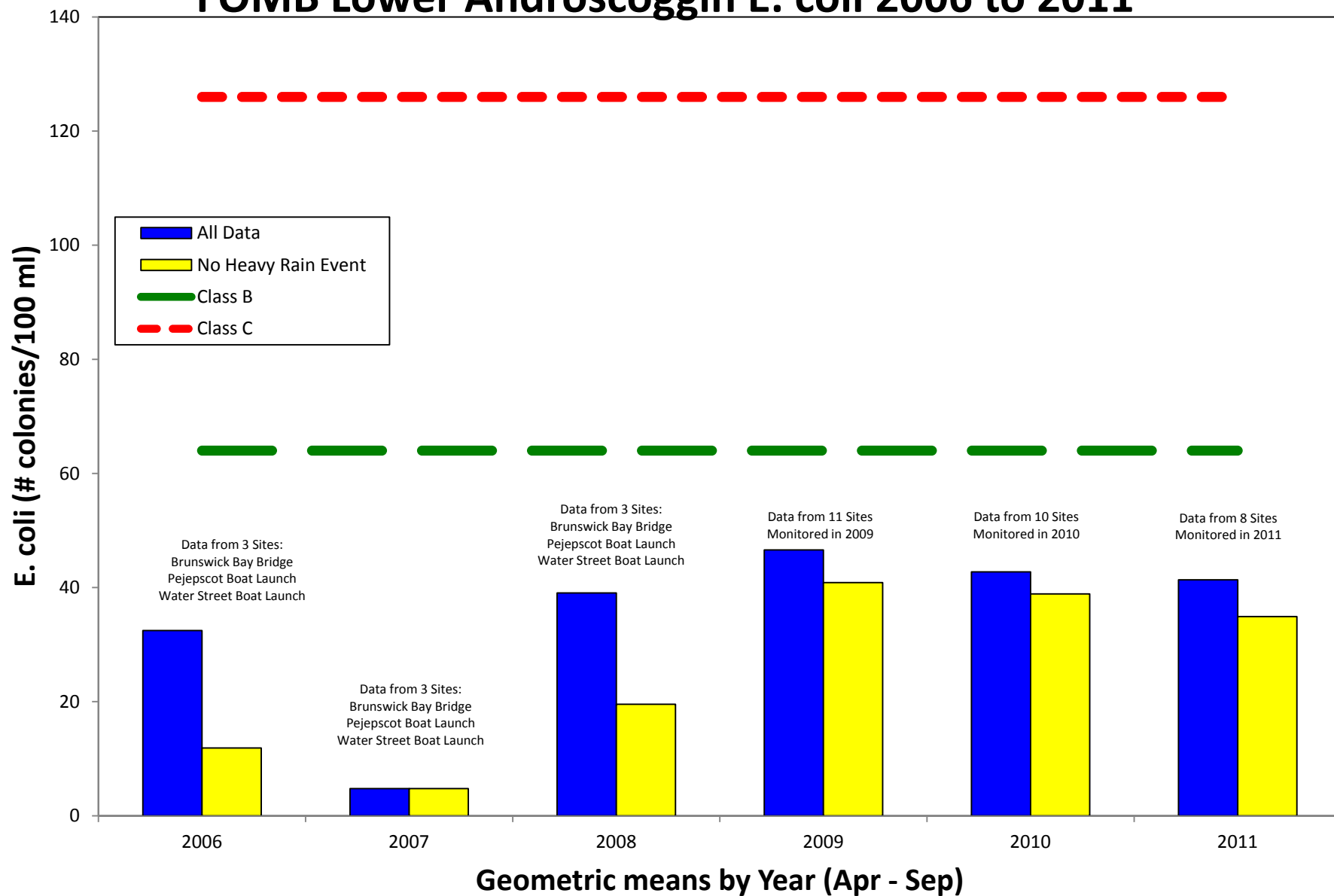


E. coli 2006 - 2011
Historical Trends
Yearly Geometric Means

Lower Androscoggin River - *E. coli* GeoMeans by Station (Apr - Sep; no heavy rain events)
2006 - 2011




FOMB Lower Androscoggin E. coli 2006 to 2011



Lower Androscoggin River 2011 *E. coli* Data Tables

Lower Androscoggin River 2011
E. coli Monthly Measurements

 = MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						<p align="center">CRITERIA</p> <p align="center">GeoMean: ≤ 64/100 ml</p> <p align="center">Instantaneous Measurement: ≤ 236/100 ml</p> <p align="center">Units of Measurement: MPN colonies/100 ml</p>			
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX	ALL DATA w/ MEANS FOR REPLICATE SAMPLES	NO APR OR OCT IDEXX DATA (Means for reps used)	NO OCT IDEXX DATA (Means for reps used)


Durham Boat Launch (DBL)

DBL	04/18/11	0700	clear	HEAVY	monthly	78.9	69.6	APR DATA ELIM	69.6
DBL	04/18/11	0700	clear	HEAVY	replicate	60.2		APR DATA ELIM	
DBL	05/15/11	0815	overcast	moderate	monthly	106.3	106.3	106.3	106.3
DBL	06/12/11	0700	overcast	drizzle	monthly	42.2	42.2	42.2	42.2
DBL	07/17/11	0810	clear		monthly	71	71	71	71.0
DBL	08/14/11	0810	overcast		monthly	28.1	28.1	28.1	28.1
DBL	09/18/11	0815	overcast		monthly	16.9	16.9	16.9	16.9
DBL	10/10/11	0910	overcast	h	monthly	101.7	101.7	OCT DATA ELIM	OCT DATA ELIM
Geomean DBL						54.1	52.3	43.2	46.8


Pejepscot Boat Launch (PBL)

PBL	04/18/11	0630	clear		monthly	106.7	106.7	APR DATA ELIM	106.7
PBL	05/15/11	0650	overcast	light	monthly	52.9	52.05	52.05	52.05
PBL	05/15/11	0650	overcast	light	replicate	51.2			
PBL	06/12/11	0625	overcast	medium	monthly	50.4	50.4	50.4	50.4
PBL	07/17/11	0640	clear		monthly	16.3	16.3	16.3	16.3
PBL	08/14/11	0645	clear		monthly	12.1	12.1	12.1	12.1
PBL	09/18/11	0720	clear		monthly	56.5	44.15	44.15	44.15
PBL	09/18/11	0720	clear		replicate	31.8			
PBL	10/16/11	0810	overcast	heavy	monthly	218.7	218.7	OCT DATA ELIM	OCT DATA ELIM
Geomean PBL						47.0	47.3	29.6	36.7


Lower Androscoggin River 2011
E. coli Monthly Measurements

 = MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						CRITERIA GeoMean: ≤ 64/100 ml Instantaneous Measurement: ≤ 236/100 ml Units of Measurement: MPN colonies/100 ml			
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX	ALL DATA w/ MEANS FOR REPLICATE SAMPLES	NO APR OR OCT IDEXX DATA (Means for reps used)	NO OCT IDEXX DATA (Means for reps used)
Fish Park Up (FPU)									
FPU	04/18/11	0730	clear		monthly	110	110	APR DATA ELIM	110
FPU	05/15/11	0720	overcast		monthly	13.4	13.4	13.4	13.4
FPU	06/12/11	0732	overcast		monthly	48.8	45.8	45.8	45.8
FPU	06/12/11	0735	overcast		replicate	42.8			
FPU	07/17/11	0710	clear		monthly	90.6	68.5	68.5	68.5
FPU	07/17/11	0710	clear		replicate	46.4			
FPU	08/14/11	0705	ptly cloudy		monthly	7.4	7.4	7.4	7.4
FPU	09/18/11	0745	clear		monthly	10.9	10.9	10.9	10.9
FPU	10/16/11	0835	overcast	heavy	monthly	461.1	504.3	OCT DATA ELIM	OCT DATA ELIM
FPU	10/16/11	0835	overcast	heavy	replicate	547.5			
					Geomean FPU	55.2	40.8	20.2	26.8
Fish Park Down (FPD)									
FPD	04/18/11	0745	clear		monthly	69.1	69.1	APR DATA ELIM	69.1
FPD	05/15/11	0730	overcast	light rain	monthly	20.3	20.3	20.3	20.3
FPD	06/12/11	0745	overcast		monthly	55.7	55.7	55.7	55.7
FPD	07/17/11	0725	clear		monthly	70.3	70.3	70.3	70.3
FPD	08/14/11	0720	clear		monthly	8.4	8.4	8.4	8.4
FPD	09/18/11	0755	clear		monthly	22.8	22.8	22.8	22.8
FPD	10/16/11	0850	overcast		monthly	325.5	325.5	OCT DATA ELIM	OCT DATA ELIM
					Geomean FPD	44.4	44.4	27.3	31.9

Lower Androscoggin River 2011
E. coli Monthly Measurements

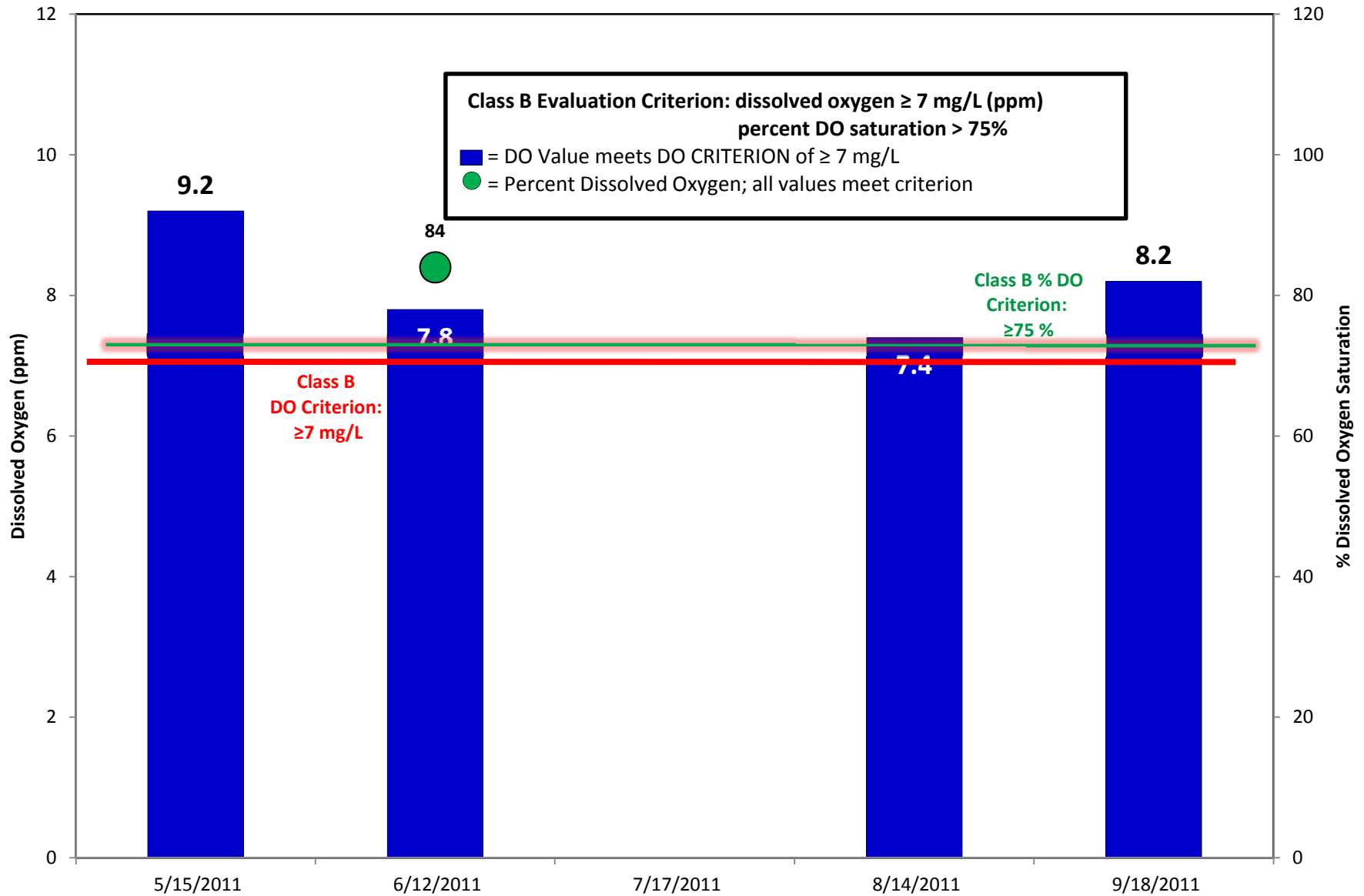
 = MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						CRITERIA GeoMean: ≤ 64/100 ml Instantaneous Measurement: ≤ 236/100 ml Units of Measurement: MPN colonies/100 ml			
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX	ALL DATA w/ MEANS FOR REPLICATE SAMPLES	NO APR OR OCT IDEXX DATA (Means for reps used)	NO OCT IDEXX DATA (Means for reps used)
Brunswick Interstate Ledges (BIL)									
BIL	04/18/11	0800	clear		monthly	111.2	111.2	APR DATA ELIM	111.2
BIL	05/15/11	0755	overcast	light	monthly	35.9	35.9	35.9	35.9
BIL	06/12/11	0805	overcast		monthly	53.7	53.7	53.7	53.7
BIL	07/17/11	0755	clear		monthly	61.3	61.3	61.3	61.3
BIL	08/14/11	0800	overcast	sprinkle	monthly	9.8	9.8	9.8	9.8
BIL	08/14/11	0815	overcast	sprinkle	replicate	9.8			
BIL	09/18/11	0815	clear		monthly	25.3	25.3	25.3	25.3
BIL	10/16/11	0905	overcast	heavy	monthly	517.2	517.2	OCT DATA ELIM	OCT DATA ELIM
Geomean BIL						44.9	55.8	31.1	38.5
Brunswick Canoe Portage (BCP)									
BCP	04/18/11	0745	overcast	heavy	monthly	116	116	APR DATA ELIM	116
BCP	05/15/11	0745	overcast		monthly	27.5	27.5	27.5	27.5
BCP	06/12/11	0800	overcast		monthly	88	88	88	88
BCP	07/17/11	0745	clear		monthly	83.9	83.9	83.9	83.9
BCP	07/17/11	0750	clear		mid-depth	56.3	56.3	56.3	56.3
BCP	08/13/11	0800	clear		monthly	9.6	7.4	7.4	7.4
BCP	08/13/11	0800	clear		replicate	5.2			
BCP	09/18/11	0820	overcast		monthly	20.3	20.3	20.3	20.3
BCP	10/16/11	0800	overcast	heavy	monthly	686.7	686.7	OCT DATA ELIM	OCT DATA ELIM
Geomean BCP						46.0	58.5	34.6	41.1

Lower Androscoggin River 2011
E. coli Monthly Measurements

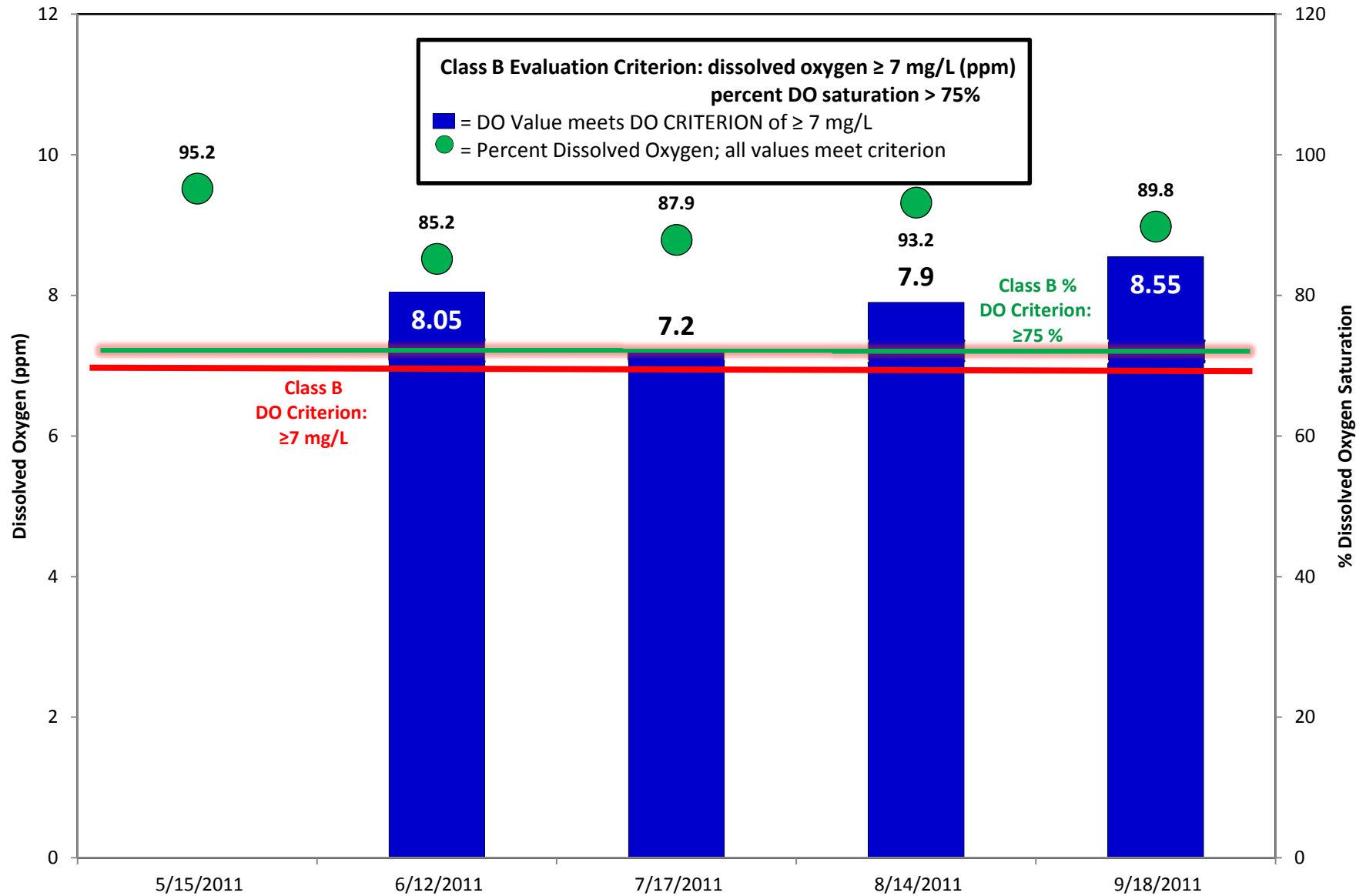
 = MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						CRITERIA GeoMean: ≤ 64/100 ml Instantaneous Measurement: ≤ 236/100 ml Units of Measurement: MPN colonies/100 ml			
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX	ALL DATA w/ MEANS FOR REPLICATE SAMPLES	NO APR OR OCT IDEXX DATA (Means for reps used)	NO OCT IDEXX DATA (Means for reps used)
Brunswick Water St. (BWS)									
BWS	04/18/11	0820	clear		monthly	139.6	139.6	APR DATA ELIM	139.6
BWS	05/15/11	0900	fog/haze	light	monthly	39.9	39.9	39.9	39.9
BWS	06/12/11	1000	overcast	heavy	monthly	185	137.9	137.9	137.9
BWS	06/12/11	1000	overcast	heavy	replicate	90.8			
BWS	07/17/11	0840	clear		monthly	75.9	75.9	75.9	75.9
BWS	08/14/11	0800	overcast		monthly	24.3	24.3	24.3	24.3
BWS	09/18/11	0820	clear		monthly	25.3	25.3	25.3	25.3
BWS	10/16/11	0730	overcast	heavy	monthly	456.9	456.9	OCT DATA ELIM	OCT DATA ELIM
Geomean BWS						81.8	77.2	48.1	57.4
Brunswick Bay Bridge (BBB)									
BBB	04/18/11	0735	ptly cloudy	heavy	monthly	209.8	209.8	APR DATA ELIM	209.8
BBB	05/15/11	0745	overcast	moderate	monthly	37.9	36	36	36
BBB	05/15/11	0745	overcast	moderate	replicate	34.1			
BBB	06/12/11	0750	downpour	heavy	monthly	142.1	142.1	142.1	142.1
BBB	07/17/11	0755	clear		monthly	42.2	42.2	42.2	42.2
BBB	08/14/11	0750	overcast		monthly	21.8	21.8	21.8	21.8
BBB	09/18/11	0750	ptly overcast		monthly	25.9	25.9	25.9	25.9
BBB	10/16/11	0920	overcast	heavy	monthly	816.4	816.4	OCT DATA ELIM	OCT DATA ELIM
Geoman BBB						72.3	79.9	41.4	54.3

Dissolved Oxygen & Percent DO Saturation - 2011
by Station
May to September

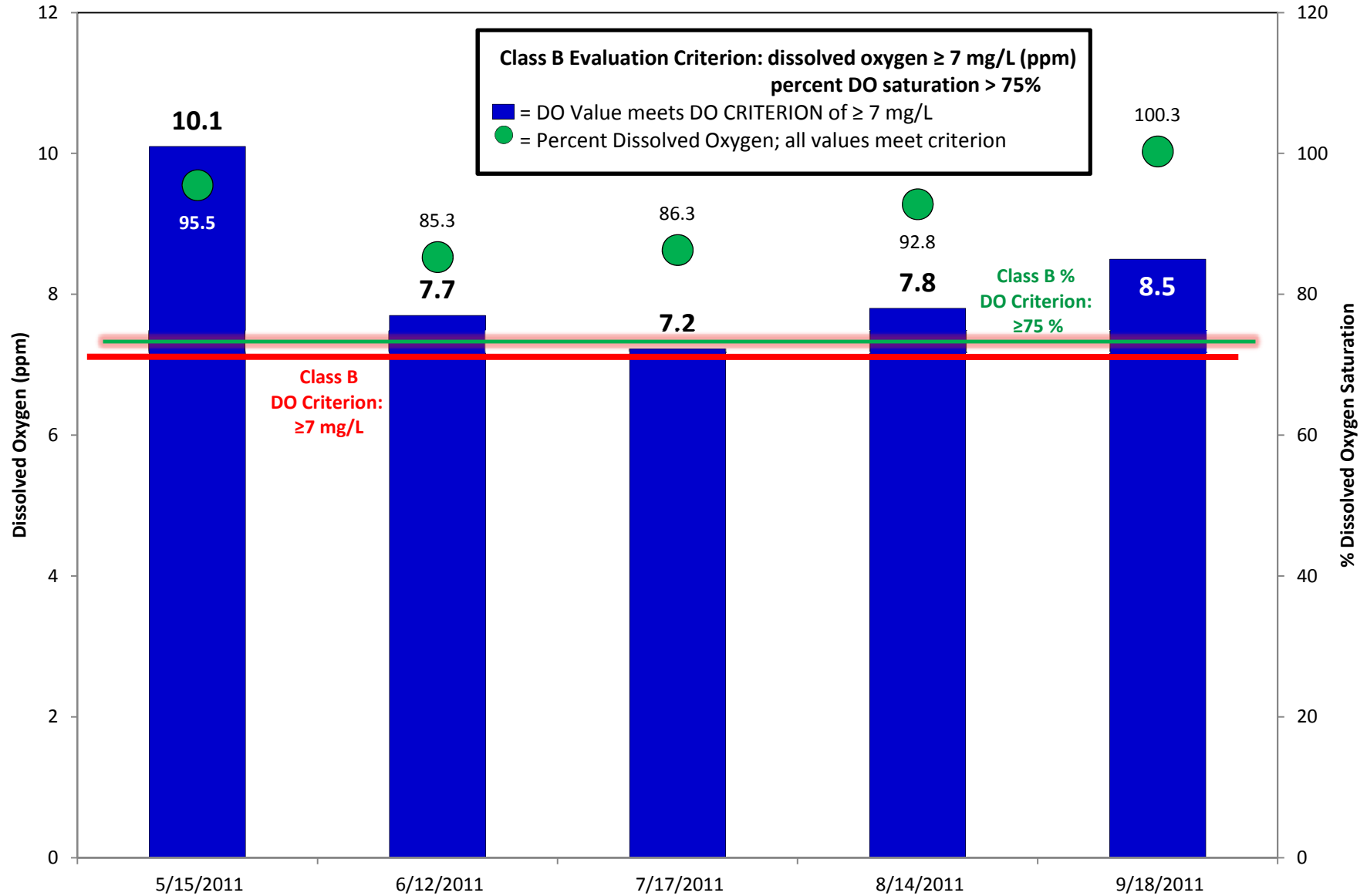
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Durham Boat Launch (May - Sep)



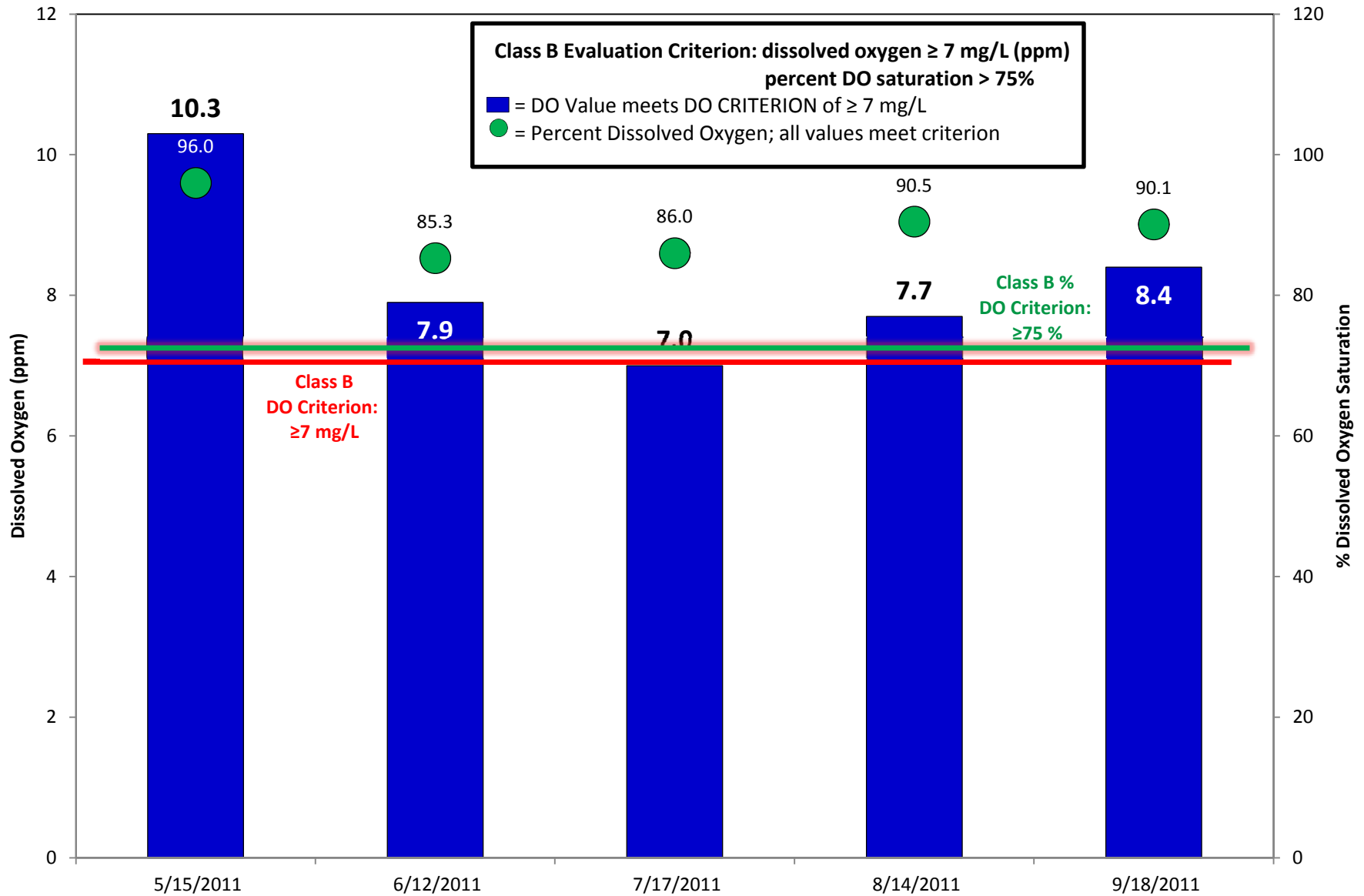
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Pejepscot Boat Launch (May - Sep)



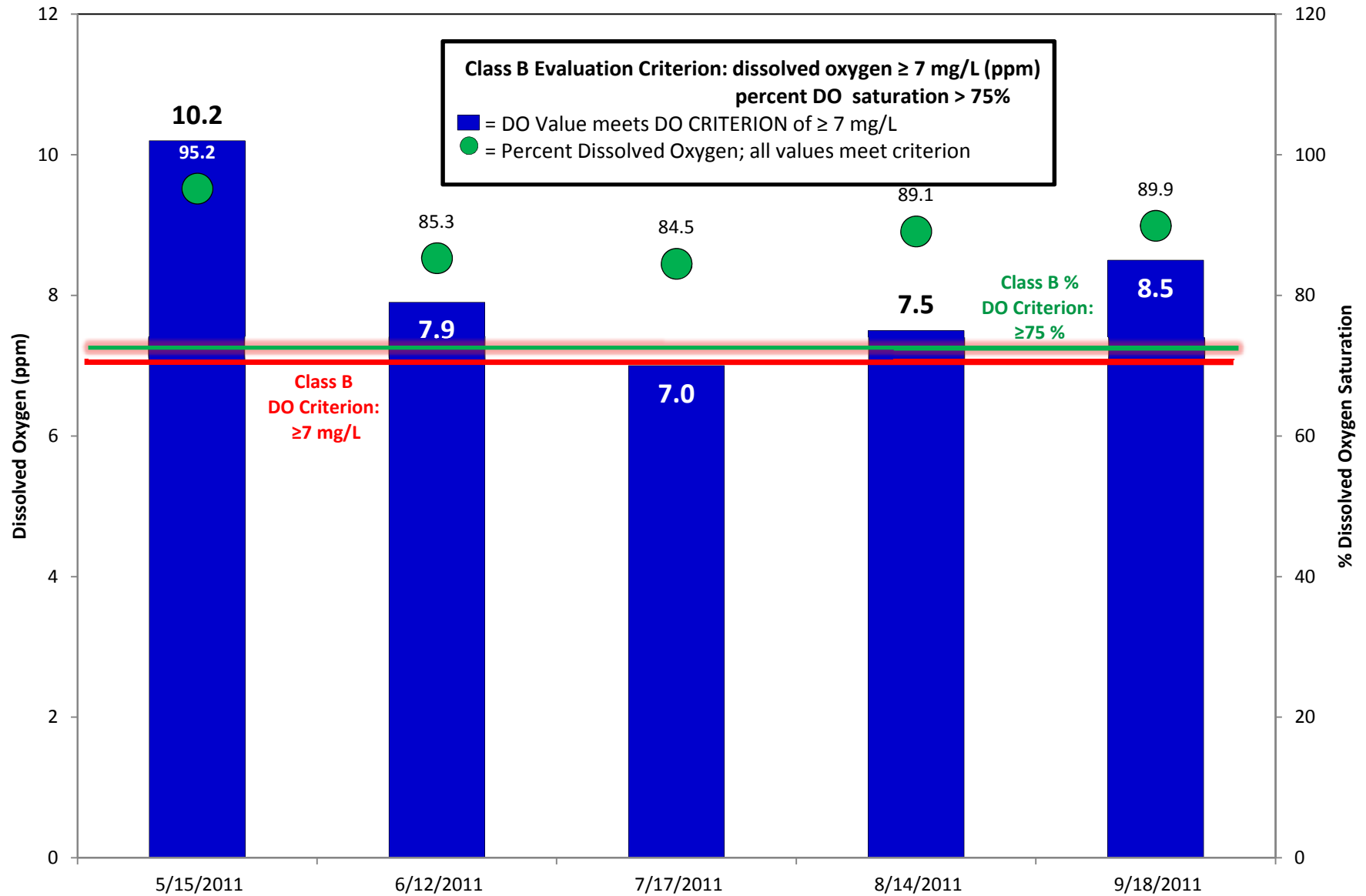
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Fish Park Up (May - Sep)



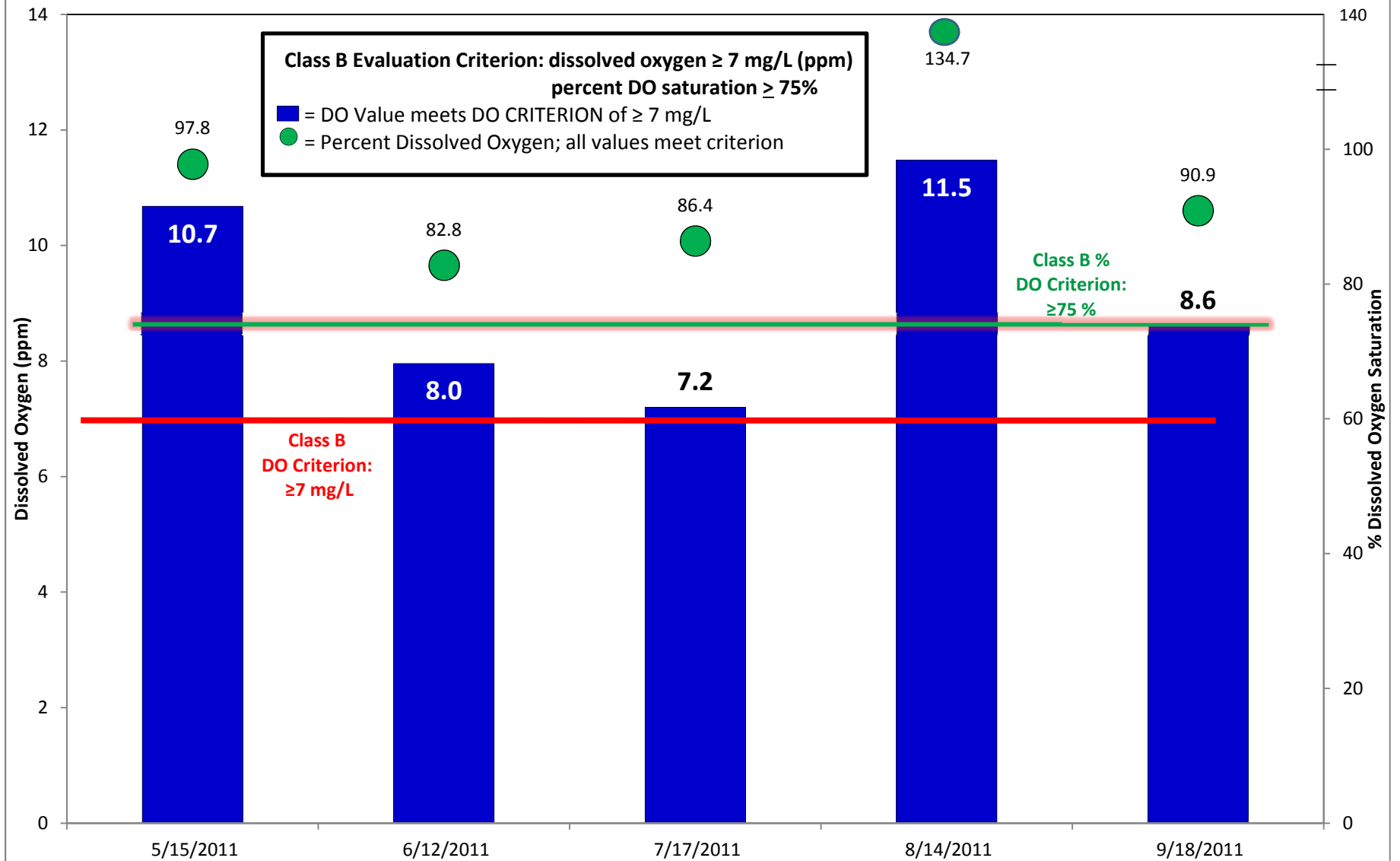
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Fish Park Down (May - Sep)



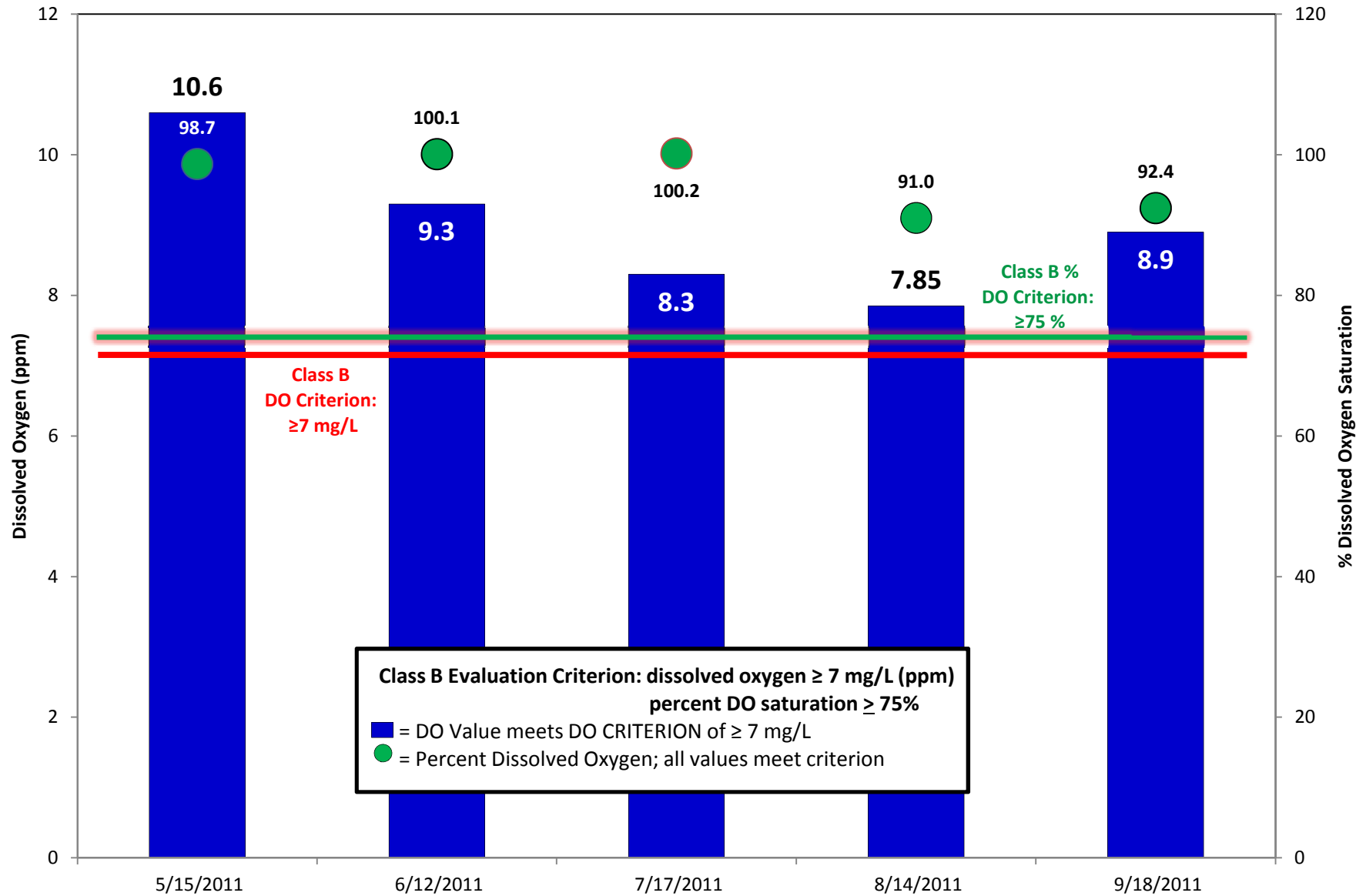
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Brunswick Interstate Ledges (May - Sep)



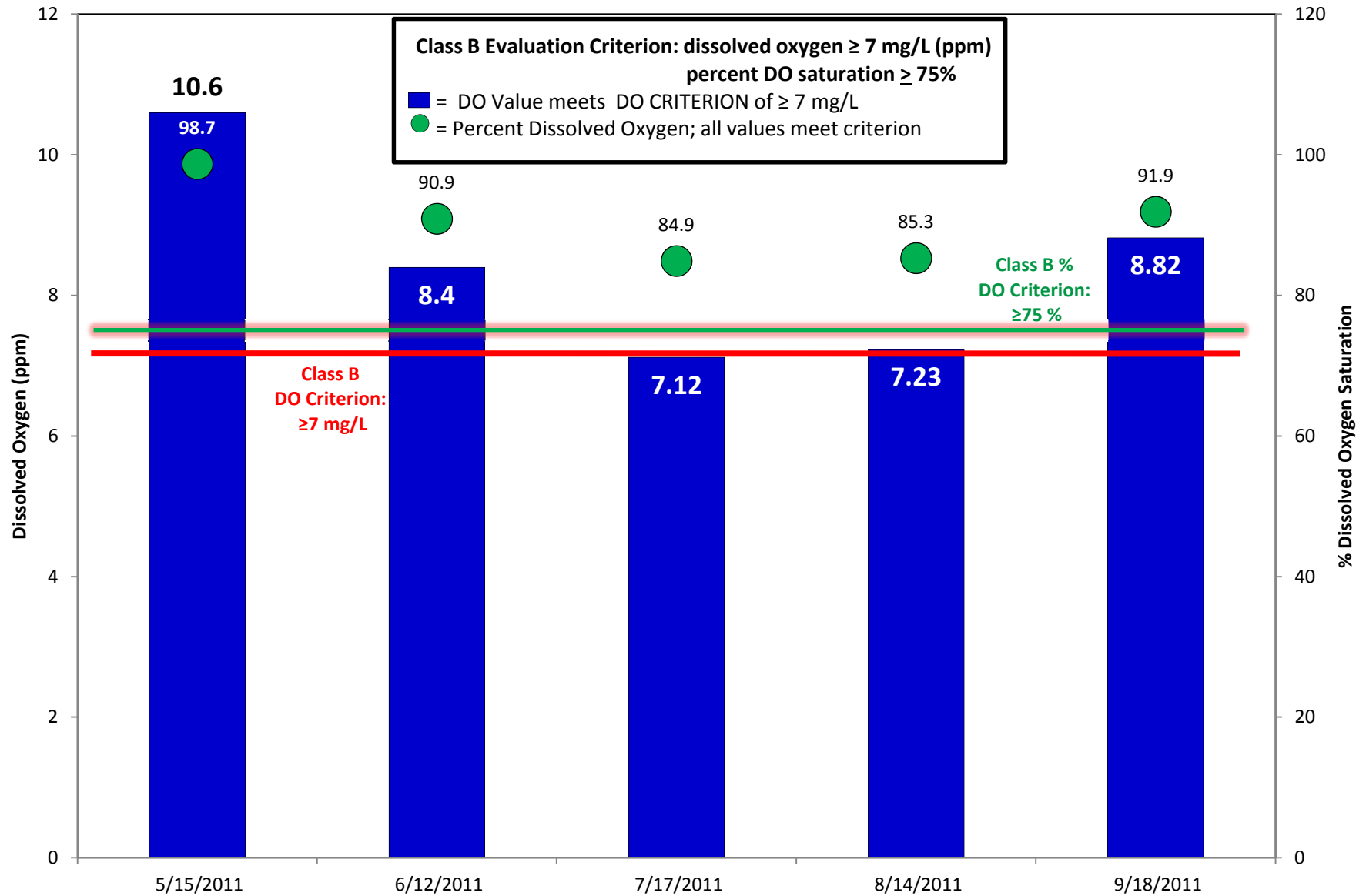
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Brunswick Canoe Portage (May - Sep)



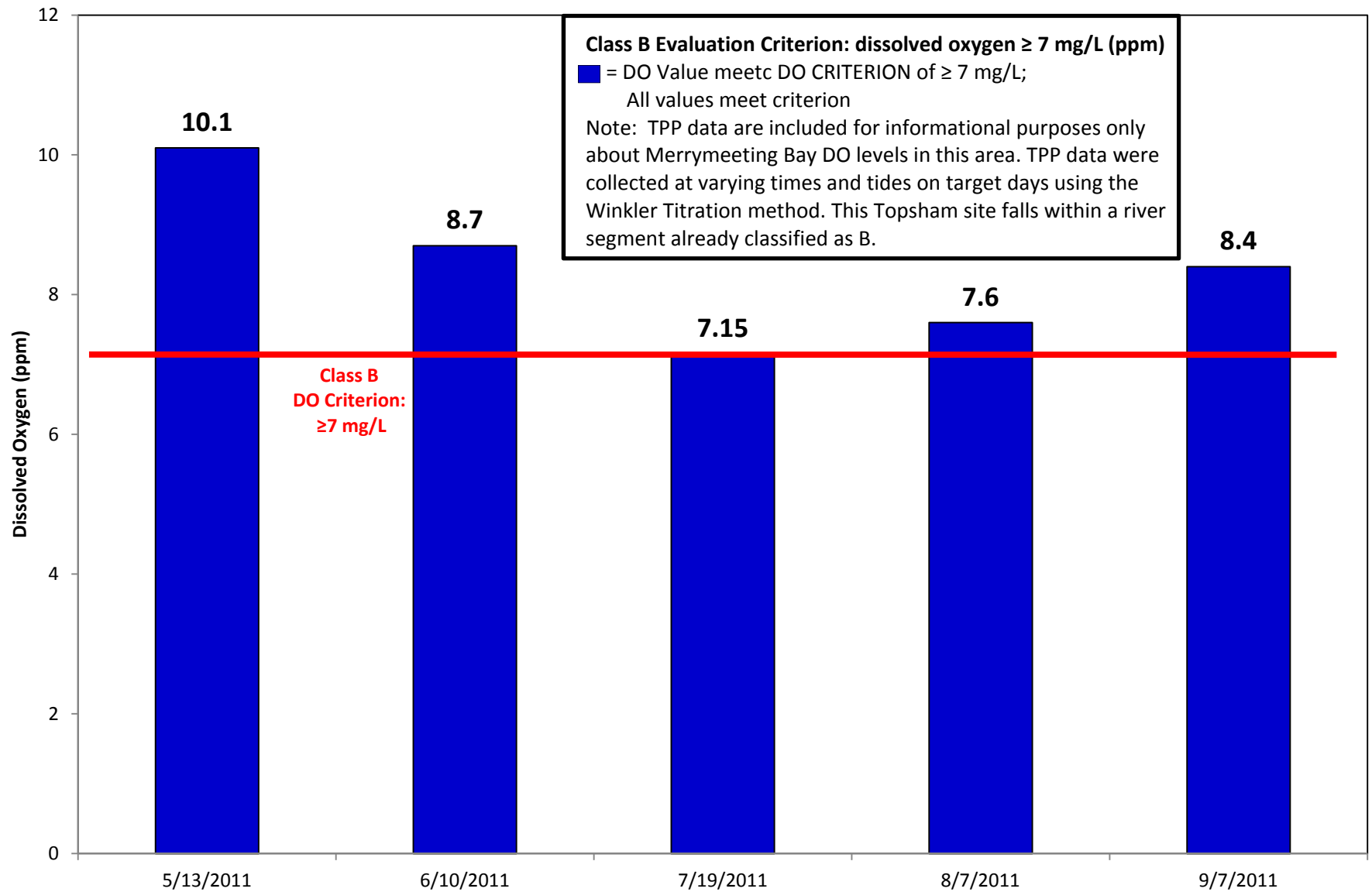
Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Brunswick Water St. (May - Sep)



Lower Androscoggin River 2011 Dissolved Oxygen & Percent DO Saturation Brunswick Bay Bridge (May - Sep)

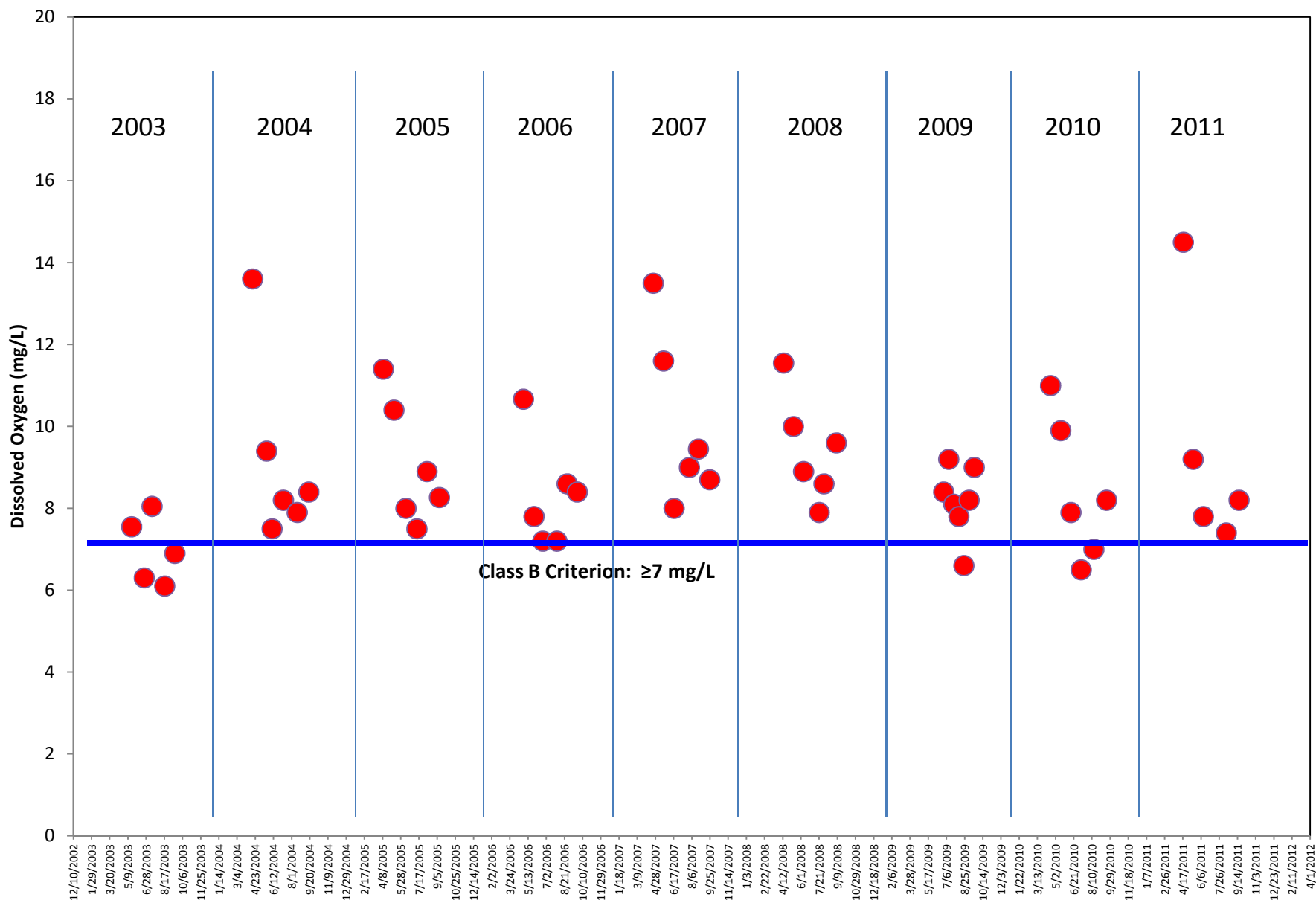


Lower Androscoggin River 2011 Dissolved Oxygen Topsham Pleasant Point (May - Sep)

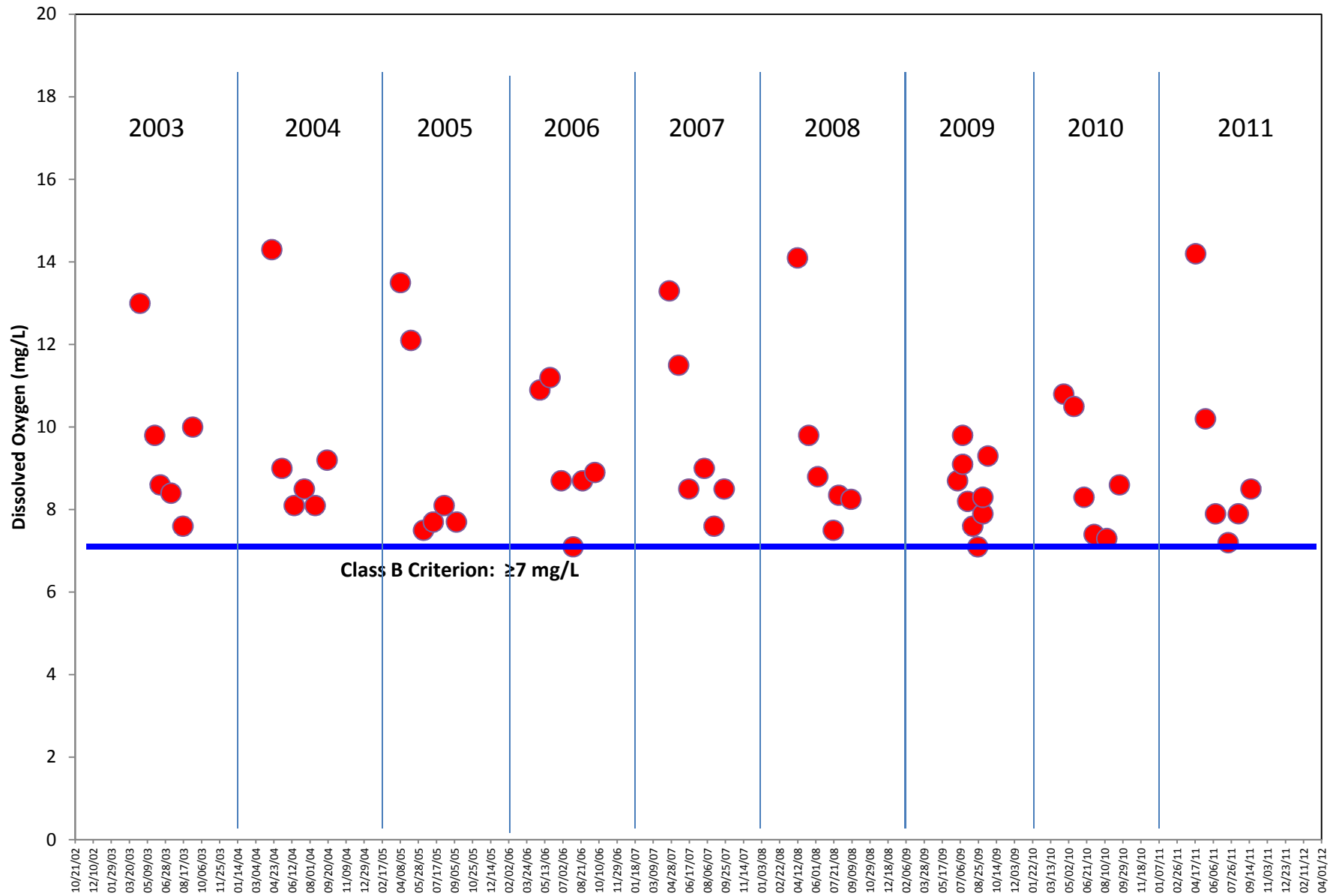


Dissolved Oxygen 2003 - 2011
Long-term Historical Trends
April to September

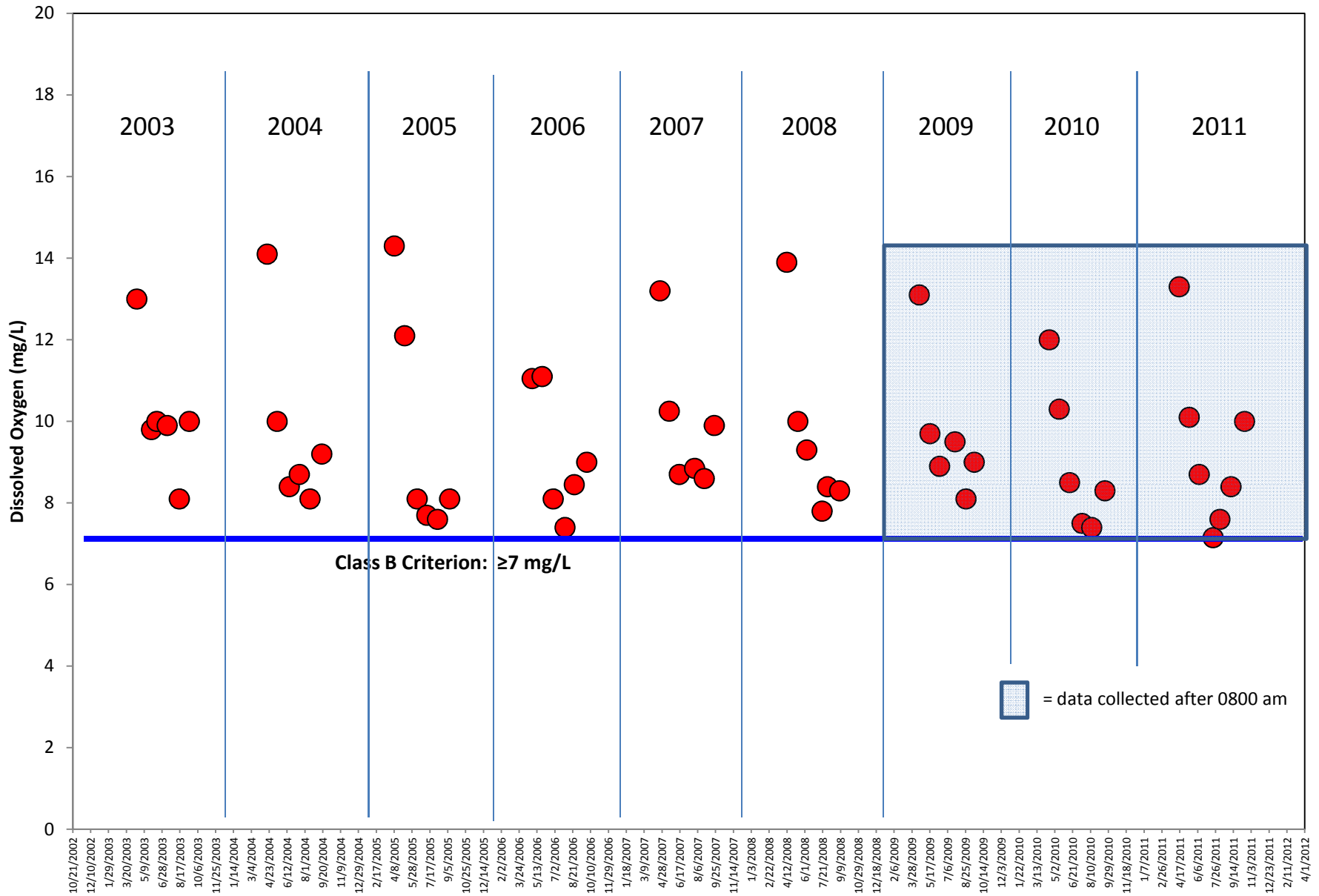
Durham Boat Launch Dissolved Oxygen: 2003 - 2011 (Apr - Sep)



Pejepscot Boat Launch Dissolved Oxygen: 2003 - 2011 (Apr - Sep)

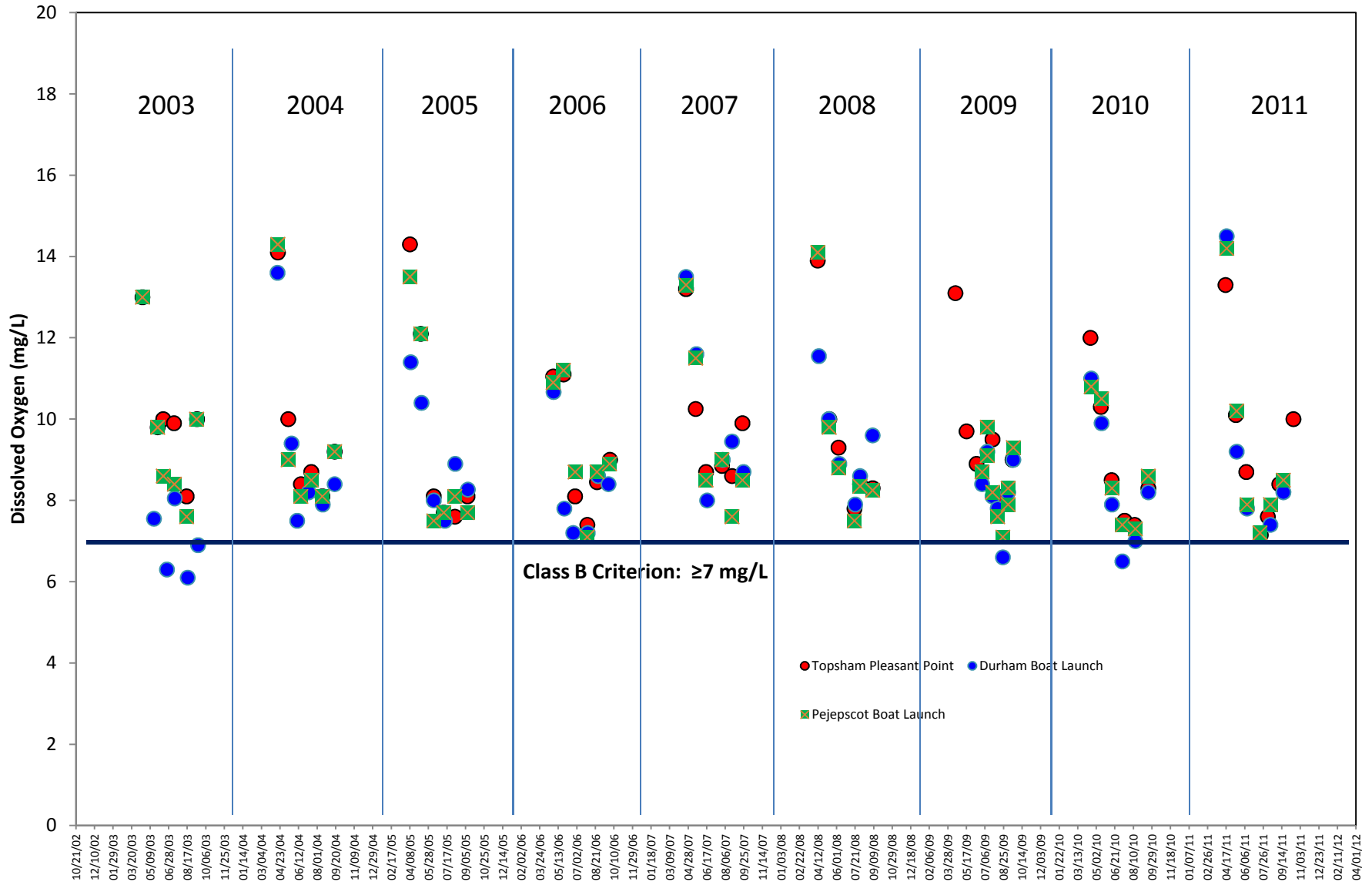


Topsham Pleasant Point Dissolved Oxygen: 2003 - 2011 (Apr - Sep)



Dissolved Oxygen 2003 - 2011
Long-term Historical Trends Stations Combined
April to September

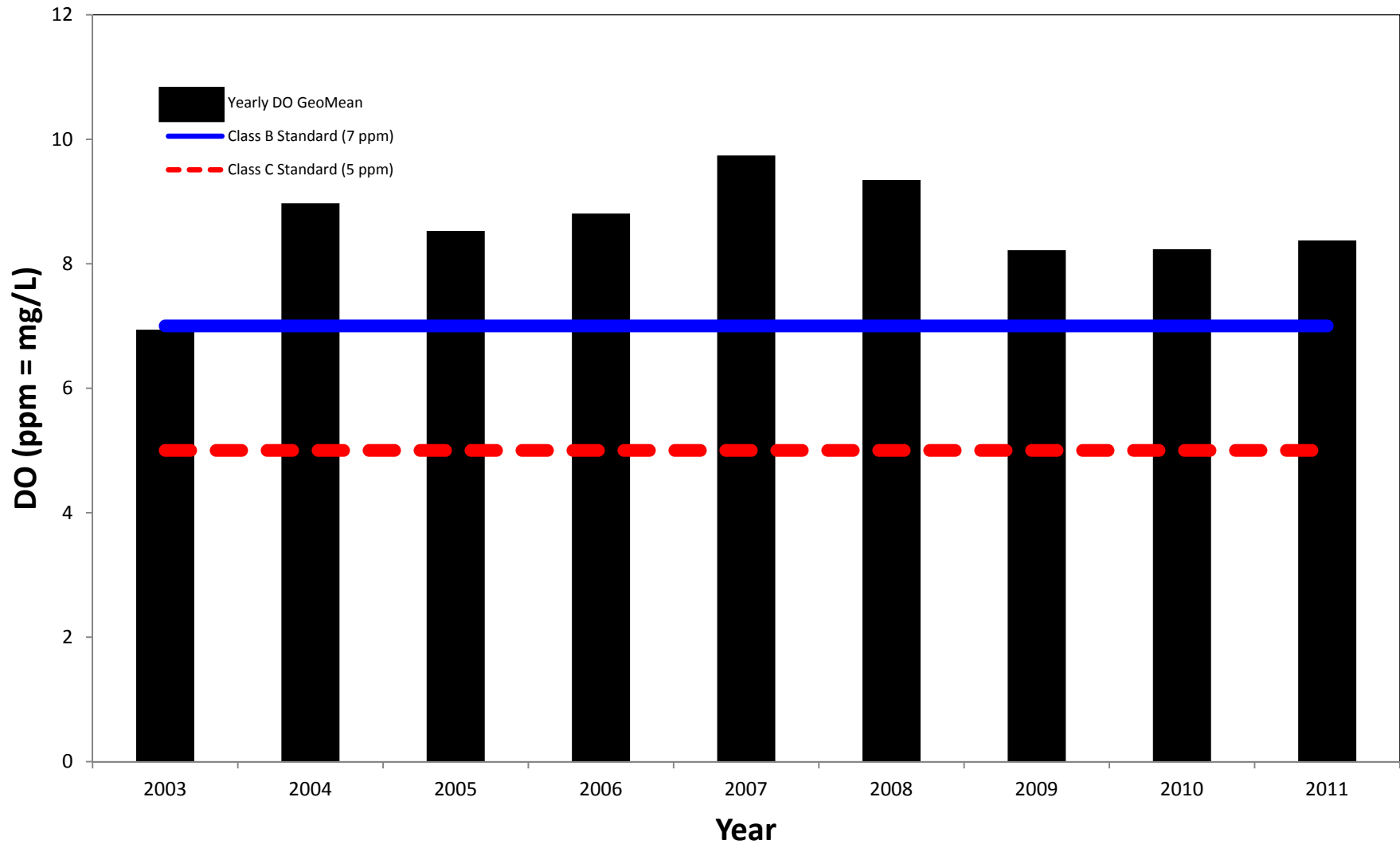
Lower Androscoggin River - Dissolved Oxygen 2003 to 2011 (Apr - Sep) Topsham Pleasant Point, Durham Boat Launch, Pejepscot Boat Launch



Dissolved Oxygen 2003 - 2011
Historical Trends
Yearly Geometric Means

2003 - 2011

Yearly DO Geometric Means for Lower Androscoggin River vs Class B & C Standards



(For 2003 through 2008 Sites = Topsham Pleasant Pt., Pejepscot Boat Launch & Durham Boat Launch. For 2009 through 2011 = all sites monitored)

Lower Androscoggin River 2011 Dissolved Oxygen Data Tables

Lower Androscoggin River 2011
Dissolved Oxygen

= MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values

Durham Boat Launch (DBL)

DBL	04/18/11	0700	clear	HEAVY	14.5	14.5			112.8
DBL	04/18/11	0700	clear	HEAVY	14.5				112.8
DBL	05/15/11	0815	overcast	moderate	9.2	9.2	9.2	9.2	
DBL	06/12/11	0700	overcast	drizzle	7.8	7.8	7.8	7.8	84
DBL	07/17/11	0810	clear						
DBL	08/14/11	0810	overcast		7.4	7.4	7.4	7.4	
DBL	09/18/11	0815	overcast		8.2	8.2	8.2	8.2	
DBL	10/10/11	0910	overcast	h					
GeoMean DBL					9.85	9.12	8.12	8.12	102.2

Pejepscot Boat Launch (PBL)

PBL	04/18/11	0630	clear		14.2	14.2			111.5
PBL	05/15/11	0650	overcast	light	10.2	10.2	10.2	10.2	95.2
PBL	05/15/11	0650	overcast	light	10.2				
PBL	06/12/11	0625	overcast	medium	8.05	8.05	8.05	8.05	85.2
PBL	07/17/11	0640	clear		7.2	7.2	7.2	7.2	87.9
PBL	08/14/11	0645	clear		7.9	7.9	7.9	7.9	93.2
PBL	09/18/11	0720	clear		8.6	8.55	8.55	8.55	89.8
PBL	09/18/11	0720	clear		8.5				
PBL	10/16/11	0810	overcast	heavy	10.4	10.4			100.6
GeoMean PBL					9.29	9.27	8.32	8.32	94.4

Lower Androscoggin River 2011
Dissolved Oxygen

= MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values


Fish Park Up (FPU)

FPU	04/18/11	0730	clear		14.4	14.4			111.6
FPU	05/15/11	0720	overcast		10.1	10.1	10.1	10.1	95.5
FPU	06/12/11	0732	overcast		7.7	7.7	7.7	7.7	85.3
FPU	06/12/11	0735	overcast		7.7				
FPU	07/17/11	0710	clear		7.35	7.23	7.23	7.23	86.3
FPU	07/17/11	0710	clear		7.1				
FPU	08/14/11	0705	ptly cloudy		7.8	7.8	7.8	7.8	92.8
FPU	09/18/11	0745	clear		8.5	8.5	8.5	8.5	90.2
FPU	10/16/11	0835	overcast	heavy	10.5	10.45			100.3
FPU	10/16/11	0835	overcast	heavy	10.4				
GeoMean FPU					8.48	8.55	8.21	8.21	91.6

Fish Park Down (FPD)

FPD	04/18/11	0745	clear		14.9	14.9			114.5
FPD	05/15/11	0730	overcast	light rain	10.3	10.3	10.3	10.3	96
FPD	06/12/11	0745	overcast		7.9	7.9	7.9	7.9	85.3
FPD	07/17/11	0725	clear		7	7	7	7	86
FPD	08/14/11	0720	clear		7.7	7.7	7.7	7.7	90.5
FPD	09/18/11	0755	clear		8.4	8.4	8.4	8.4	90.1
FPD	10/16/11	0850	overcast	Heavy Rain	11.2	11.2			107
GeoMean FPD					8.63	8.63	8.19	8.19	92.2

Lower Androscoggin River 2011
Dissolved Oxygen

 = MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values

Brunswick Interstate Ledges (BIL)

BIL	04/18/11	0800	clear		14.05	14.05			115.2
BIL	05/15/11	0755	overcast	light	10.2	10.2	10.2	10.2	95.2
BIL	06/12/11	0805	overcast		7.9	7.9	7.9	7.9	85.3
BIL	07/17/11	0755	clear		7	7	7	7	84.5
BIL	08/14/11	0800	overcast	sprinkle	7.5	7.5	7.5	7.5	89.1
BIL	08/14/11	0815	overcast	sprinkle	7.5				89.1
BIL	09/18/11	0815	clear		8.5	8.5	8.5	8.5	89.9
BIL	10/16/11	0905	overcast	heavy	11	11			105
GeoMean BIL					8.41	8.57	8.15	8.15	90.9

Brunswick Canoe Portage (BCP)

BCP	04/18/11	0745	overcast	heavy	15.26	15.26			115.3
BCP	05/15/11	0745	overcast		10.68	10.68	10.68	10.68	97.8
BCP	06/12/11	0800	overcast		7.96	7.96	7.96	7.96	82.8
BCP	07/17/11	0745	clear		7.2	7.2	7.2	7.2	86.4
BCP	07/17/11	0750	clear		7.2				
BCP	08/13/11	0800	clear		11.48	11.48	11.48	11.48	134.7
BCP	09/18/11	0820	overcast		8.62	8.62	8.62	8.62	90.9
BCP	10/16/11	0800	overcast	heavy	11.61	11.61			113
GeoMean BCP					9.7	10.1	9.0	9.0	101.6

Lower Androscoggin River 2011
Dissolved Oxygen

= MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA	Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$
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Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values
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Brunswick Water St. (BWS)

BWS	04/18/11	0820	clear		13.7	13.7			107.1
BWS	05/15/11	0900	fog/haze	light	10.6	10.6	10.6	10.6	98.7
BWS	06/12/11	1000	overcast	heavy	9.3	9.3	9.3	9.3	100.1
BWS	07/17/11	0840	clear		8.3	8.3	8.3	8.3	100.2
BWS	08/14/11	0800	overcast		7.85	7.85	7.85	7.85	91
BWS	09/18/11	0820	clear		8.9	8.9	8.9	8.9	92.4
BWS	10/16/11	0730	overcast	heavy	10.75	10.75			103.5
GeoMean BWS					9.76	9.76	8.94	8.94	98.9

Brunswick Bay Bridge (BBB)

BBB	04/18/11	0735	ptly cloudy	heavy	13.52	13.52			107.4
BBB	05/15/11	0745	overcast	moderate	10.6	10.6	10.6	10.6	98.7
BBB	05/15/11	0745	overcast	moderate	10.6				
BBB	06/12/11	0750	downpour	heavy	8.4	8.4	8.4		90.9
BBB	07/17/11	0755	clear		7.12	7.12	7.12	7.12	84.9
BBB	08/14/11	0750	overcast		7.23	7.23	7.23	7.23	85.3
BBB	09/18/11	0750	ptly overcast		8.82	8.82	8.82	8.82	91.9
BBB	10/16/11	0920	overcast	heavy	10.15	10.15			98.5
GeoMean BBB					9.36	9.19	8.34	8.33	93.6

Lower Androscoggin River 2011
Dissolved Oxygen

= MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values

Topsham Pleasant Point (TPP)*

TPP	4/16/2010	1000			12				
TPP	5/14/2010	1000			10.3				
TPP	6/12/2010	820			8.5				
TPP	7/17/2010	1400			7.5				
TPP	8/13/2010	830			7.4				
TPP	9/19/2010	910			8.3				
TPP	10/17/2010	1030			11.2				
GeoMean TPP					9.16				

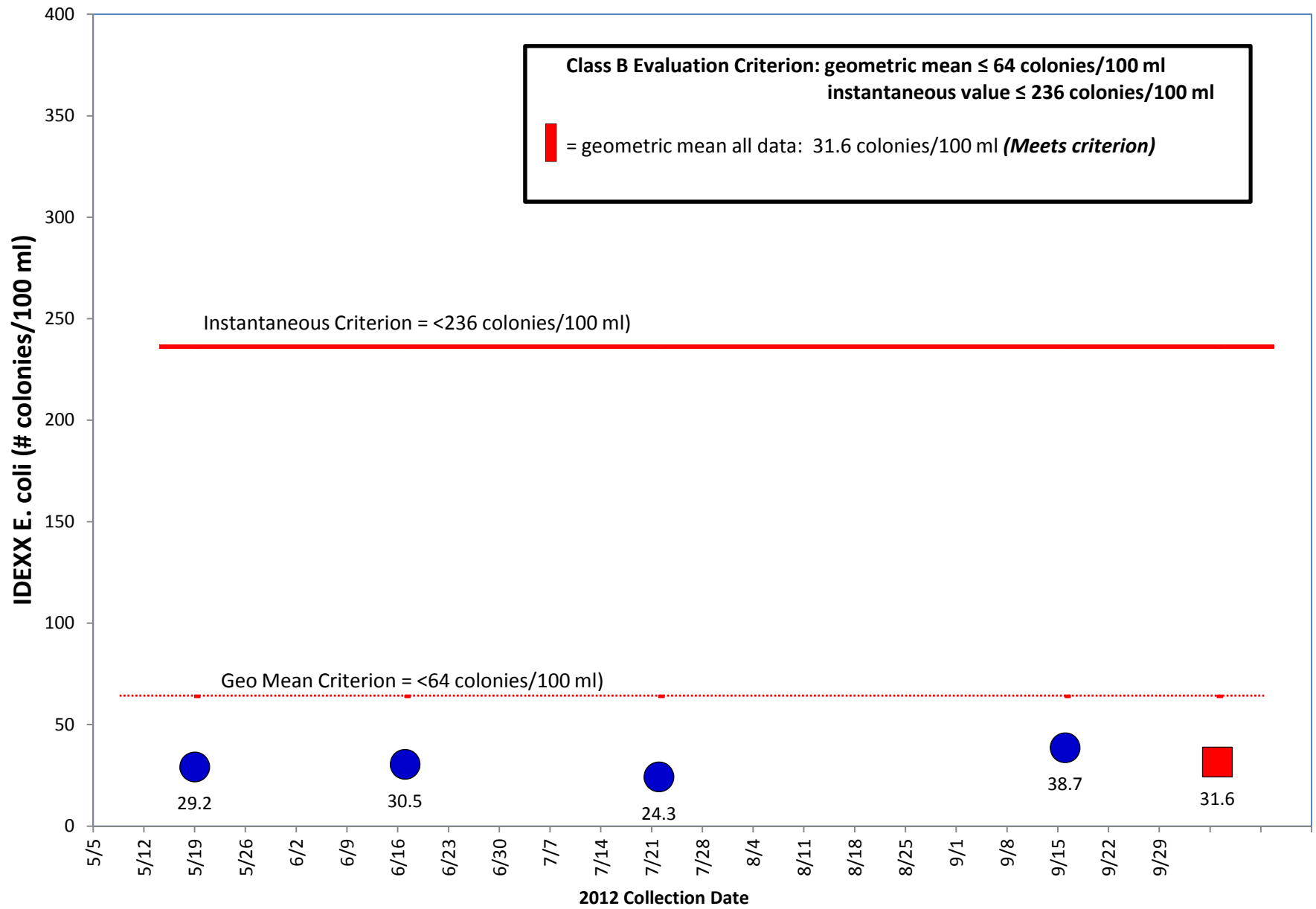
*TPP data are included for informational purposes only about Merrymeeting Bay DO levels in this area. TPP data were collected at varying times and tides on target days using the Winkler Titration method. This Topsham site falls within a river segment already classified as B.



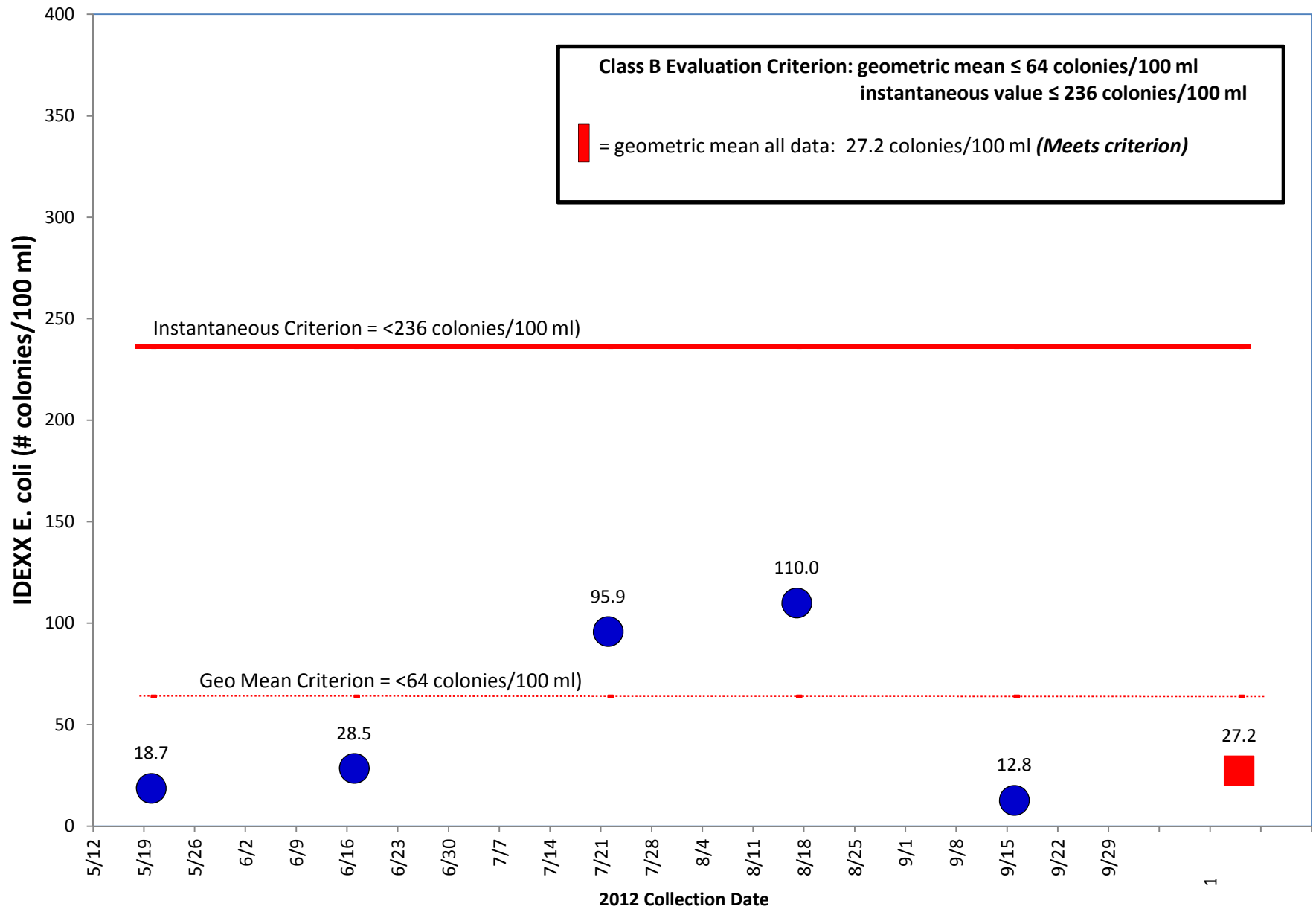
Water Quality Data Analysis and Review
Lower Androscoggin River
2012

E. coli 2012 by Station
May to September

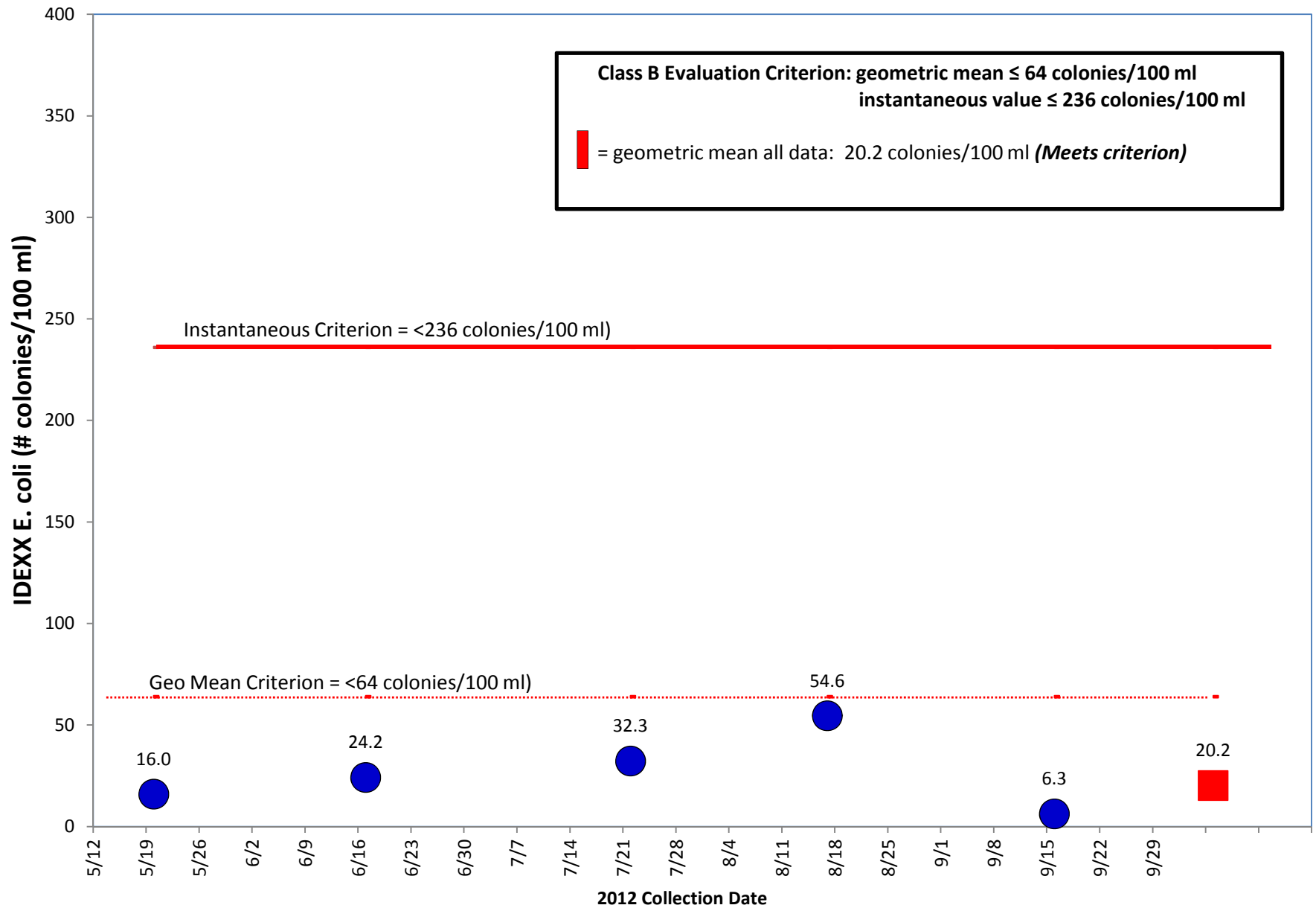
Lower Androscoggin River 2012 *E. coli* (IDEXX) Durham Boat Launch (May - Sep)



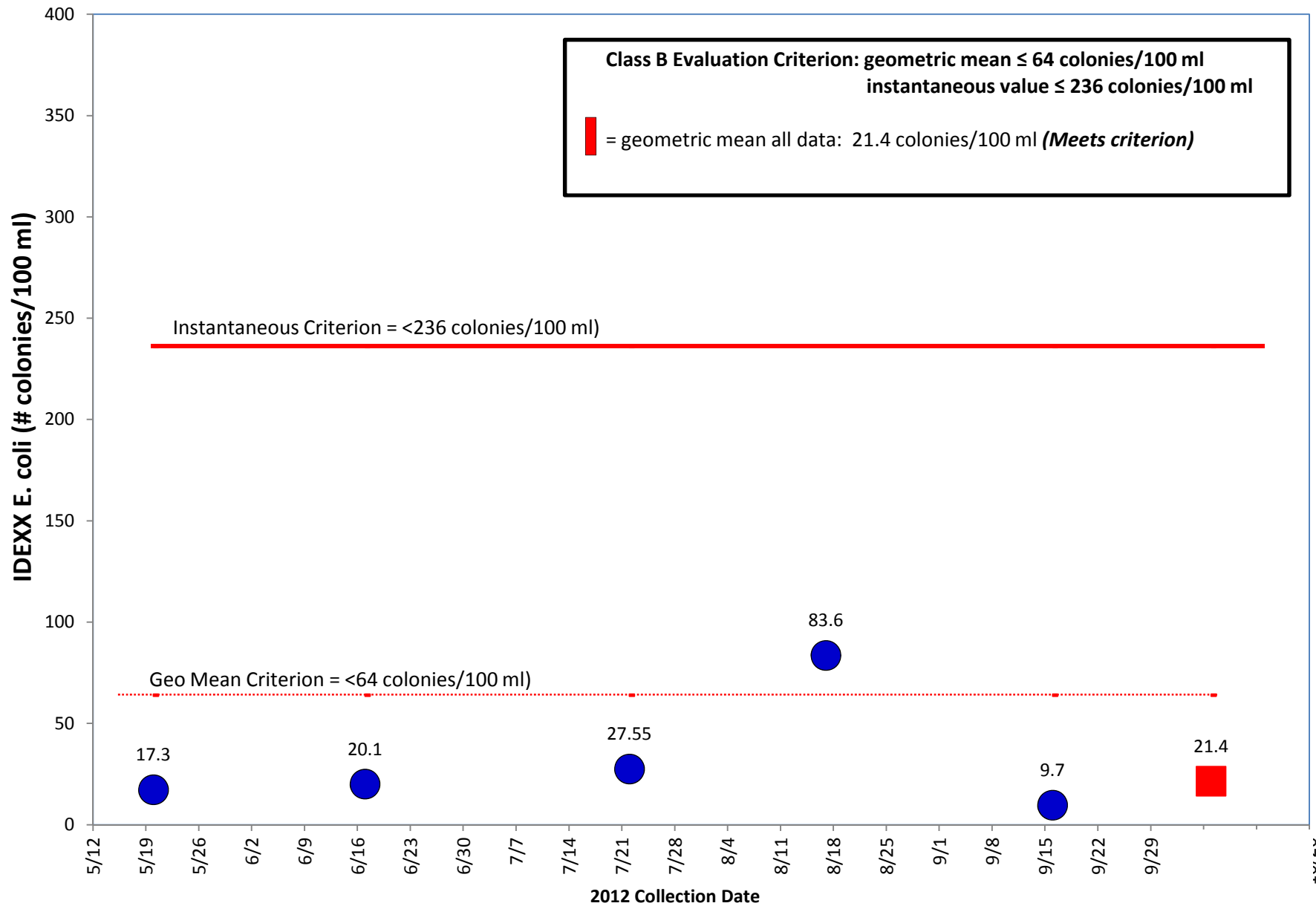
Lower Androscoggin River 2012 *E. coli* (IDEXX) Pejepscot Boat Launch (May - Sep)



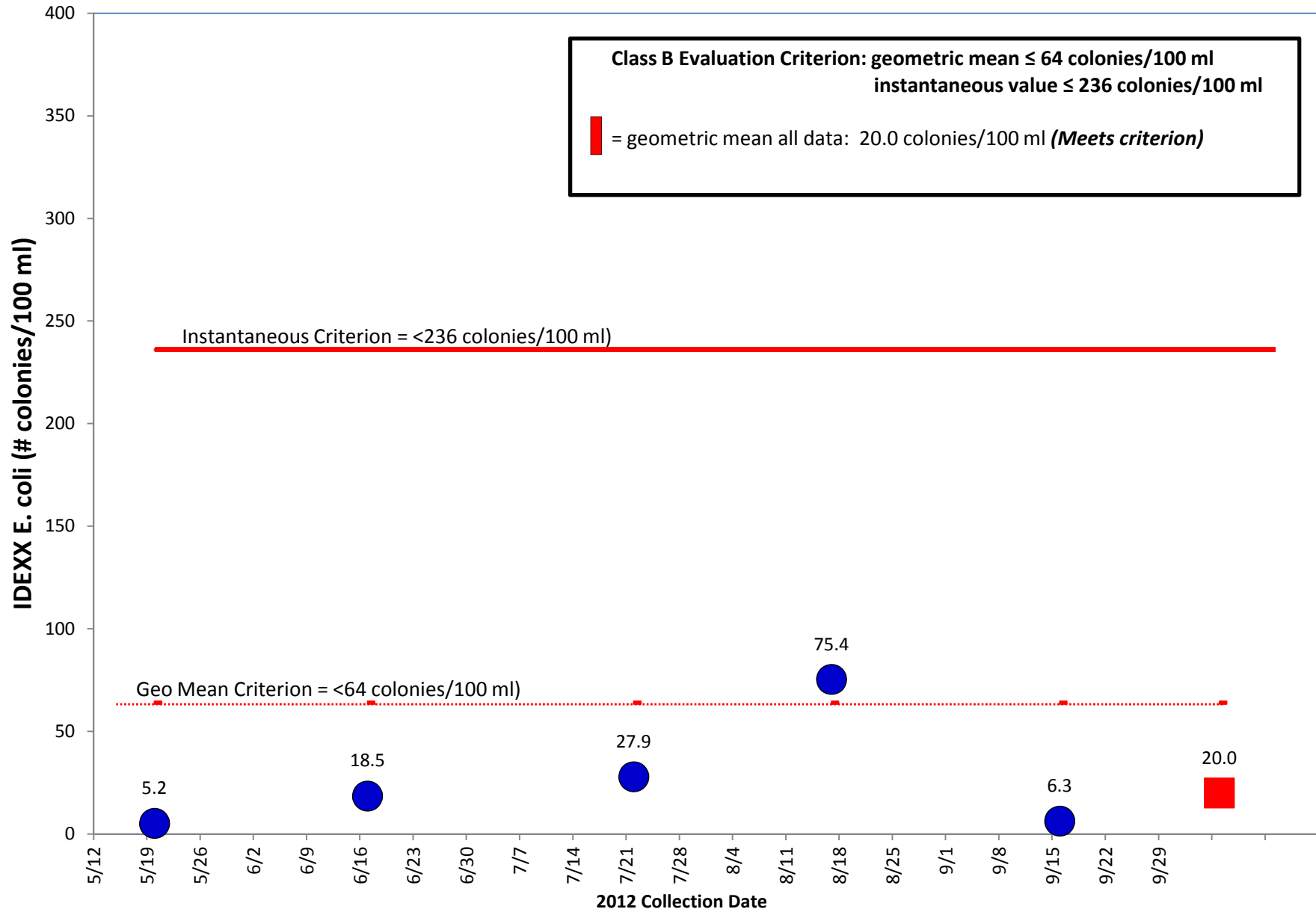
Lower Androscoggin River 2012 *E. coli* (IDEXX) Fish Park Above Dam (May - Sep)



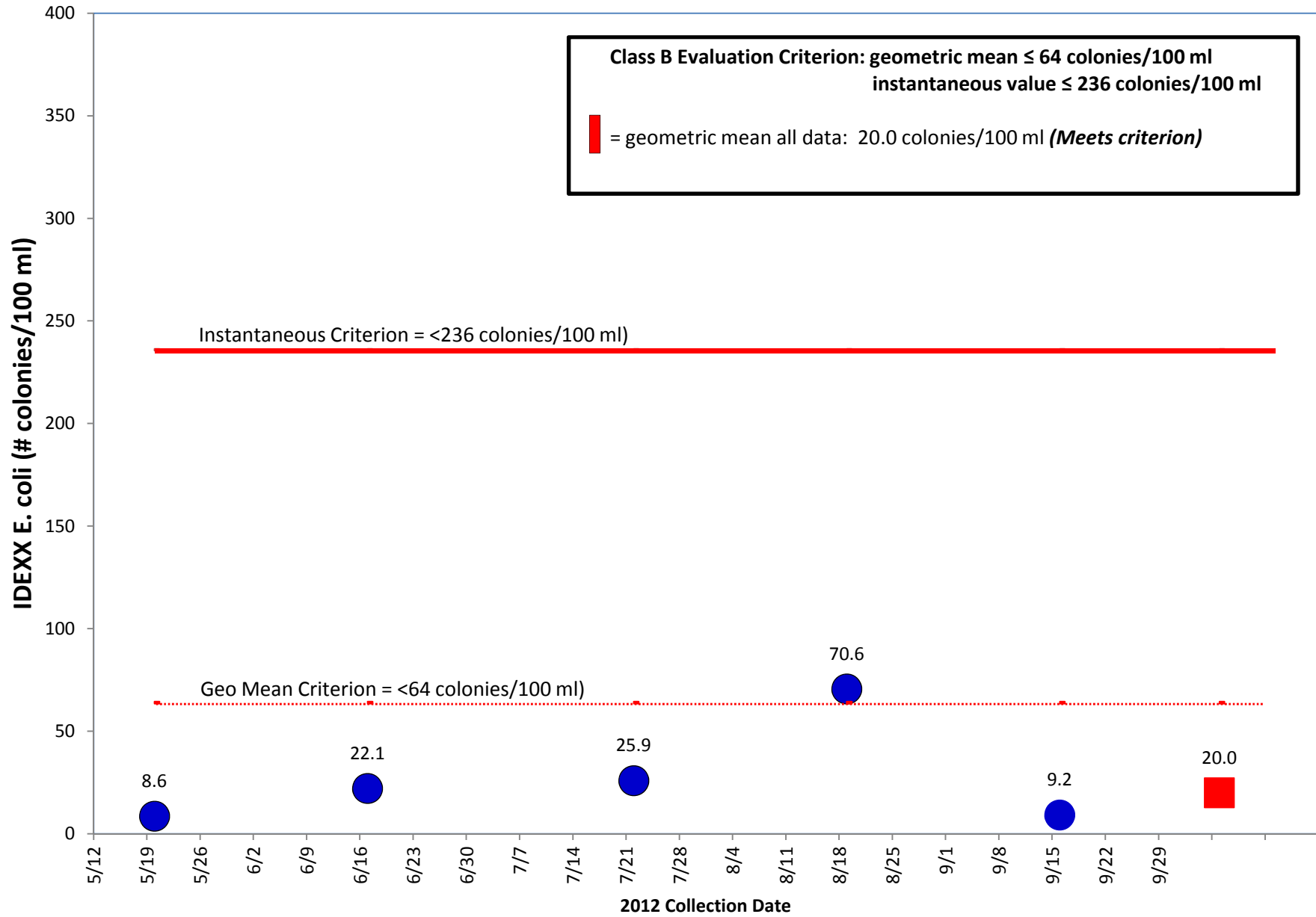
Lower Androscoggin River 2012 *E. coli* (IDEXX) Fish Park Below Dam (May - Sep)



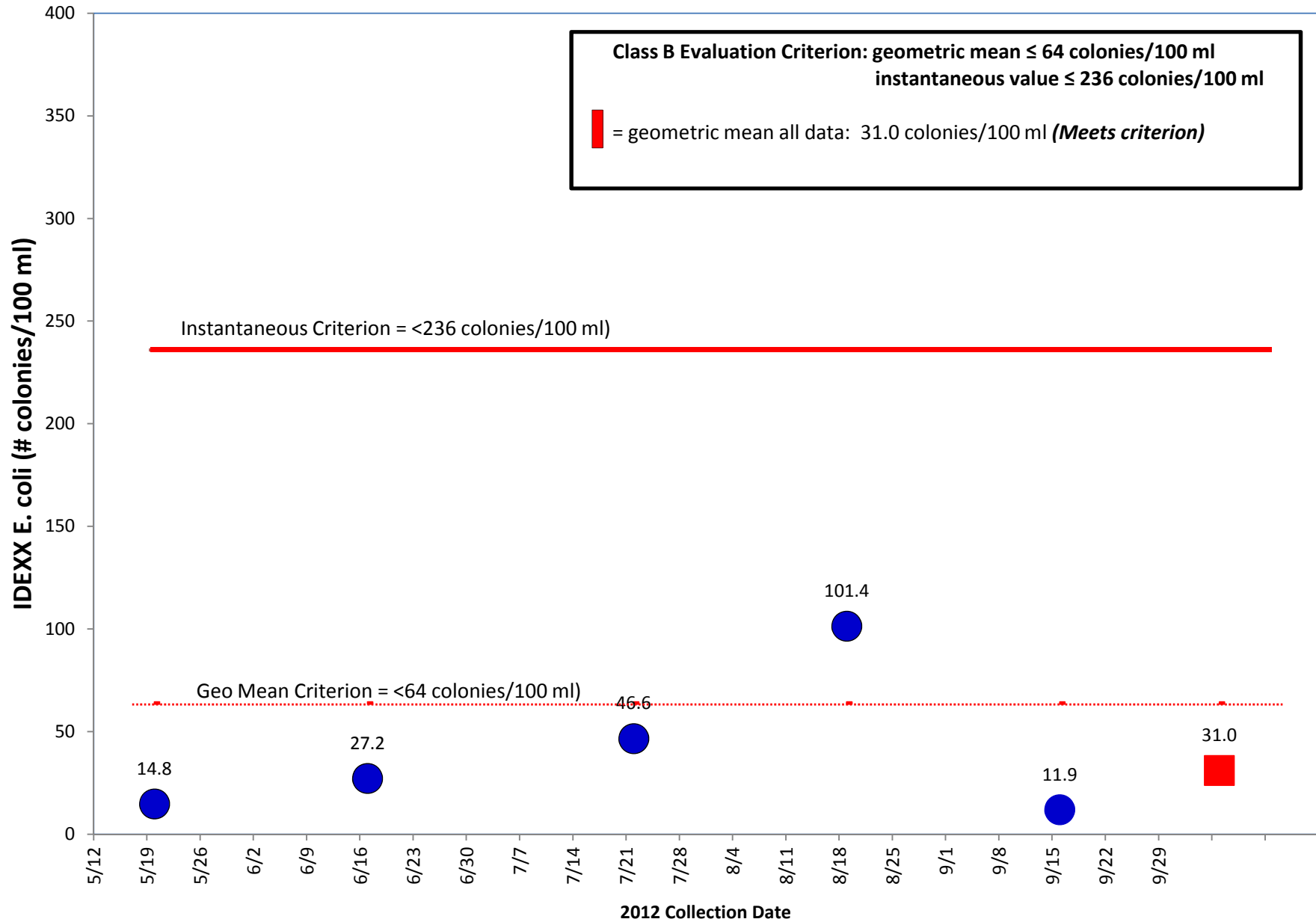
Lower Androscoggin River 2012 *E. coli* (IDEXX) Brunswick Interstate Ledges (May - Sep)



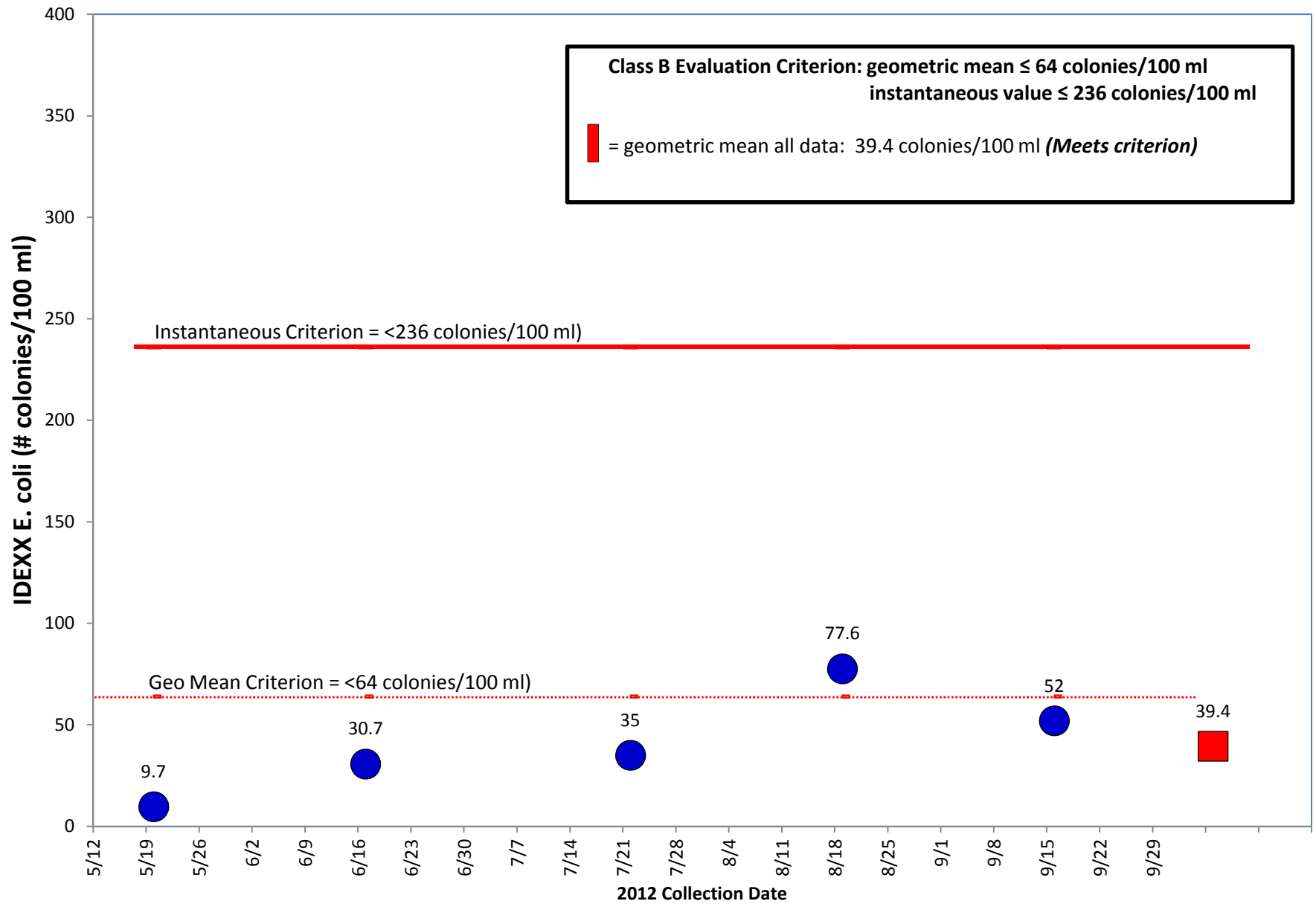
Lower Androscoggin River 2012 *E. coli* (IDEXX) Brunswick Canoe Portage (May - Sep)



Lower Androscoggin River 2012 *E. coli* (IDEXX) Brunswick Water St. Boat Launch (May - Sep)

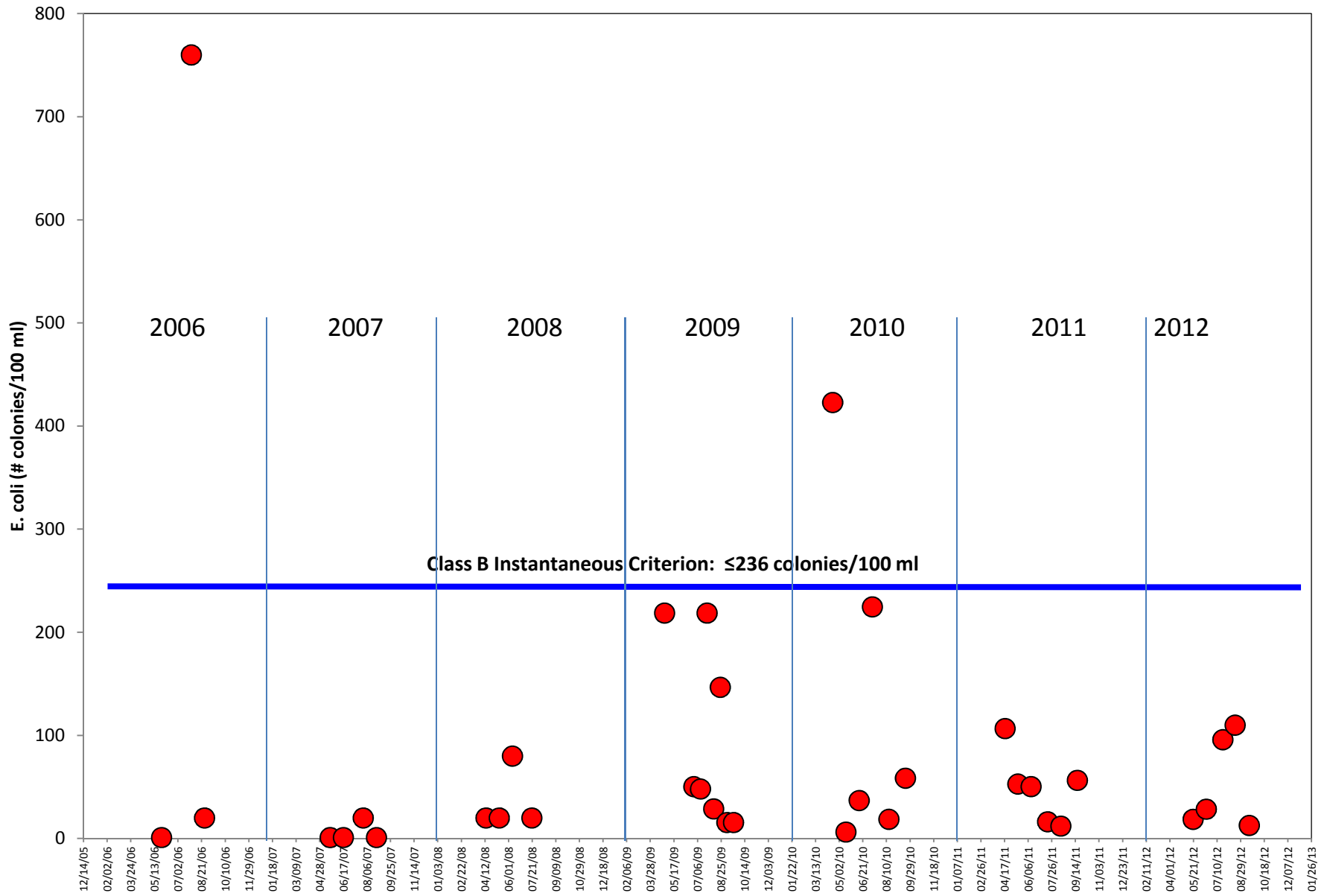


Lower Androscoggin River 2012 *E. coli* (IDEXX) Brunswick Bay Bridge (May - Sep)

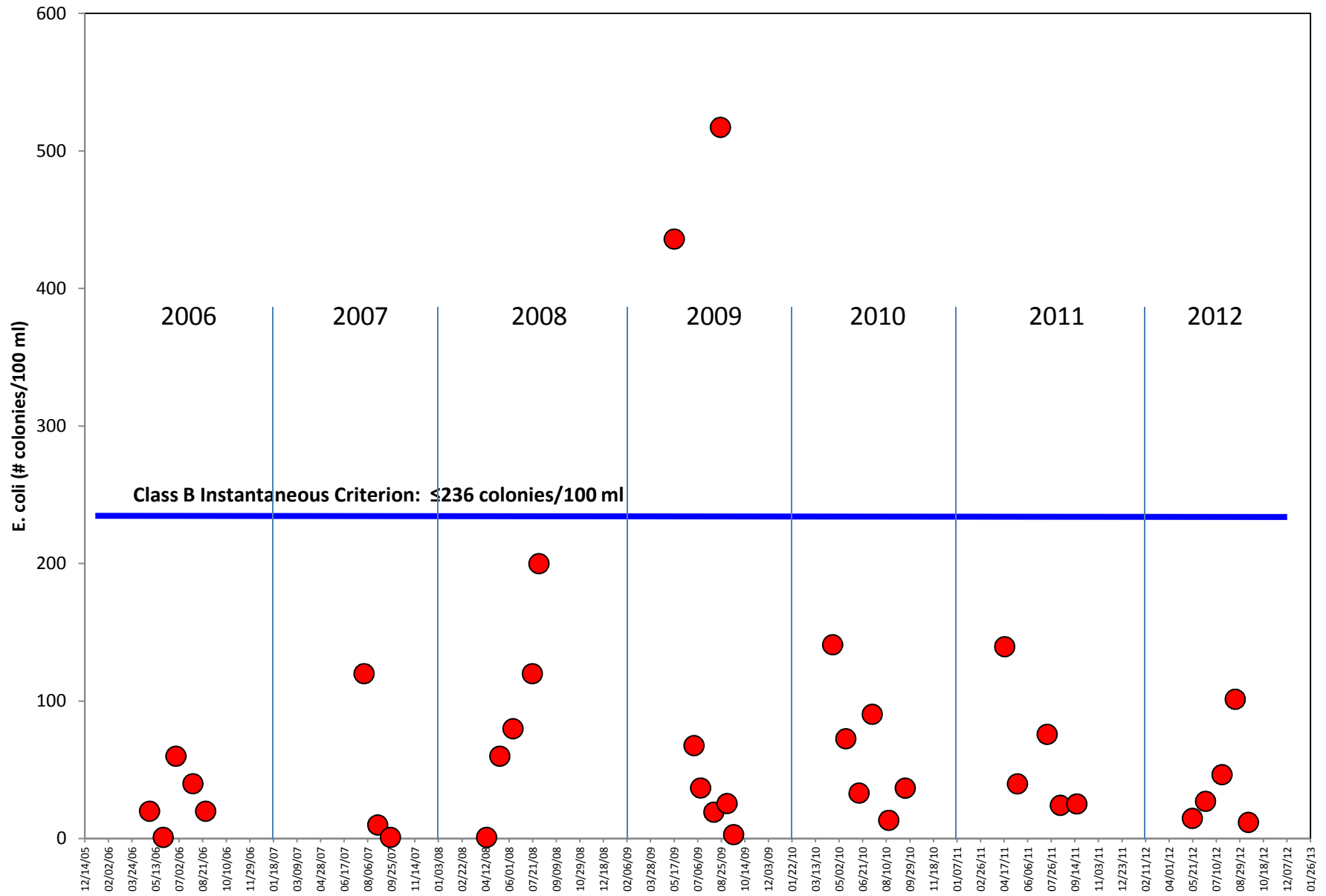


E. coli 2006 - 2012 Long-term Stations
Historical Trends
April to September

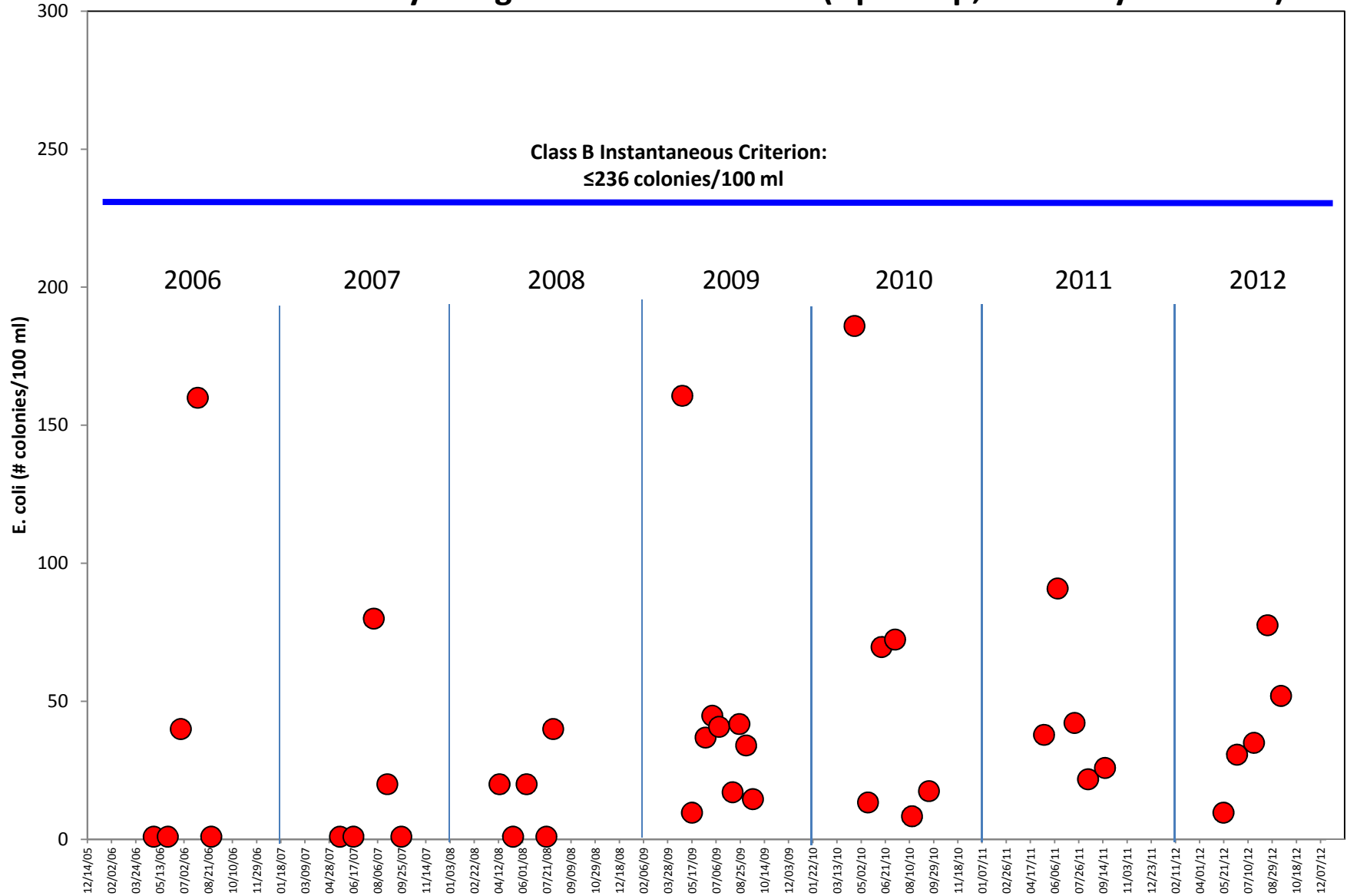
Pejepscot Boat Landing *E. coli* 2006 - 2012 (Apr - Sep; no heavy rain data)



Brunswick Water Street Boat Launch *E. coli* 2006 - 2012 (Apr - Sep; no heavy rain data)

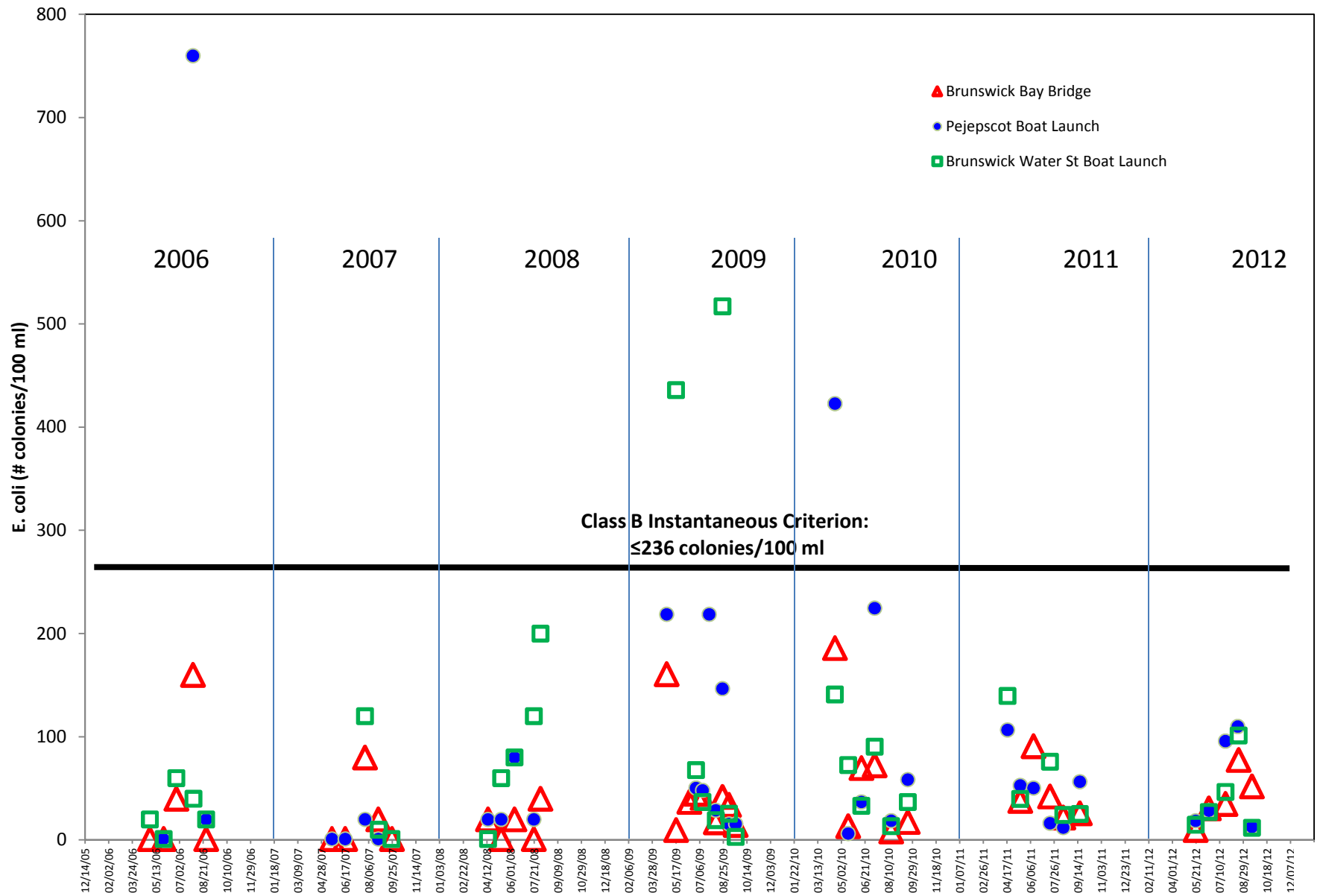


Brunswick Bay Bridge *E. coli* 2006 - 2012 (Apr - Sep; no heavy rain data)



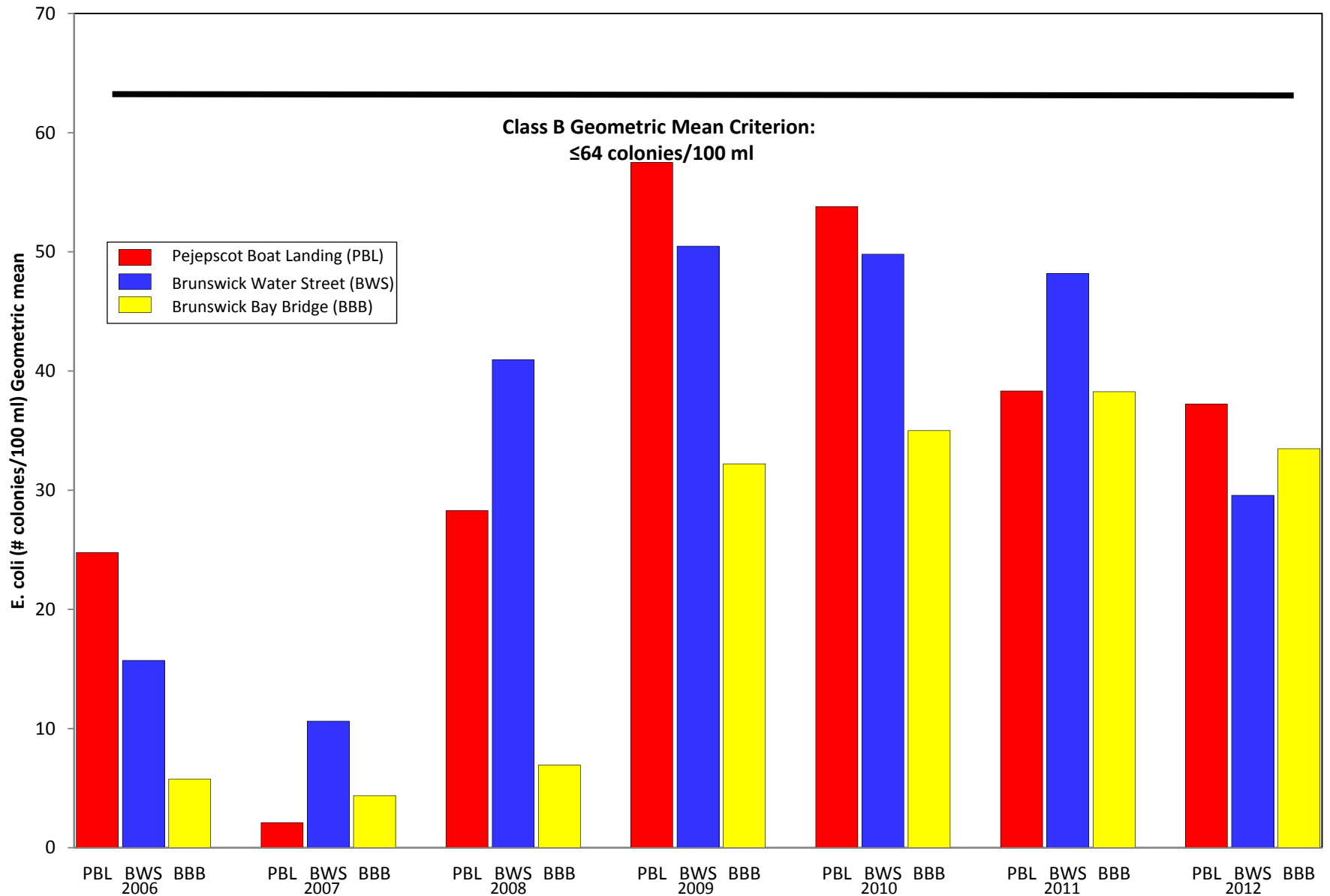
E. coli 2006 - 2012 Long-term Stations Combined
Historical Trends
April to September

Lower Androscoggin River - E. coli 2006 to 2012 (Apr - Sep; no heavy rain data)

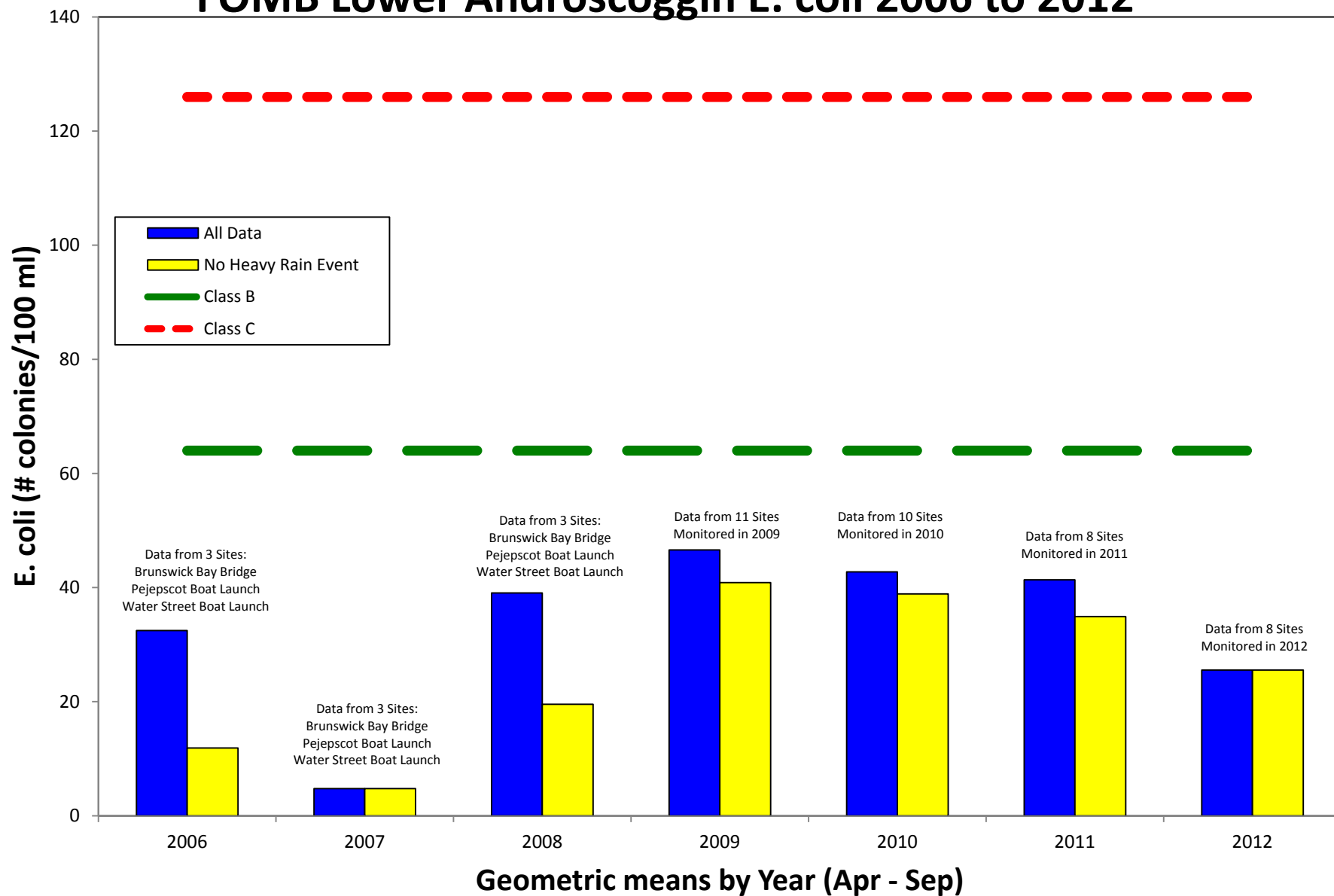


E. coli 2006 - 2012
Historical Trends
Yearly Geometric Means

**Lower Androscoggin River - *E. coli* GeoMeans by Station (Apr - Sep; no heavy rain events)
2006 - 2012**



FOMB Lower Androscoggin E. coli 2006 to 2012



Lower Androscoggin River 2012 *E. coli* Data Tables

MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX MPN colonies/ 100mgl	ALL DATA WITH MEANS FOR REPLICATE SAMPLES MPN colonies/ 100mgl	NO OCT IDEXX DATA (Means for reps used) MPN colonies/ 100mgl

Durham Boat Launch (DBL)


DBL	05/19/12	0730	clear		monthly	29.2	29.2	29.2
DBL	06/17/12	0700	fog/haze		monthly	30.5	30.5	30.5
DBL	07/22/12	0700	clear		monthly	24.3	24.3	24.3
DBL	09/16/12	0715	clear		monthly	32.3	38.65	38.65
DBL	09/16/12	0715	clear		replicate	45		
DBL	10/07/12	0555	fog		monthly	31.7	31.7	OCT DATA ELIM
Geomean DBL						31.6	30.5	30.2

Pejepscot Boat Launch (PBL)

PBL	05/20/12	0700	clear		monthly	22.8	18.65	18.65
PBL	05/20/12	0700	clear		replicate	14.5		
PBL	06/17/12	0700	clear		monthly	28.5	28.5	28.5
PBL	07/22/12	0705	clear		monthly	95.9	95.9	95.9
PBL	08/17/12	0700	clear	med P before	monthly	110	110	110
PBL	09/16/12	0655	clear		monthly	13.4	12.75	12.75
PBL	09/16/12	0655	clear		replicate	12.1		
PBL	10/17/12	0705	clear	fog; light P before	monthly	18.7	18.7	OCT DATA ELIM
Geomean PBL						27.2	33.2	37.2

Fish Park Up (FPU)

FPU	05/20/12	0730	clear		monthly	16	16	16
FPU	06/17/12	0725	clear		monthly	26.6	24.2	24.2
FPU	06/17/12	0725	clear		replicate	21.8		
FPU	07/22/12	0730	clear		monthly	32.3	32.3	32.3
FPU	08/17/12	0720	clear	p - med	monthly	54.6	54.6	54.6
FPU	09/16/12	0720	clear		monthly	6.3	6.3	6.3
FPU	10/07/12	0725	clear	p - light	monthly	16	16.55	OCT DATA ELIM
FPU	10/07/12	0725	clear	p - light	replicate	17.1	17.1	OCT DATA ELIM
Geomean FPU						20.2	19.9	21.2

 MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX MPN colonies/ 100mgl	ALL DATA WITH MEANS FOR REPLICATE SAMPLES MPN colonies/ 100mgl	NO OCT IDEXX DATA (Means for reps used) MPN colonies/ 100mgl

Fish Park Down (FPD)

FPD	05/20/12	0745	clear		monthly	17.3	17.3	17.3
FPD	06/17/12	0740	clear		monthly	20.1	20.1	20.1
FPD	07/22/12	0745	clear		monthly	28.2	27.55	27.55
FPD	07/22/12	0745	clear		replicate	26.9		
FPD	08/17/12	0730	clear		monthly	83.6	83.6	83.6
FPD	09/16/12	0730	clear		monthly	9.7	9.7	9.7
FPD	10/07/12	0745	clear		monthly	9.7	9.7	OCT DATA ELIM
					Geomean FPD	21.4	20.6	23.9

Brunswick Interstate Ledges (BIL)

BIL	05/20/12	0800	clear		monthly	5.2	5.2	5.2
BIL	06/17/12	0800	clear		monthly	18.5	18.5	18.5
BIL	07/22/12	0800	clear		monthly	27.9	27.9	27.9
BIL	08/17/12	0755	clear		monthly	70.6	75.35	75.35
BIL	08/17/12	0755	clear		replicate	80.1		
BIL	09/16/12	0800	clear		monthly	6.3	6.3	6.3
BIL	10/07/12	0800	clear		monthly	13.2	13.2	OCT DATA ELIM
					Geomean BIL	20.0	16.0	16.6

Brunswick Canoe Portage (BCP)

BCP	05/20/12	0800	clear		monthly	8.6	8.6	8.6
BCP	06/17/12	0800	clear		monthly	20.1	22.1	22.1
BCP	06/17/12	0800	clear		replicate	24.1		
BCP	07/22/12	0745	clear		monthly	25.9	25.9	25.9
BCP	08/19/12	0805	clear		monthly	70.6	70.6	70.6
BCP	09/16/12	0715	clear		monthly	7.4	9.15	9.15
BCP	10/07/12	0800	clear		monthly	10.9	10.9	OCT DATA ELIM
					Geomean BCP	18.0	18.1	20.0

MEAN VALUE Bolded Red Text = VALUE EXCEEDS CRITERIA						Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml	Criteria: GeoMean ≤ 64/100 ml or Instant ≤ 236/100 ml
Site	Date	Sample Time	Weather	Adversities	Sample Type	ALL DATA IDEXX MPN colonies/ 100mgl	ALL DATA WITH MEANS FOR REPLICATE SAMPLES MPN colonies/ 100mgl	NO OCT IDEXX DATA (Means for reps used) MPN colonies/ 100mgl

Brunswick Water St. (BWS)

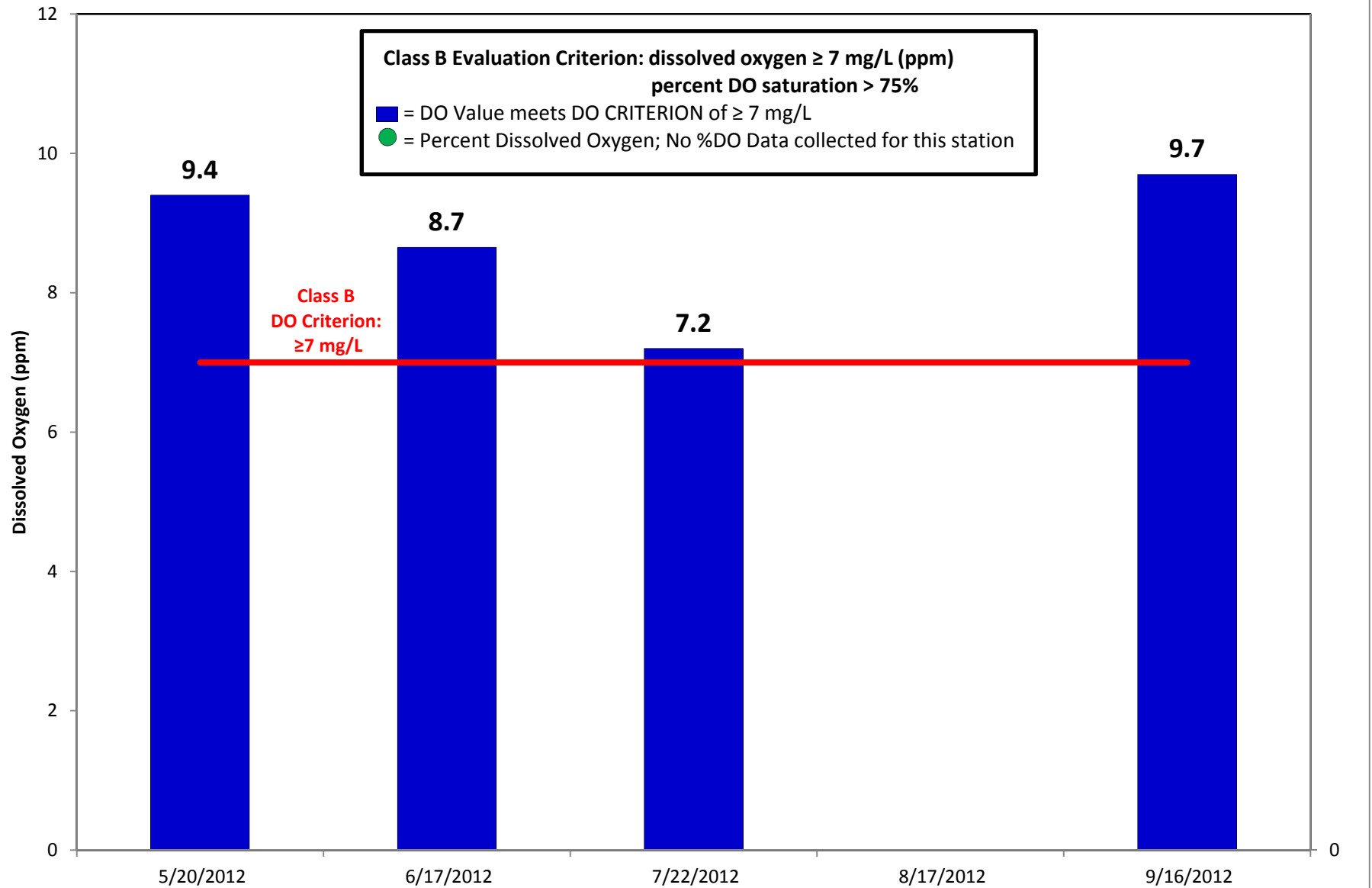
BWS	05/20/12	0700	clear		monthly	14.8	14.8	14.8
BWS	06/17/12	0745			monthly	27.2	27.2	27.2
BWS	07/22/12	0800	clear		monthly	40.4	46.6	46.6
BWS	07/22/12	0800			replicate	52.8		
BWS	08/19/12	0745	clear		monthly	101.4	101.4	101.4
BWS	09/16/12	0750	clear		monthly	11.9	11.9	11.9
BWS	10/07/12	0900	clear		monthly	26.5	26.5	OCT DATA ELIM
Geomean BWS						31.0	29.0	29.6

Brunswick Bay Bridge (BBB)

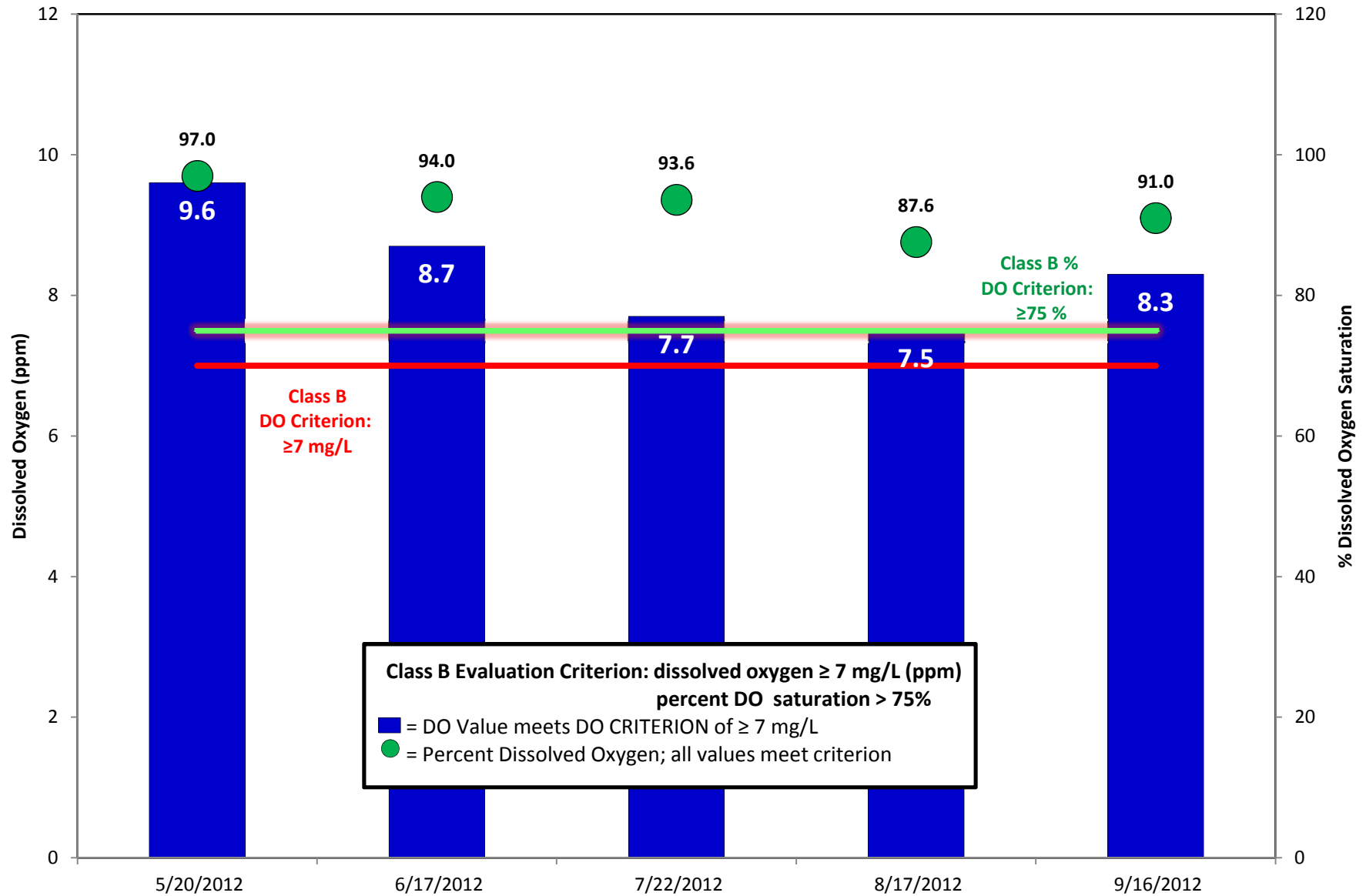
BBB	05/20/12	0815	clear		monthly	9.7	9.7	9.7
BBB	06/17/12	0730			monthly	30.7	30.7	30.7
BBB	07/22/12	0750	pt cloudy		monthly	35	35	35
BBB	08/19/12	0735	clear		monthly	77.6	77.6	77.6
BBB	09/16/12	0745	clear		monthly	52	52	52
BBB	10/07/12	0840	overcast		monthly	59.1	59.1	OCT DATA ELIM
BBB	10/07/12	0840			replicate	59.1		
Geoman BBB						39.4	36.8	33.5

Dissolved Oxygen & Percent DO Saturation - 2012
by Station
May to September

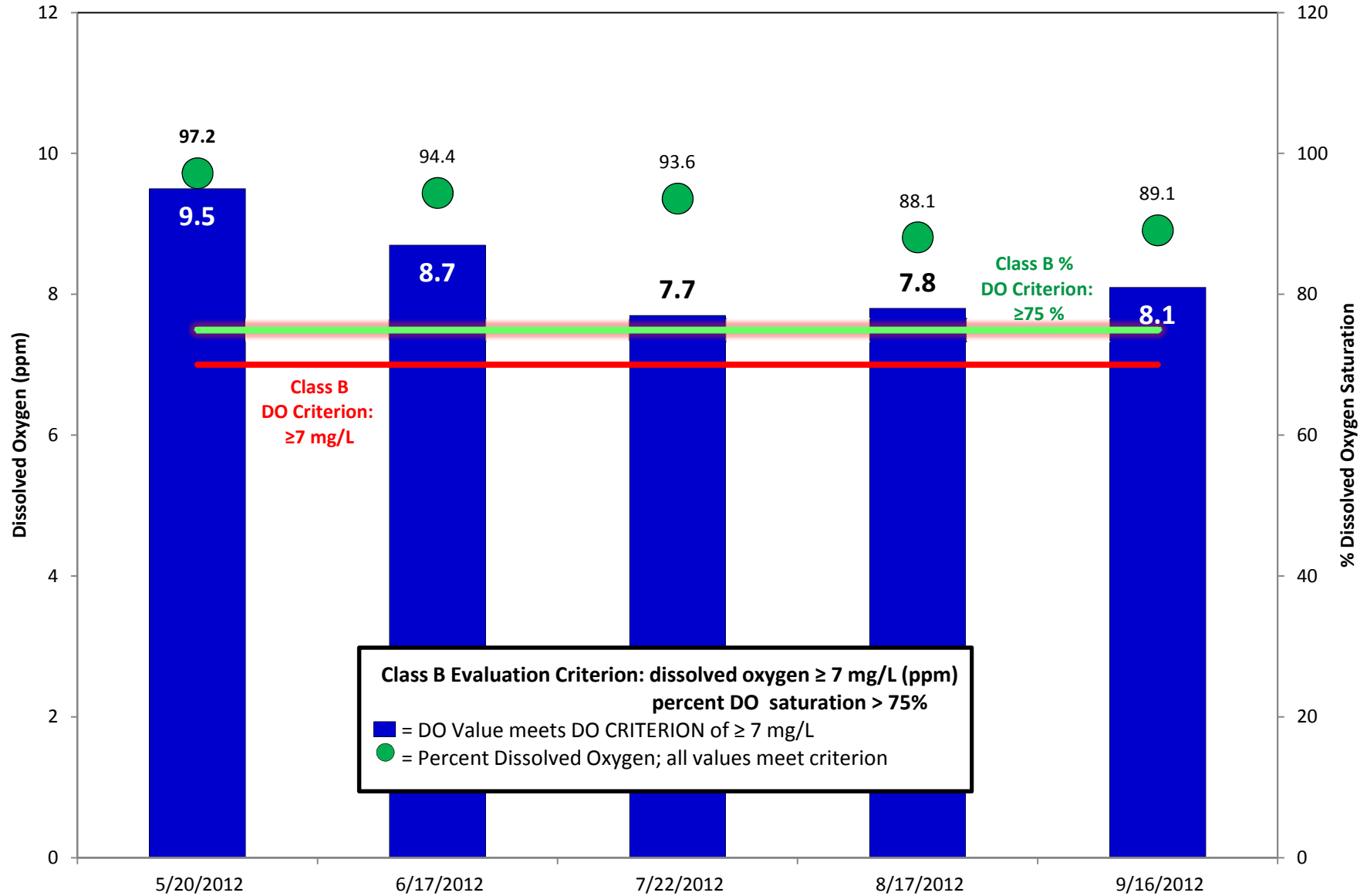
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Durham Boat Launch (May - Sep)



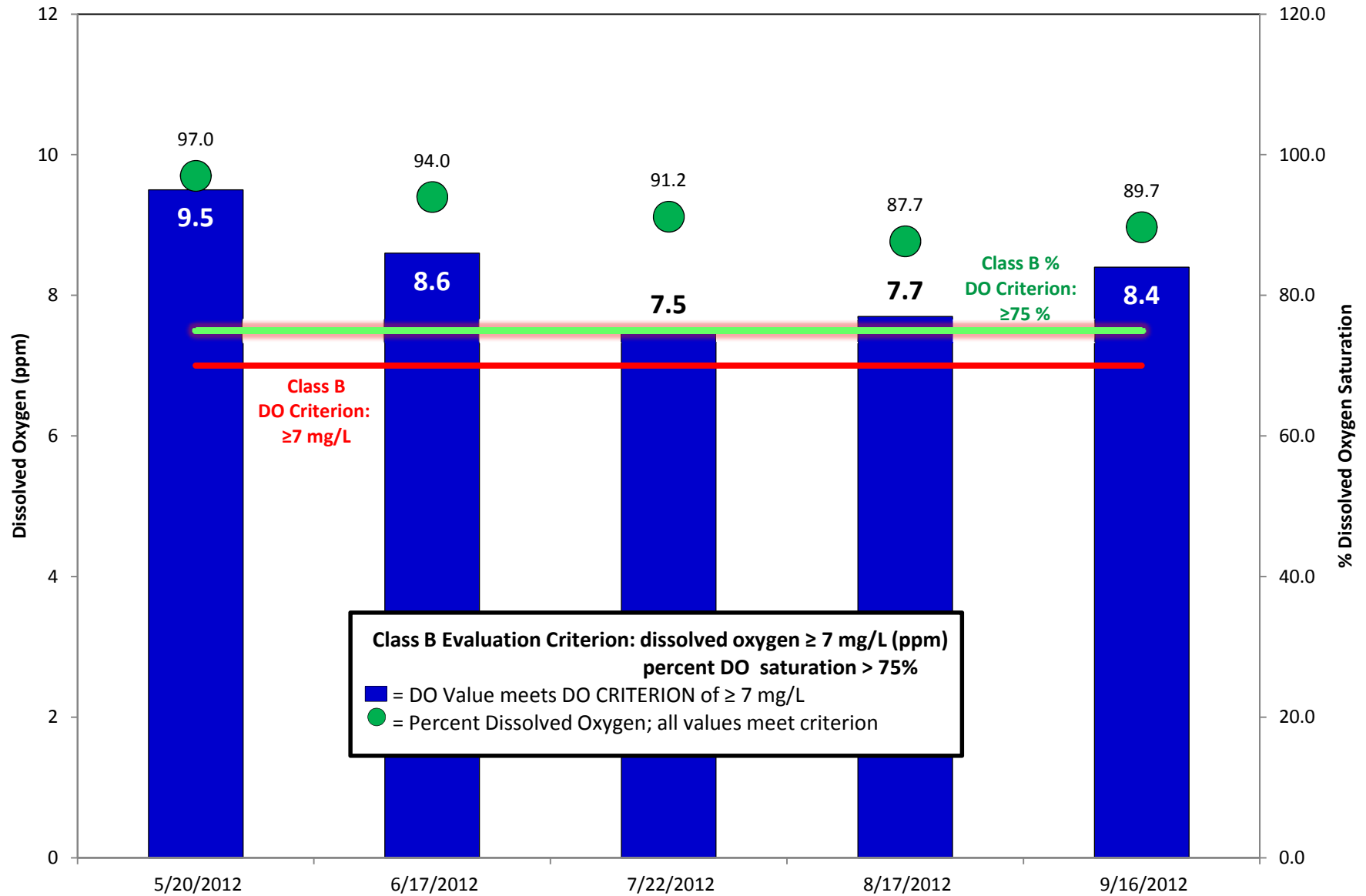
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Pejepscot Boat Launch (May - Sep)



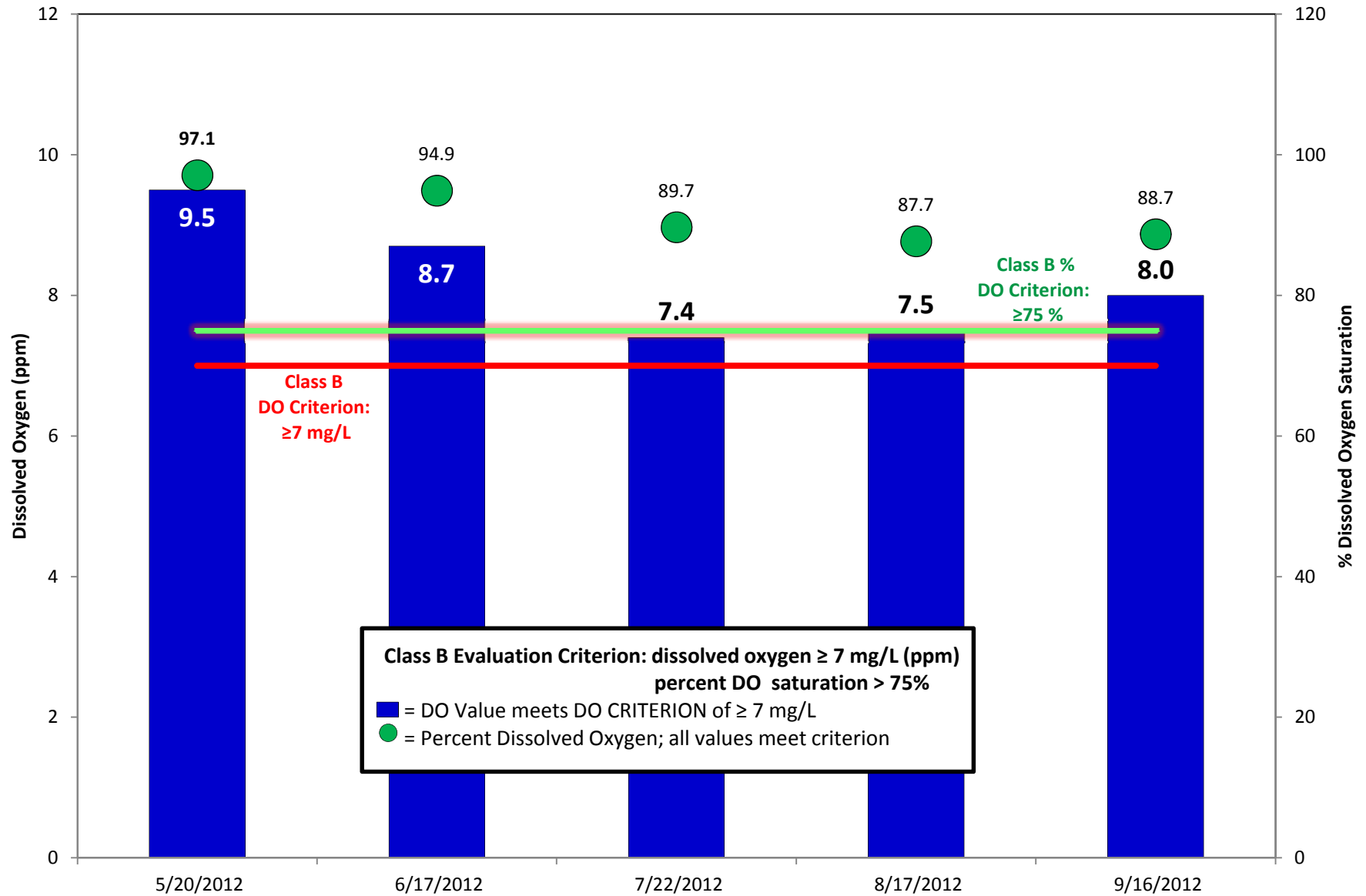
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Fish Park Up (May - Sep)



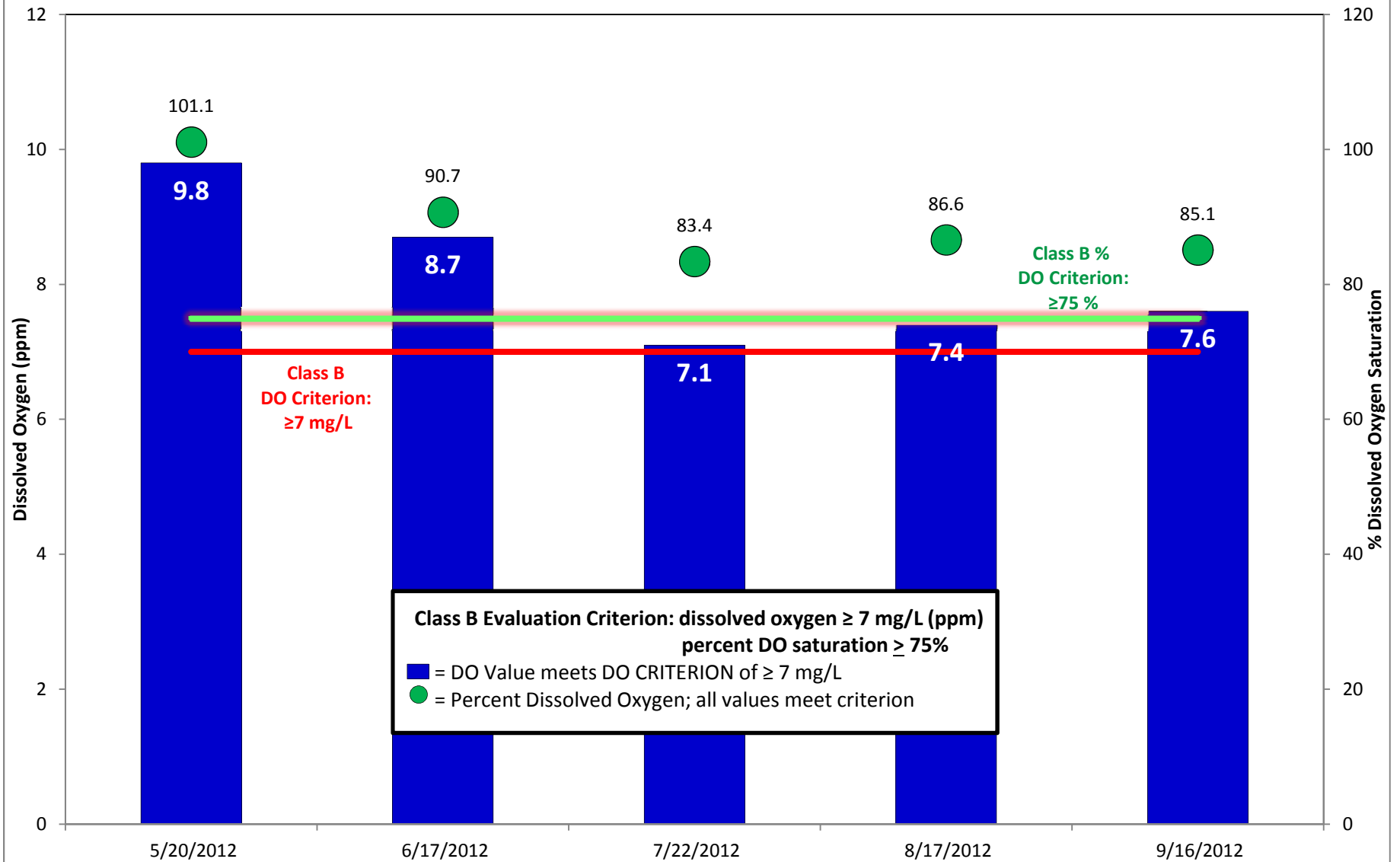
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Fish Park Down (May - Sep)



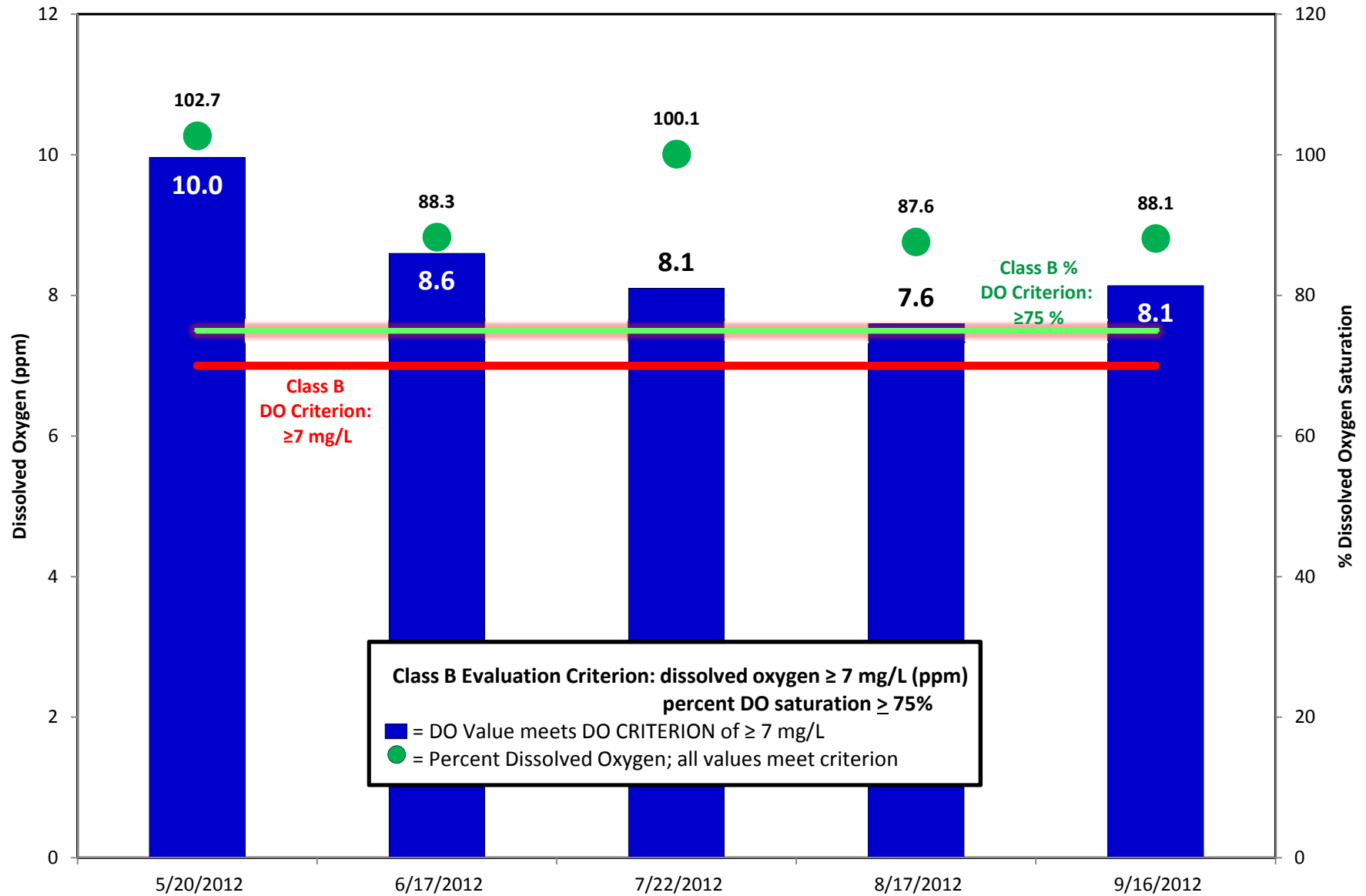
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Brunswick Interstate Ledges (May - Sep)



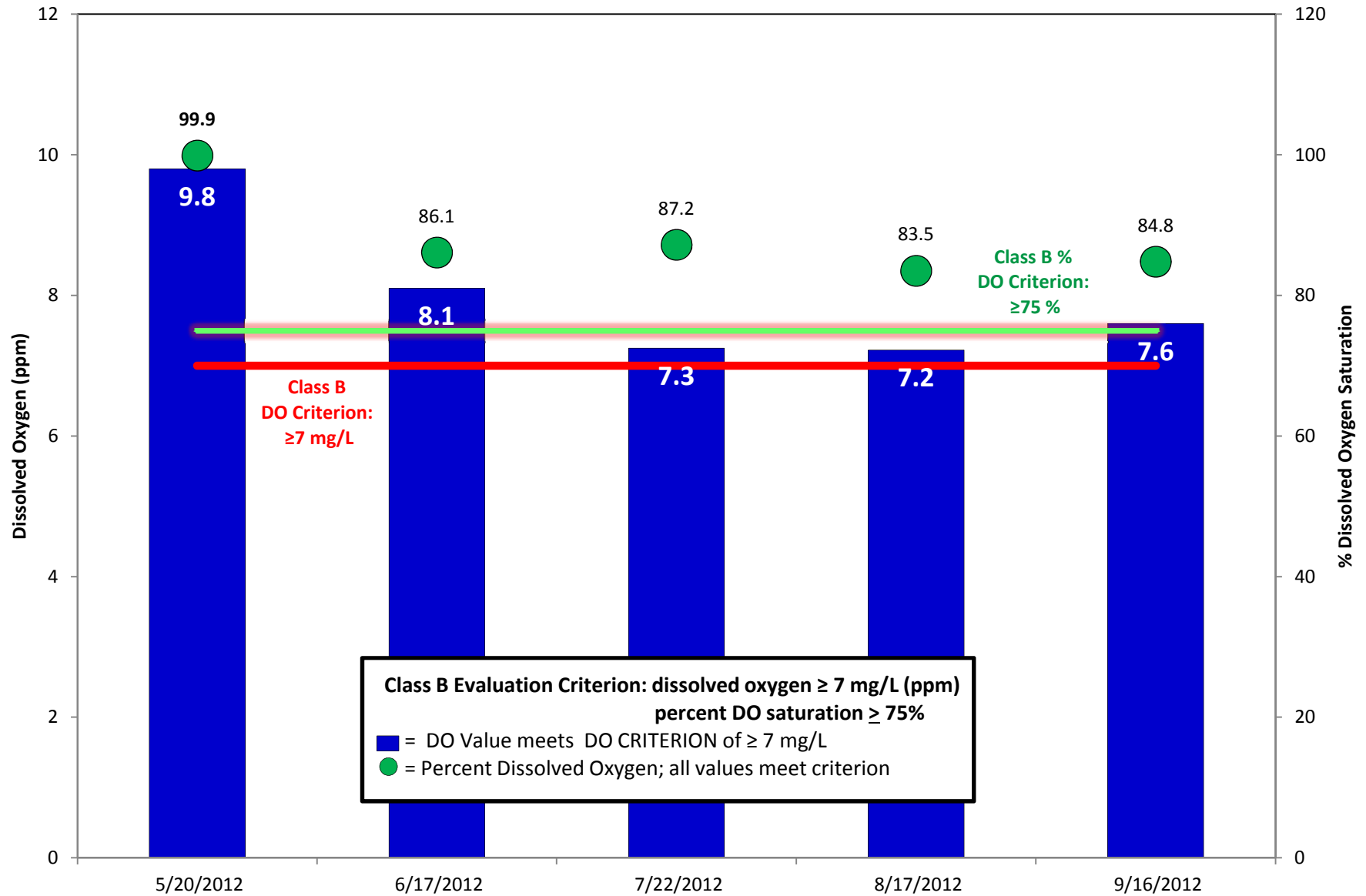
Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Brunswick Canoe Portage (May - Sep)



Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Brunswick Water St. (May - Sep)

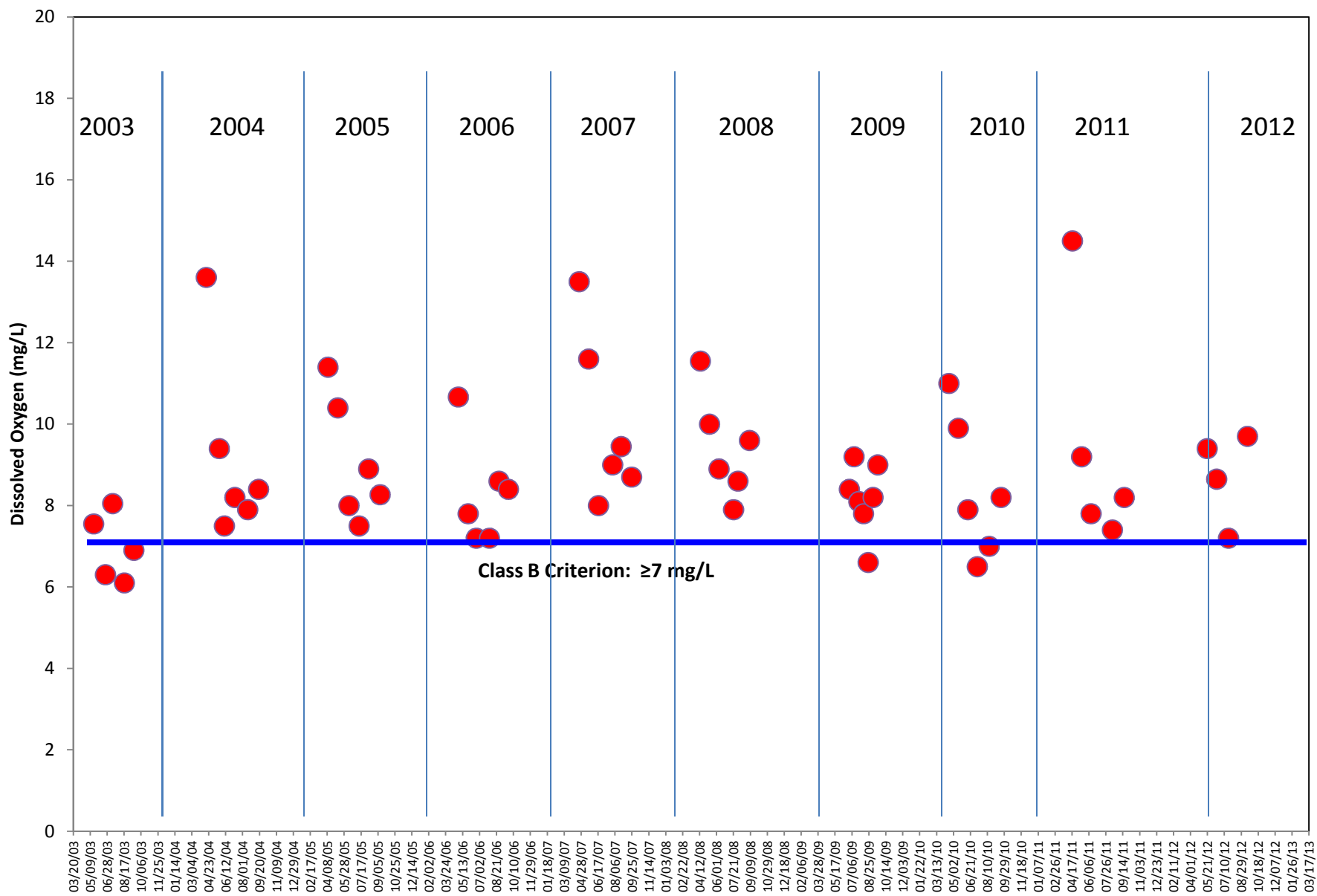


Lower Androscoggin River 2012 Dissolved Oxygen & Percent DO Saturation Brunswick Bay Bridge (May - Sep)

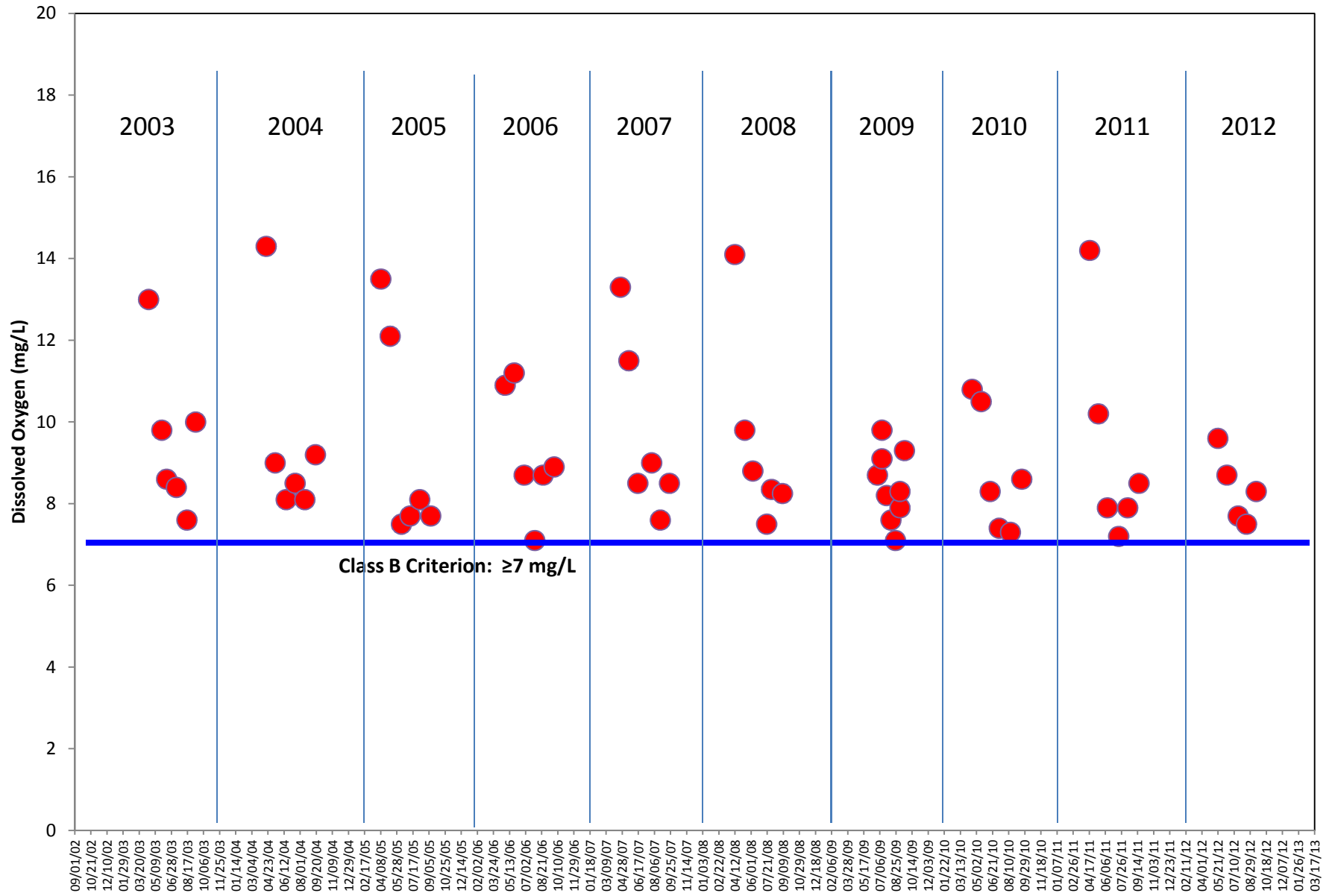


Dissolved Oxygen 2003 - 2012
Long-term Historical Trends
April to September

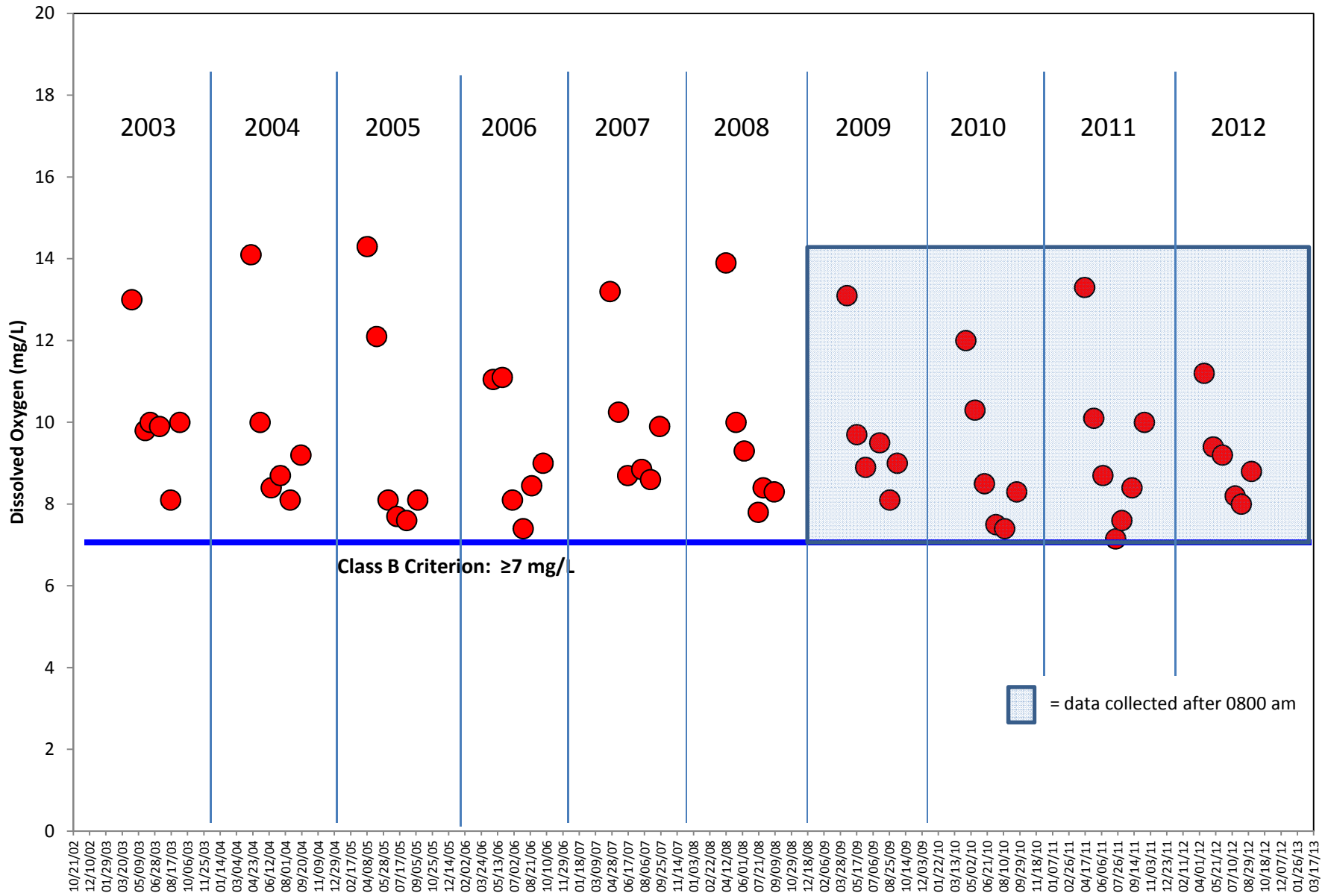
Durham Boat Launch Dissolved Oxygen: 2003 - 2012 (Apr - Sep)



Pejepscot Boat Launch Dissolved Oxygen: 2003 - 2012 (Apr - Sep)



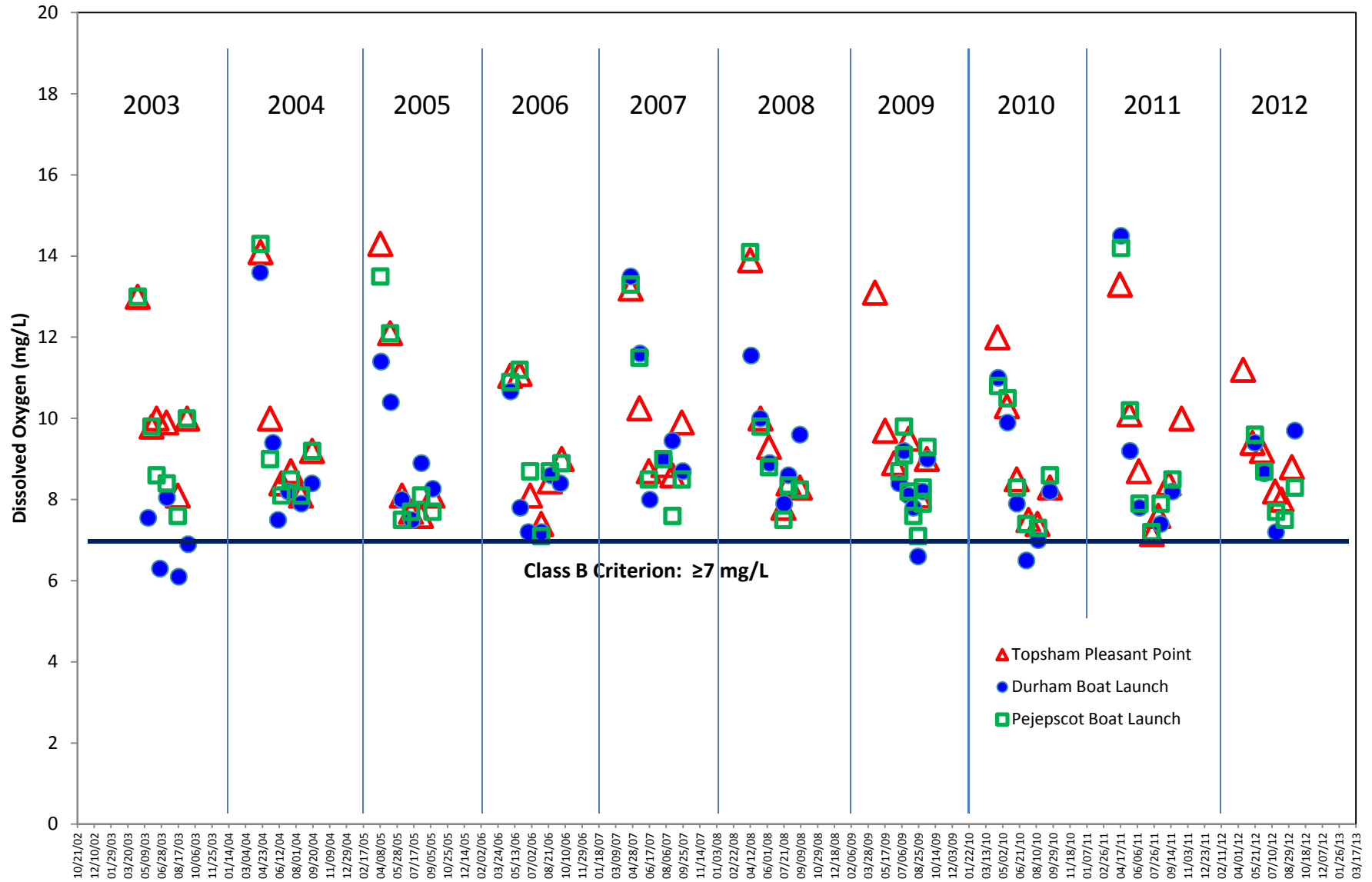
Topsham Pleasant Point Dissolved Oxygen: 2003 - 2012 (Apr - Sep)



Dissolved Oxygen 2003 - 2012
Long-term Historical Trends Stations Combined
April to September

Lower Androscoggin River - Dissolved Oxygen 2003 to 2012 (Apr - Sep)

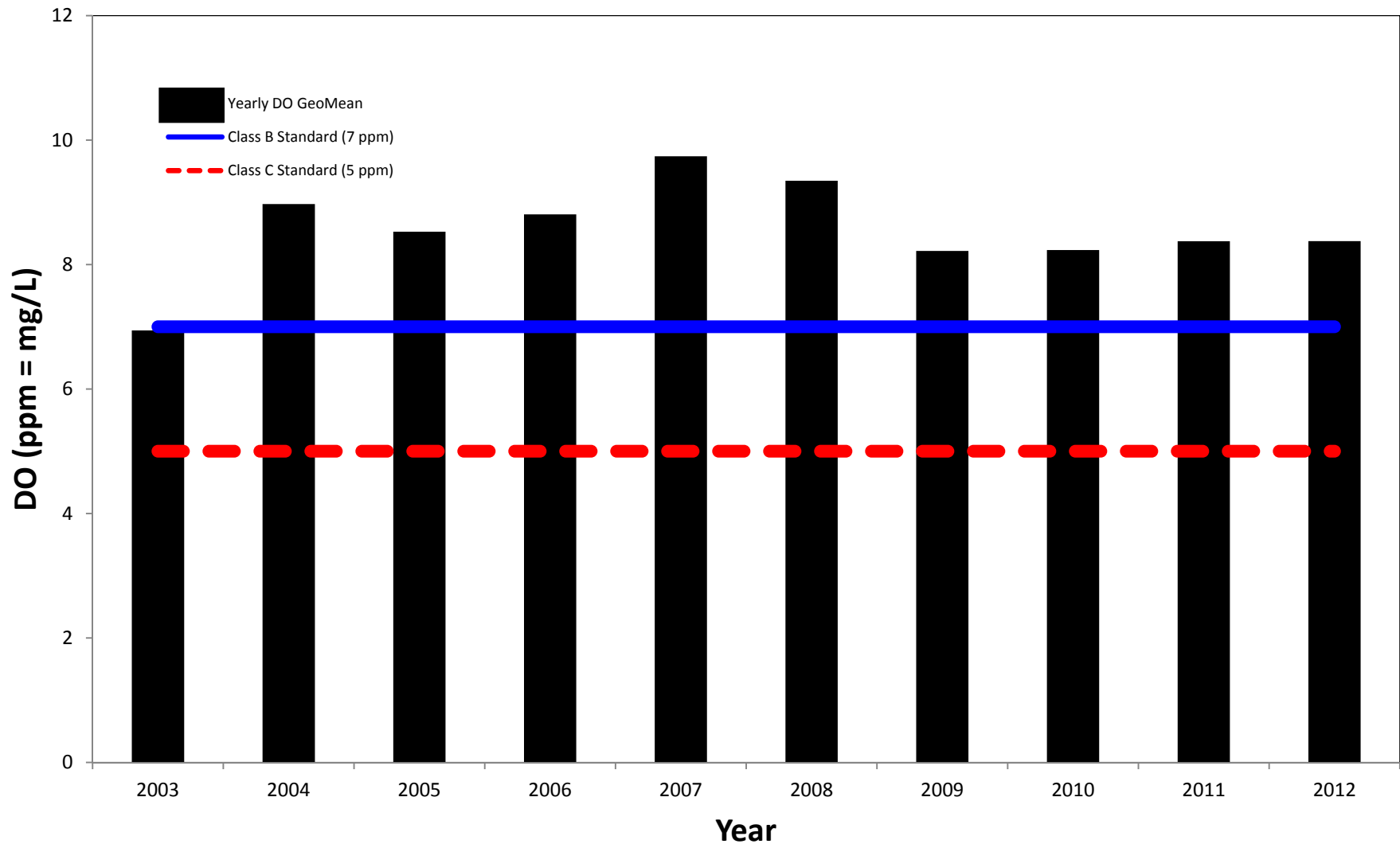
Topsham Pleasant Point, Durham Boat Launch, Pejepscot Boat Launch



Dissolved Oxygen 2003 - 2012
Historical Trends
Yearly Geometric Means


2003 - 2012

Yearly DO Geometric Means for Lower Androscoggin River vs Class B & C Standards



(For 2003 through 2008 Sites = Topsham Pleasant Pt., Pejepscot Boat Launch & Durham Boat Launch. For 2009 through 2012 = all sites monitored)

Lower Androscoggin River 2012 Dissolved Oxygen Data Tables

 = MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
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Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values
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Durham Boat Launch (DBL)


DBL	05/19/12	0730	clear		9.4	9.4	9.4	9.4	none collected
DBL	06/17/12	0700	fog/haze		8.7	8.7	8.7	8.7	none collected
DBL	07/22/12	0700	clear		7.2	7.2	7.2	7.2	none collected
DBL	09/16/12	0715	clear		9.7	9.7	9.7	9.7	none collected
DBL	10/07/12	0555	fog		8.4	8.4			none collected
GeoMean DBL					8.62	8.62	8.68	8.68	

Pejepscot Boat Launch (PBL)

PBL	05/20/12	0700	clear		9.6	9.6	9.6	9.6	97.0
PBL	05/20/12	0700	clear		9.6				
PBL	06/17/12	0700	clear		8.7	8.7	8.7	8.7	94.0
PBL	07/22/12	0705	clear		7.7	7.7	7.7	7.7	93.6
PBL	08/17/12	0700	clear	med P before	7.5	7.5	7.5	7.5	87.6
PBL	09/16/12	0655	clear		8.3	8.3	8.3	8.3	91.0
PBL	09/16/12	0655	clear		8.3				
PBL	10/17/12	0705	clear	fog; light P be	9.1				97.8
GeoMean PBL					8.57	8.33	8.33	8.33	93.4

Fish Park Up (FPU)


FPU	05/20/12	0730	clear		9.5	9.5	9.5	9.5	97.2
FPU	06/17/12	0725	clear		8.7	8.7	8.7	8.7	94.4
FPU	06/17/12	0725	clear		8.7				
FPU	07/22/12	0730	clear		7.7	7.7	7.7	7.7	93.6
FPU	08/17/12	0720	clear	p - med	7.5	7.80	7.80	7.80	88.1
FPU	09/16/12	0720	clear		8.1	8.1	8.1	8.1	89.1
FPU	10/07/12	0725	clear	p - light	9.1	9.1			91.7
FPU	10/07/12	0725	clear	p - light	9.1				
GeoMean FPU					8.39	8.26	8.07	8.07	91.3

 = MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA					Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$				
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Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values
Fish Park Down (FPD)									
FPD	05/20/12	0745	clear		9.5	9.5	9.5	9.5	97.0
FPD	06/17/12	0740	clear		8.6	8.6	8.6	8.6	94.0
FPD	07/22/12	0745	clear		7.5	7.5	7.5	7.5	91.2
FPD	07/22/12	0745	clear		7.5				
FPD	08/17/12	0730	clear		7.5	7.5	7.7	7.7	87.7
FPD	09/16/12	0730	clear		8.1	8.1	8.4	8.4	89.7
FPD	10/07/12	0745	clear		9.1	9.1			93.2
GeoMean FPD					8.03	8.14	8.04	8.04	91.1

Brunswick Interstate Ledges (BIL)									
BIL	05/20/12	0800	clear		9.5	9.5	9.5	9.5	97.1
BIL	06/17/12	0800	clear		8.7	8.7	8.7	8.7	94.9
BIL	07/22/12	0800	clear		7.4	7.4	7.4	7.4	89.7
BIL	08/17/12	0755	clear		7.5	7.5	7.5	7.5	87.7
BIL	08/17/12	0755	clear		7.5				
BIL	09/16/12	0800	clear		8.0	8.0	8.0	8.0	88.7
BIL	10/07/12	0800	clear		9.1	9.1			89.8
GeoMean BIL					8.01	8.11	7.88	7.88	90.1

Brunswick Canoe Portage (BCP)									
BCP	05/20/12	0800	clear		9.8	9.8	9.8	9.8	101.1
BCP	06/17/12	0800	clear		8.7	8.7	8.7	8.7	90.7
BCP	06/17/12	0800	clear		8.7				
BCP	07/22/12	0745	clear		7.1	7.1	7.1	7.1	83.4
BCP	08/19/12	0805	clear		7.4	7.4	7.4	7.4	86.6
BCP	09/16/12	0715	clear		7.6	7.6	7.6	7.6	85.1
BCP	10/07/12	0800	clear		8.52	8.52			84.7
GeoMean BCP					8.2	8.1	8.1	8.1	88.4

 = MEAN VALUE Bolded Red Text = VALUE DOES NOT MEET CRITERIA	Dissolved Oxygen Class B Criteria: ≥ 7 ppm (mg/L) Saturation $\geq 75\%$
---	--

Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values
Brunswick Water St. (BWS)									
BWS	05/20/12	0700	clear		9.96	9.96	9.96	9.96	102.7
BWS	06/17/12	0745			8.6	8.6	8.6	8.6	88.3
BWS	07/22/12	0800	clear		8.1	8.1	8.1	8.1	100.1
BWS	08/19/12	0745	clear		7.6	7.6	7.6	7.6	87.6
BWS	09/16/12	0750	clear		8.14	8.14	8.14	8.14	88.1
BWS	10/07/12	0900	clear		10.7	10.7			105.4
GeoMean BWS					8.78	8.78	8.44	8.44	95.1

Brunswick Bay Bridge (BBB)									
Site	Date	Sample Time	Weather	Adversities	ALL DATA DO (mg/L)	ALL DATA WITH MEANS FOR REPLICATE SAMPLES (mg/L)	NO APR OR OCT DO DATA (mg/L) (Means for reps used)	NO APR OR OCT DO DATA - HEAVY RAIN DATA ELIMINATED (mg/L) (Means for reps used)	Percent DO All Data Collected, Including Replicate Values
BBB	05/20/12	0815	clear		9.8	9.8	9.8	9.8	99.9
BBB	06/17/12	0730			8.1	8.1	8.1	8.1	86.1
BBB	07/22/12	0750	pt cloudy		7.25	7.25	7.25	7.25	87.2
BBB	08/19/12	0735	clear		7.22	7.22	7.22	7.22	83.5
BBB	09/16/12	0745	clear		7.6	7.6	7.6	7.6	84.8
BBB	10/07/12	0840	overcast		10.33	10.33			103.5
GeoMean BBB					8.30	8.30	7.94	7.94	90.5



Water Quality Data Analysis and Review
Lower Androscoggin River 2001-2012
Appendices

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Appendix I
Public Law, Chapter 163 LD 330
(Lower Androscoggin is Section 24)

PLEASE NOTE: Legislative Information **cannot** perform research, provide legal advice, or interpret Maine law. For legal assistance, please contact a qualified attorney.

An Act To Change the Classification of Certain Waters of the State

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 38 MRSA §467, sub-§1, ¶C, as amended by PL 2003, c. 317, §2, is further amended to read:

C. Androscoggin River, Upper Drainage; that portion within the State lying above the river's most upstream crossing of the Maine-New Hampshire boundary - Class A unless otherwise specified.

(1) Cupsuptic River and its tributaries - Class AA.

(2) Kennebago River and its tributaries except for the impoundment of the dam at Kennebago Falls - Class AA.

(3) Rapid River, from a point located 1,000 feet downstream of Middle Dam to its confluence with Umbagog Lake - Class AA.

(4) Magalloway River and tributaries above Aziscohos Lake in Lynchton Township, Parmachenee Township and Bowmantown Township - Class AA.

(4-A) Abbott Brook and its tributaries in Lincoln Plantation - Class AA.

(5) Little Magalloway River and tributaries in Parmachenee Township and Bowmantown Township - Class AA.

(6) Long Pond Stream in Rangeley - Class AA.

(7) Dodge Pond Stream in Rangeley - Class AA.

Sec. 2. 38 MRSA §467, sub-§1, ¶D, as amended by PL 2003, c. 317, §3, is further amended to read:

D. Androscoggin River, minor tributaries - Class B unless otherwise specified.

(1) All tributaries of the Androscoggin River that enter between the Maine-New Hampshire boundary in Gilead and its confluence with, and including, the Ellis River and that are not otherwise classified - Class A.

(2) Bear River - Class AA.

(3) Sabattus River from Sabattus Lake to limits of the Lisbon urban area - Class C.

- (4) Webb River - Class A.
- (5) Swift River, and its tributaries, above the Mexico-Rumford boundary - Class A.
- (6) Nezinscot River, east and west branches above their confluence in Buckfield - Class A.
- (7) Wild River in Gilead, Batchelders Grant - Class AA.
- (8) Aunt Hannah Brook and its tributaries in Dixfield - Class A.

Sec. 3. 38 MRSA §467, sub-§4, ¶A, as amended by PL 2003, c. 317, §6 and affected by §25, is further amended to read:

A. Kennebec River, main stem.

- (1) From the east outlet of Moosehead Lake to a point 1,000 feet below the lake - Class A.
- (2) From the west outlet of Moosehead Lake to a point 1,000 feet below the lake - Class A.
- (3) From a point 1,000 feet below Moosehead Lake to its confluence with Indian Pond - Class AA.
- (4) From Harris Dam to a point located 1,000 feet downstream from Harris Dam - Class A.
- (5) From a point located 1,000 feet downstream from Harris Dam to its confluence with the Dead River - Class AA.
- (6) From its confluence with the Dead River to the confluence with Wyman Lake, including all impoundments - Class A.
- (7) From the Wyman Dam to its confluence with the impoundment formed by the Williams Dam - Class A.
- (8) From the confluence with the Williams impoundment to the Route 201A bridge in Anson-Madison, including all impoundments - Class A.
- (9) From the Route 201A bridge in Anson-Madison to the Fairfield-Skowhegan boundary, including all impoundments - Class B.
- (10) From the Fairfield-Skowhegan boundary to ~~its confluence with Messalonskee Stream, including all impoundments~~ the Shawmut Dam - Class C.
- (10-A) From the Shawmut Dam to its confluence with Messalonskee Stream, excluding all impoundments - Class B.

(a) Waters impounded by the Hydro-Kennebec Dam and the Lockwood Dam in Waterville-Winslow - Class C.

(11) From its confluence with Messalonskee Stream to the Sidney-Augusta boundary, including all impoundments - Class B.

(12) From the Sidney-Augusta boundary to the Father John J. Curran Bridge in Augusta, including all impoundments - Class B.

(13) From the Father John J. Curran Bridge in Augusta to a line drawn across the tidal estuary of the Kennebec River due east of Abagadasset Point - Class B. Further, the Legislature finds that the free-flowing habitat of this river segment provides irreplaceable social and economic benefits and that this use must be maintained. Further, the license limits for total residual chlorine and bacteria for existing direct discharges of wastewater to this segment as of January 1, 2003 must remain the same as the limits in effect on that date and must remain in effect until June 30, 2009 or upon renewal of the license, whichever comes later. Thereafter, license limits for total residual chlorine and bacteria must be those established by the department in the license and may include a compliance schedule pursuant to section 414-A, subsection 2.

(14) From a line drawn across the tidal estuary of the Kennebec River due east of Abagadasset Point, to a line across the southwesterly area of Merrymeeting Bay formed by an extension of the Brunswick-Bath boundary across the bay in a northwesterly direction to the westerly shore of Merrymeeting Bay and to a line drawn from Chop Point in Woolwich to West Chop Point in Bath - Class B. Further, the Legislature finds that the free-flowing habitat of this river segment provides irreplaceable social and economic benefits and that this use must be maintained.

Sec. 4. 38 MRSA §467, sub-§4, ¶I, as repealed and replaced by PL 1989, c. 228, §2, is amended to read:

I. Kennebec River, minor tributaries - Class B unless otherwise specified.

(1) All minor tributaries entering above Wyman Dam that are not otherwise classified - Class A.

(2) All tidal portions of tributaries entering between ~~Edwards Dam~~ the Sidney-Vassalboro-Augusta town line and a line drawn across the tidal estuary of the Kennebec River due east of Abagadasset Point - ~~Class B~~, unless otherwise specified.

(a) Eastern River from head of tide to its confluence with the Kennebec River - Class C.

(3) Cold Stream, West Forks Plantation - Class AA.

(4) Moxie Stream, Moxie Gore, below a point located 1,000 feet downstream of the Moxie

Pond dam - Class AA.

(5) Austin Stream and its tributaries above the highway bridge of Route 201 in the Town of Bingham - Class A.

Sec. 5. 38 MRSA §467, sub-§7, ¶E, as amended by PL 1999, c. 277, §11, is further amended to read:

E. Piscataquis River Drainage.

(1) Piscataquis River, main stem.

(a) From the confluence of the East Branch and the West Branch to the Route 15 bridge in Guilford - Class A.

(b) From the Route 15 bridge in Guilford to the Maine Central Railroad bridge in Dover-Foxcroft - Class B.

(c) From the Maine Central Railroad bridge in Dover-Foxcroft to its confluence with the Penobscot River - Class B.

(2) Piscataquis River, tributaries - Class B unless otherwise specified.

(a) Except as otherwise provided, East and West Branches of the Piscataquis River and their tributaries above their confluence near Blanchard - Class A.

(b) East Branch of the Piscataquis River from 1,000 feet below Shirley Pond to its confluence with the West Branch - Class AA.

(c) Pleasant River, East Branch and its tributaries - Class A.

(d) Pleasant River, West Branch, from the outlet of Fourth West Branch Pond to its confluence with the East Branch - Class AA.

(e) Pleasant River, West Branch tributaries - Class A.

(f) Sebec River and its tributaries above Route 6 in Milo - Class A.

(g) West Branch of the Piscataquis River from 1,000 feet below West Shirley Bog to its confluence with the East Branch - Class AA.

(h) Black Stream - Class A.

(i) Cold Stream - Class A.

(j) Kingsbury Stream - Class A.

(k) Schoodic Stream - Class A.

(l) Scutaze Stream - Class A.

(m) ~~Sebois~~Seboeis Stream, including East and West Branches, and tributaries - Class A.

(n) Alder Stream and its tributaries - Class A.

Sec. 6. 38 MRSA §467, sub-§7, ¶F, as amended by PL 2003, c. 317, §13, is further amended to read:

F. Penobscot River, minor tributaries - Class B unless otherwise specified.

(1) Cambolasse Stream (Lincoln) below the Route 2 bridge - Class C.

(2) Great Works Stream (Bradley) and its tributaries above the Route 178 bridge - Class A.

(3) Kenduskeag Stream (Bangor) below the Bullseye Bridge - Class C.

(4) Mattanawcook Stream (Lincoln) below the outlet of Mattanawcook Pond - Class C.

(5) Olamon Stream and its tributaries above the bridge on Horseback Road - Class A.

(6) Passadumkeag River and its tributaries - Class A, unless otherwise specified.

(a) Passadumkeag River from the Pumpkinhill Dam to its confluence with the Penobscot River - Class AA.

(b) Ayers Brook - Class AA.

(7) Souadabscook Stream above head of tide - Class AA.

(7-A) Souadabscook Stream, tributaries of - Class B, unless otherwise specified.

(a) West Branch Souadabscook Stream (Hampden, Newburgh) - Class A.

(b) Brown Brook (Hampden) - Class A.

(8) Sunkhaze Stream and its tributaries - Class AA.

(9) Birch Stream - Class A.

(10) Hemlock Stream - Class A.

(11) Mattamiscontis Stream and its tributaries - Class A.

(12) Medunkeunk Stream - Class A.

(13) Rockabema Stream - Class A.

(14) Salmon Stream - Class A.

(15) Salmon Stream in Winn - Class A.

(16) Little Salmon Stream in Medway - Class A.

(17) Narrimissic River in Bucksport and Orland, including all impoundments - Class B.

Sec. 7. 38 MRSA §467, sub-§9, ¶B, as amended by PL 1991, c. 499, §16, is further amended to read:

B. Presumpscot River, tributaries - Class A unless otherwise specified.

(1) All tributaries entering below the outlet of Sebago Lake - Class B.

(2) Crooked River and its tributaries, except as otherwise provided, excluding existing impoundments ~~and excluding that area of the river previously impounded at Scribners Mill~~ - Class AA.

(3) Stevens Brook (Bridgton) - Class B.

(4) Mile Brook (Casco) - Class B.

Sec. 8. 38 MRSA §467, sub-§12, ¶B, as amended by PL 2003, c. 317, §15, is further amended to read:

B. Saco River, tributaries, those waters lying within the State - Class B unless otherwise specified.

(1) All tributaries entering above the confluence of the Ossipee River lying within the State

and not otherwise classified - Class A.

(2) Wards Brook (Fryeburg) - Class C.

(3) Buff Brook (Waterboro) - Class A.

(4) Ossipee River Drainage, those waters lying within the State - Class B unless otherwise specified.

(a) Emerson Brook in Parsonsfield - Class A.

(b) South River and its tributaries (Parsonsfield), those waters lying within the State - Class A.

Sec. 9. 38 MRSA §467, sub-§13, ¶A, as repealed and replaced by PL 1989, c. 764, §14, is amended to read:

A. St. Croix River, main stem.

(1) Except as otherwise provided, from the outlet of Chiputneticook Lakes to its confluence with the Woodland Lake impoundment, those waters lying within the State - Class A.

(2) Those waters ~~of~~ impounded in the Grand Falls Flowage including those waters between Route 1 (Princeton and Indian Township) and ~~Black-Cat Island~~ Grand Falls Dam - Class BGPA.

(3) Woodland Lake impoundment - Class C.

(4) From the Woodland Dam to tidewater, those waters lying within the State, including all impoundments - Class C.

Sec. 10. 38 MRSA §467, sub-§15, ¶C, as amended by PL 2003, c. 317, §17, is further amended to read:

C. Aroostook River Drainage.

(1) Aroostook River, main stem.

(a) From the confluence of Millinocket Stream and Munsungan Stream to the Route 11 bridge - Class AA.

(b) From the Route 11 bridge to the Sheridan Dam - Class B.

- (c) From the Sheridan Dam to its confluence with Presque Isle Stream, including all impoundments - Class B.
 - (d) From its confluence with Presque Isle Stream to a point located 3.0 miles upstream of the intake of the Caribou water supply, including all impoundments - Class C.
 - (e) From a point located 3.0 miles upstream of the intake of the Caribou water supply to a point located 100 yards downstream of the intake of the Caribou water supply, including all impoundments - Class B.
 - (f) From a point located 100 yards downstream of the intake of the Caribou water supply to the international boundary, including all impoundments - Class C.
- (2) Aroostook River, tributaries, those waters lying within the State - Class A unless otherwise specified.
- (a) All tributaries of the Aroostook River entering below the confluence of the Machias River that are not otherwise classified - Class B.
 - (b) Little Machias River and its tributaries - Class A.
 - (c) Little Madawaska River and its tributaries, including Madawaska Lake tributaries above the Caribou-Connor Township line - Class A.
 - (d) Machias River, from the outlet of Big Machias Lake to the Aroostook River - Class AA.
 - (e) Millinocket Stream, from the outlet of Millinocket Lake to its confluence with Munsungan Stream - Class AA.
 - (f) Munsungan Stream, from the outlet of Little Munsungan Lake to its confluence with Millinocket Stream - Class AA.
 - (g) Presque Isle Stream and its tributaries above the Mapleton-Presque Isle town line - Class A.
 - (h) St. Croix Stream from its confluence with Hall Brook in T.9, R.5, W.E.L.S. to its confluence with the Aroostook River - Class AA.

(j) Squa Pan Stream from the outlet of Squa Pan Lake to its confluence with the Aroostook River - Class C.

(k) Limestone Stream from the Long Road bridge to the Canadian border - Class C.

(l) Beaver Brook and its tributaries (T.14 R.6 W.E.L.S., T.14 R.5 W.E.L.S., T.13 R.5 W.E.L.S., Portage Lake, Ashland, Castle Hill) - Class A.

(m) Gardner Brook and its tributaries (T.14 R.5 W.E.L.S., T.13 R.5 W.E.L.S., Wade) - Class A.

Sec. 11. 38 MRSA §467, sub-§15, ¶F, as amended by PL 2003, c. 317, §18, is further amended to read:

F. St. John River, minor tributaries, those waters lying within the State - Class A unless otherwise specified.

(1) Except as otherwise classified, all minor tributaries of the St. John River entering below the international bridge in Fort Kent, those waters lying within the State - Class B.

(2) Baker Branch, from the headwaters at the St. John Ponds to its confluence with the Southwest Branch - Class AA.

(3) Big Black River, from the international boundary to its confluence with the St. John River - Class AA.

(4) Northwest Branch, from the outlet of Beaver Pond in T.12, R.17, W.E.L.S. to its confluence with the St. John River - Class AA.

(5) Prestile Stream from its source to Route 1A in Mars Hill - Class A.

(6) Southwest Branch, from a point located 5 miles downstream of the international boundary to its confluence with the Baker Branch - Class AA.

(7) Violette Stream and its tributaries, from its source to the confluence with Caniba Brook - Class A.

Sec. 12. 38 MRSA §467, sub-§16, ¶B, as amended by PL 1999, c. 277, §22, is further amended to read:

B. Salmon Falls River, tributaries, those waters lying within the State - Class B unless otherwise specified.

(1) Chicks Brook (South Berwick, York) - Class A.

(2) Little River and its tributaries (Berwick, North Berwick, Lebanon) - Class A.

Sec. 13. 38 MRS §468, sub-§1, ¶A-1 is enacted to read:

A-1. Cape Elizabeth.

(1) Trout Brook, those waters that form the town boundary with South Portland - Class C.

Sec. 14. 38 MRS §468, sub-§1, ¶B, as repealed and replaced by PL 1989, c. 764, §21, is amended to read:

B. Portland.

(1) All minor drainages unless otherwise specified - Class C.

(2) Stroudwater River from its origin to tidewater, including all tributaries - Class B.

Sec. 15. 38 MRS §468, sub-§1, ¶C, as repealed and replaced by PL 1989, c. 764, §21, is amended to read:

C. Scarborough.

(1) All minor drainages - Class C unless otherwise specified.

(2) Finnard Brook - Class B.

(3) Stuart Brook - Class B.

(4) Nonesuch River from the headwaters to a point 1/2 mile downstream of Mitchell Hill Road crossing - Class B.

(5) Stroudwater River from its origin to tidewater, including all tributaries - Class B.

Sec. 16. 38 MRS §468, sub-§1, ¶D, as repealed and replaced by PL 1989, c. 764, §21, is amended to read:

D. South Portland.

(1) All minor drainages - Class C.

(2) Trout Brook downstream of the first point where the brook becomes the town boundary between South Portland and Cape Elizabeth - Class C.

Sec. 17. 38 MRS §468, sub-§1, ¶J is enacted to read:

J. Westbrook.

(1) Long Creek, main stem - Class C.

Sec. 18. 38 MRSA §468, sub-§4, ¶D is enacted to read:

D. Bristol.

(1) Pemaquid River and its tributaries, all freshwater sections below Pemaquid Pond - Class A.

Sec. 19. 38 MRSA §468, sub-§7, ¶D is enacted to read:

D. Black Brook in Lincolnville - Class A.

Sec. 20. 38 MRSA §468, sub-§7, ¶E is enacted to read:

E. Kendall Brook in Lincolnville - Class A.

Sec. 21. 38 MRSA §468, sub-§7, ¶F is enacted to read:

F. Tucker Brook in Lincolnville - Class A.

Sec. 22. 38 MRSA §469, sub-§5, ¶B, as enacted by PL 1989, c. 764, §27, is amended to read:

B. Phippsburg.

(1) Tidal waters east of longitude 69°-50'-05" W. and west of longitude 69°-47'-00" W. - Class SA.

(2) Tidal waters of The Basin, including The Narrows east of a line drawn between 69°-51'-57" W. and 43°-48'-14" N. - Class SA.

Sec. 23. Report concerning procedures for reclassification. The Department of Environmental Protection shall review the current procedures for reclassification contained in the Maine Revised Statutes, Title 38, section 464, subsection 2 and suggest any changes or clarifications needed to make the procedures more consistent and efficient while maintaining a full public review process. The recommendations may include draft legislation. The report must be submitted to the Joint Standing Committee on Natural Resources by January 15, 2010 and the committee may submit legislation related to this report to the Second Regular Session of the 124th Legislature.

Sec. 24. Lower Androscoggin River water quality sampling; report; legislation. The Department of Environmental Protection, with the assistance of and in consultation with volunteer river monitors, shall establish and implement a water quality sampling program for the lower Androscoggin River from Gulf Island Dam to the line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction.

1. Timing. The water quality sampling program must occur during the 2009 sampling season.

2. Purpose. The purpose of the water quality sampling program implemented under this section is to allow additional water quality data to be collected to determine if the section of the Androscoggin River from Worumbo Dam in Lisbon Falls to the line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction meets, or can reasonably be expected

to meet, the criteria for reclassification from Class C to Class B.

3. Reclassification procedures. Unless the Department of Environmental Protection is unable to obtain the required monitoring data due to excessive rainfall or other unforeseen events, or unless the monitoring data indicate an upgrade is unwarranted, the department shall initiate the procedures for reclassification in accordance with the Maine Revised Statutes, Title 38, section 464, subsection 2 to upgrade the lower Androscoggin River from Worumbo Dam in Lisbon Falls to the line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction from Class C to Class B.

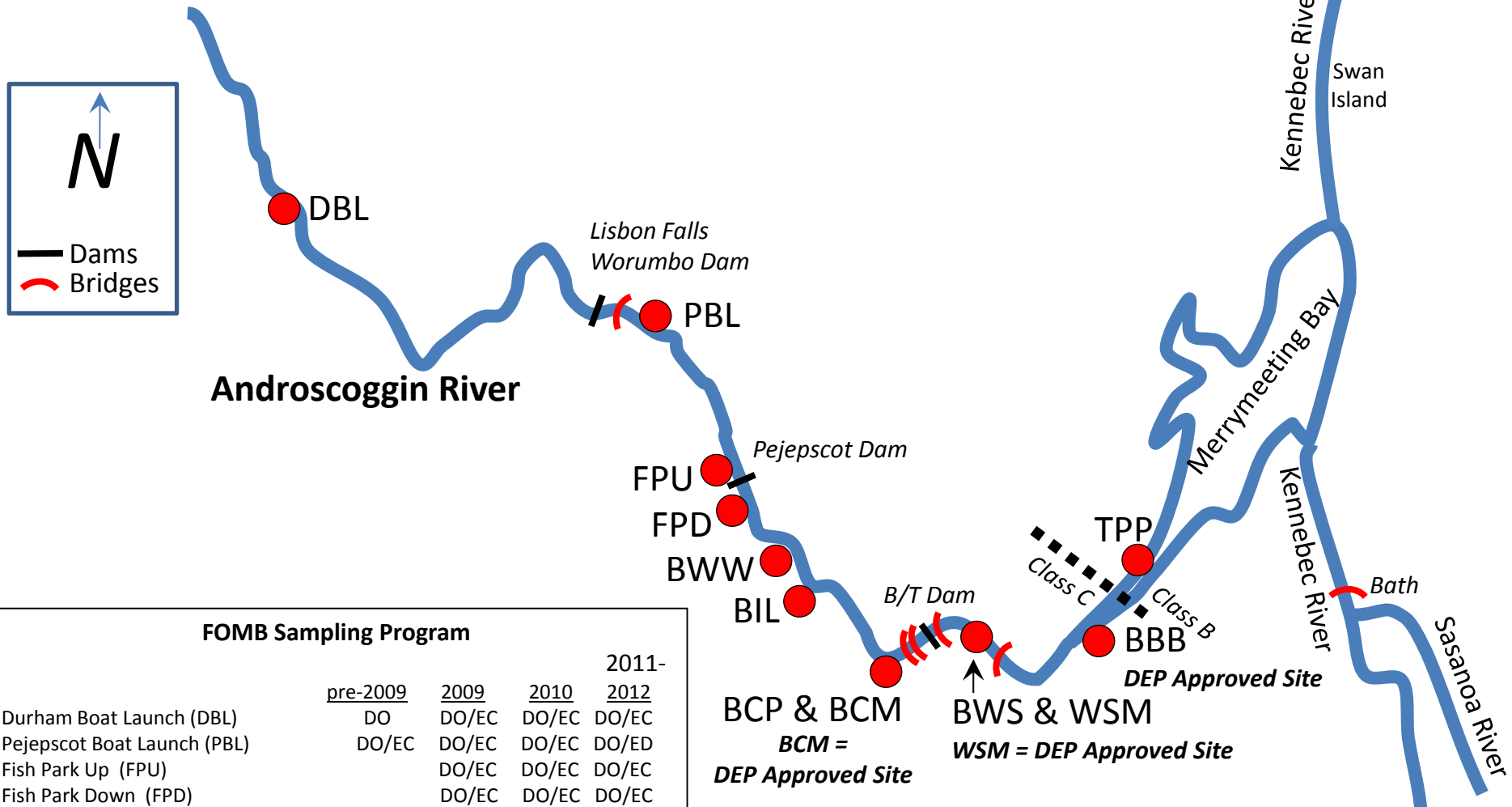
4. Report. By February 15, 2010, the Department of Environmental Protection shall submit a report, including recommendations and any necessary implementing legislation, in connection with the water quality sampling program required under this section to the Joint Standing Committee on Natural Resources.

5. Legislation authorized. The Joint Standing Committee on Natural Resources may report out legislation relating to the subject matter of this section to the Second Regular Session of the 124th Legislature.

Effective September 12, 2009

Appendix 2
Map-Lower Androscoggin River Sample Sites

Lower Androskoggin River – FOMB Sample Sites



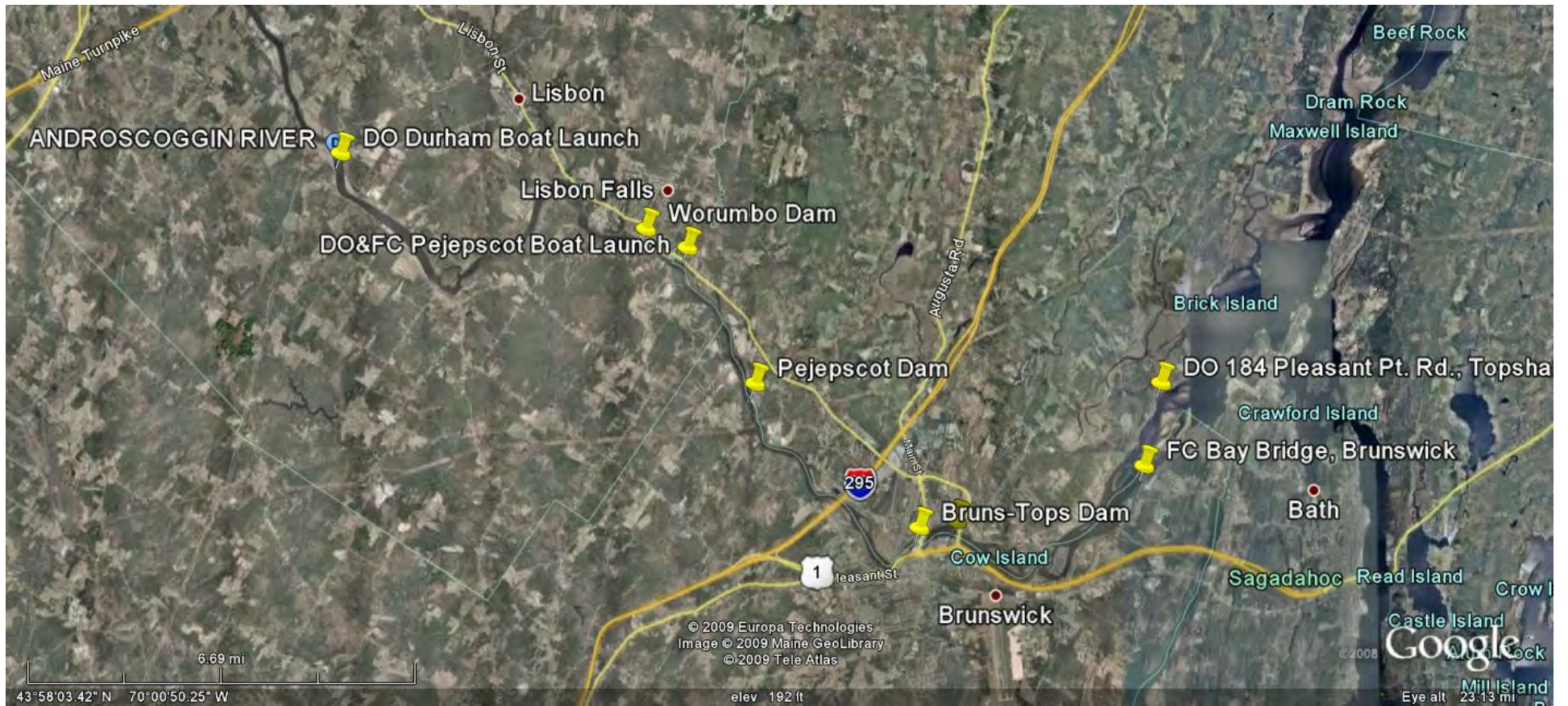
	<u>pre-2009</u>	<u>2009</u>	<u>2010</u>	<u>2011-2012</u>
Durham Boat Launch (DBL)	DO	DO/EC	DO/EC	DO/EC
Pejepscot Boat Launch (PBL)	DO/EC	DO/EC	DO/EC	DO/ED
Fish Park Up (FPU)		DO/EC	DO/EC	DO/EC
Fish Park Down (FPD)		DO/EC	DO/EC	DO/EC
Brunswick Water Works (BWW)		EC	na	na
Brunswick Interstate Ledges (BIL)		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

BCP & BCM
BCM = DEP Approved Site

BWS & WSM
WSM = DEP Approved Site

	<u>pre-2009</u>	<u>2009</u>	<u>2010-2012</u>
Gulf Island Pond Above	DO		
Gulf Island Pond Below (Bates Boathouse)	DO		
Auburn Boat Launch		DO	DO

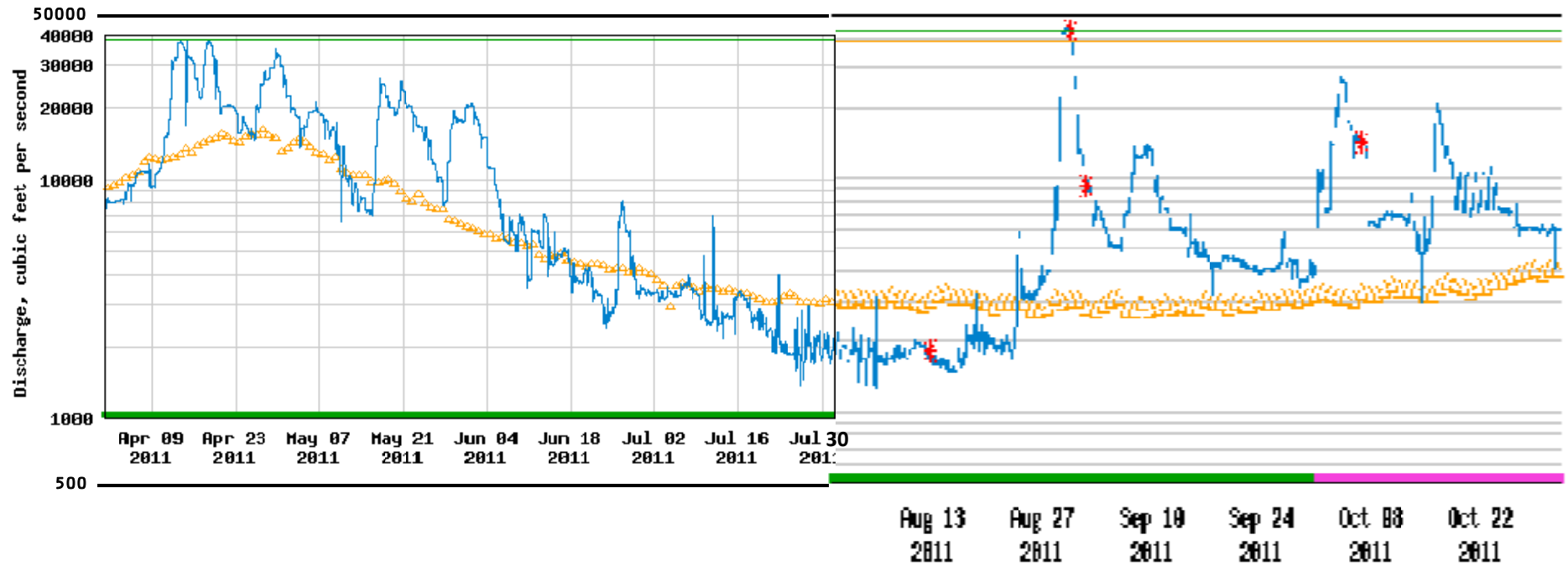
Appendix 3
Lower Androscoggin River
Aerial View Map



Appendix 4
USGS Monthly Flows
Lower Androscoggin River - Auburn



USGS 01059000 Androscoggin River near Auburn, Maine

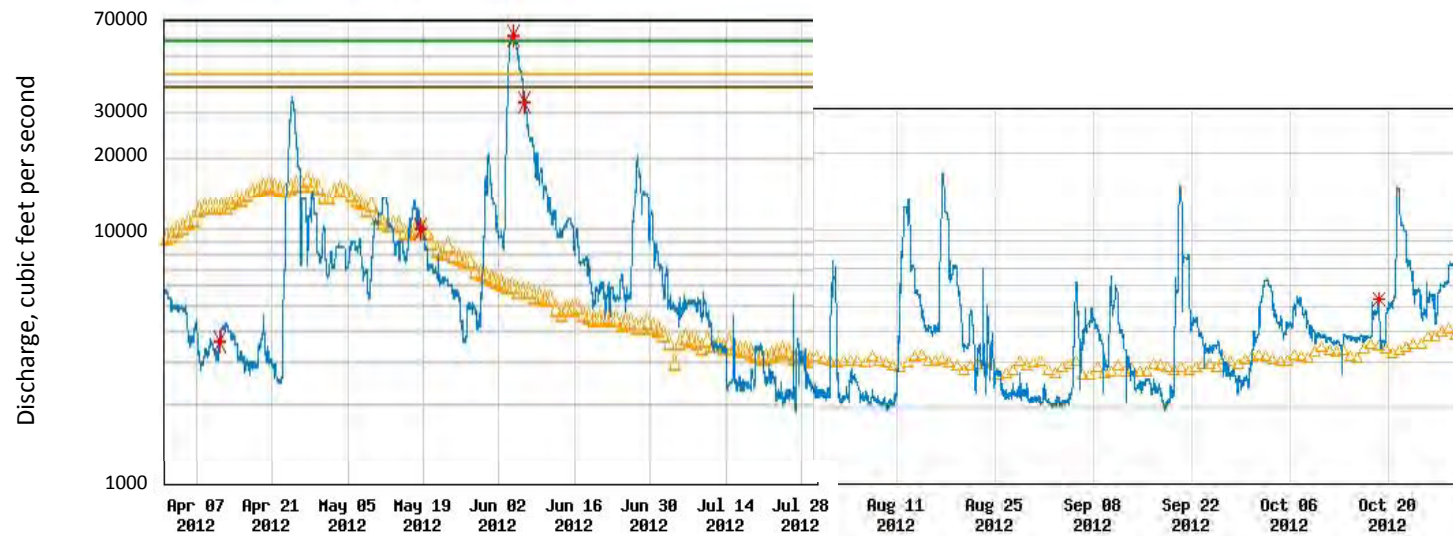


- △ Median daily statistic (82 years)
- Discharge
- * Measured discharge
- █ Period of approved data
- █ Period of provisional data
- Discharge at National Weather Service Flood Stage
- 2 Year Peak Flow *



USGS 01059000 Androscoggin River near Auburn, Maine

2012



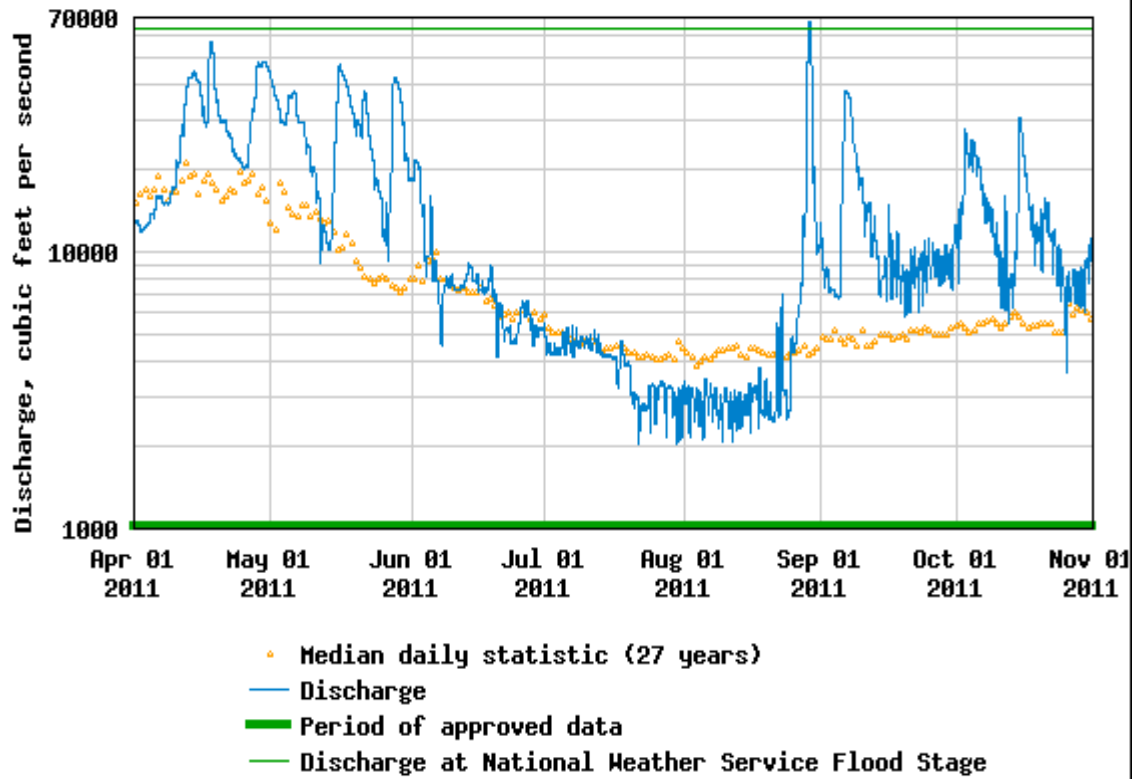
----- Provisional Data Subject to Revision -----

- △ Median daily statistic (83 years)
- Discharge
- * Measured discharge
- 18 Year Peak Flow *
- Discharge at National Weather Service Flood Stage
- 2 Year Peak Flow *

Appendix 5
USGS Monthly Flows
Lower Kennebec River - North Sidney

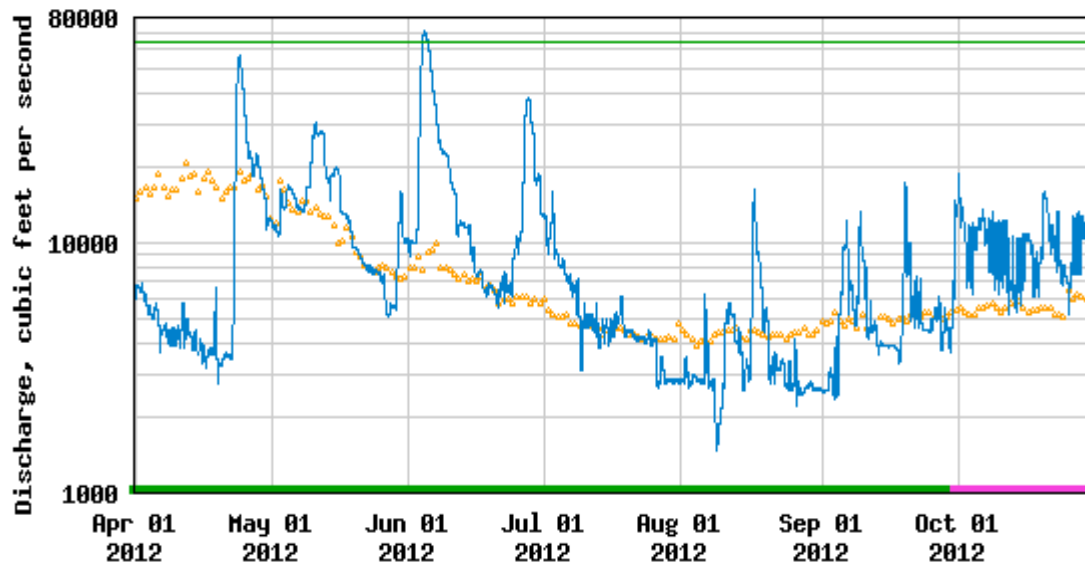


USGS 01049265 Kennebec River at North Sidney, Maine





USGS 01049265 Kennebec River at North Sidney, Maine



- Median daily statistic (27 years)
- Discharge
- Period of approved data
- Period of provisional data
- Discharge at National Weather Service Flood Stage

Appendix 6
Graphics Extracted from
Androscoggin River VRMP 2011 Data Report

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.

The following graphics were extracted from this report, available at:
http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/reports/2010/andro-fomb-2010.pdf

These graphics do not contain the Class B standard for reclassification of Maine waters:

	Dissolved Oxygen instantaneous reading (ppm); percent saturation;	<i>E. coli</i> (colonies /100 ml) instantaneous reading; geometric mean
Class B Criteria	7; 75%	236; 64
Class C Criteria	5; 60%	236; 126

DEP figures based on FOMB data consistently lack indications that Class B standards are actually being met.

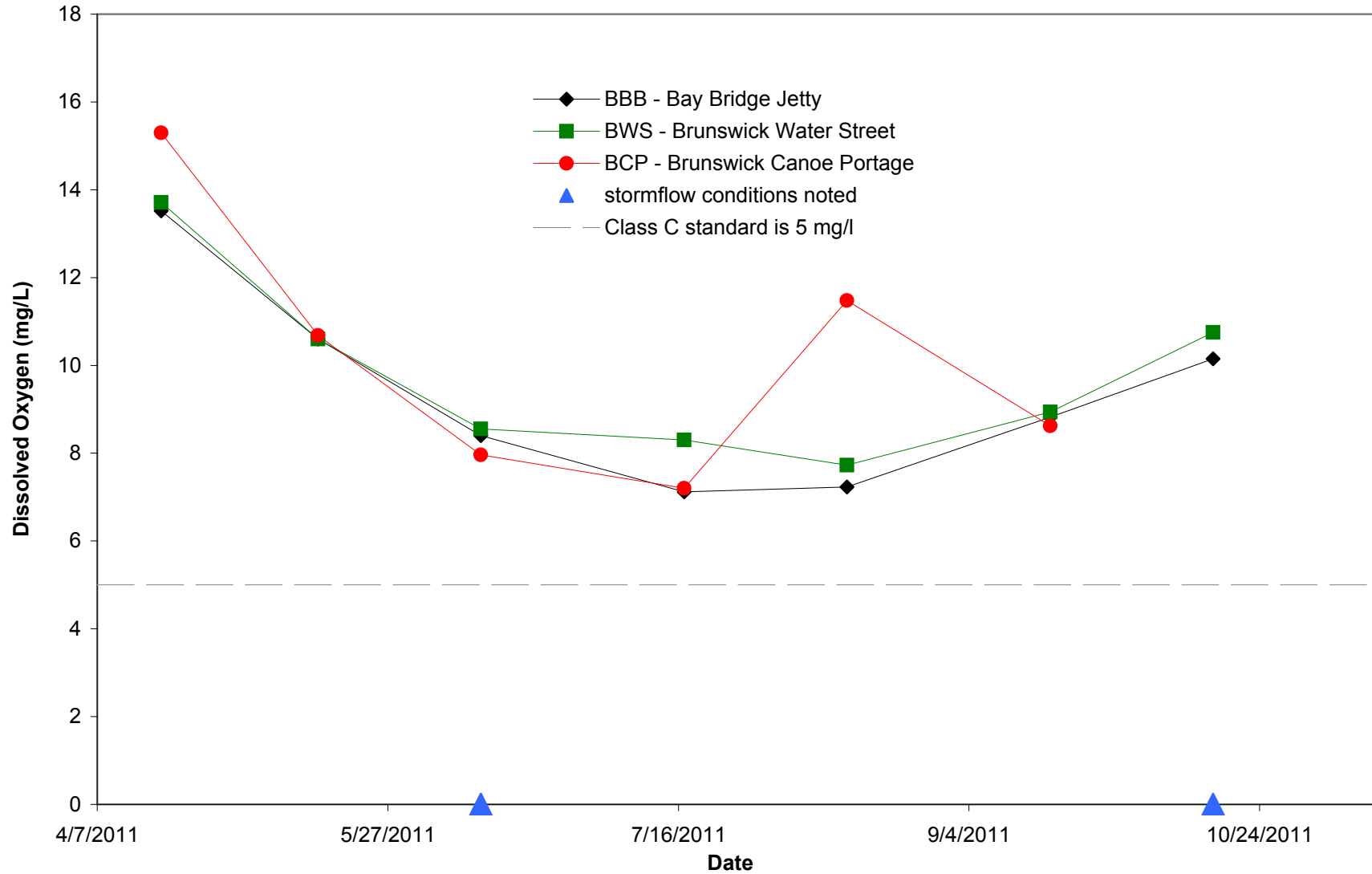


Figure 5-1-5. Dissolved oxygen concentrations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

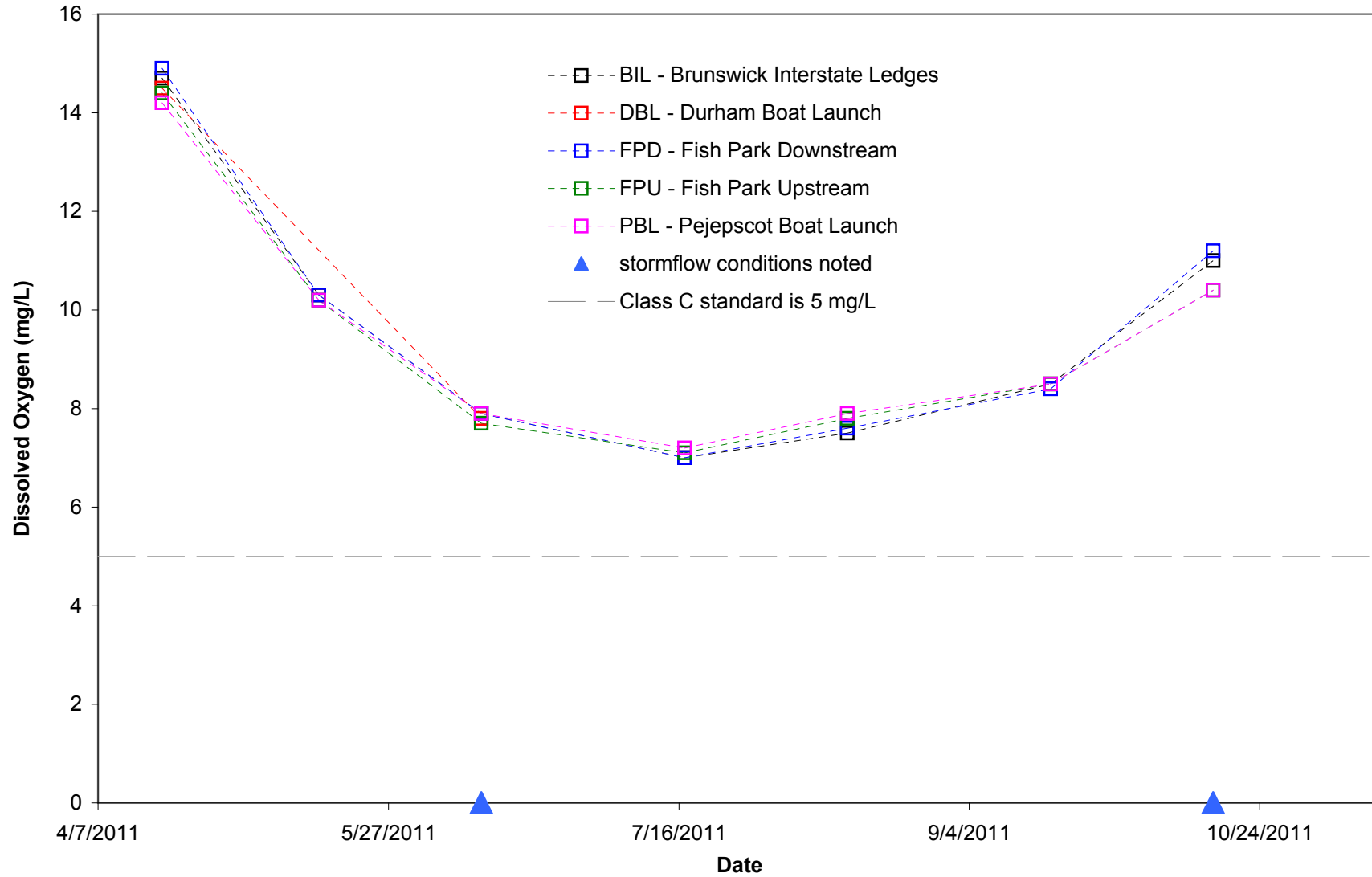


Figure 5-1-6. Dissolved oxygen concentrations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

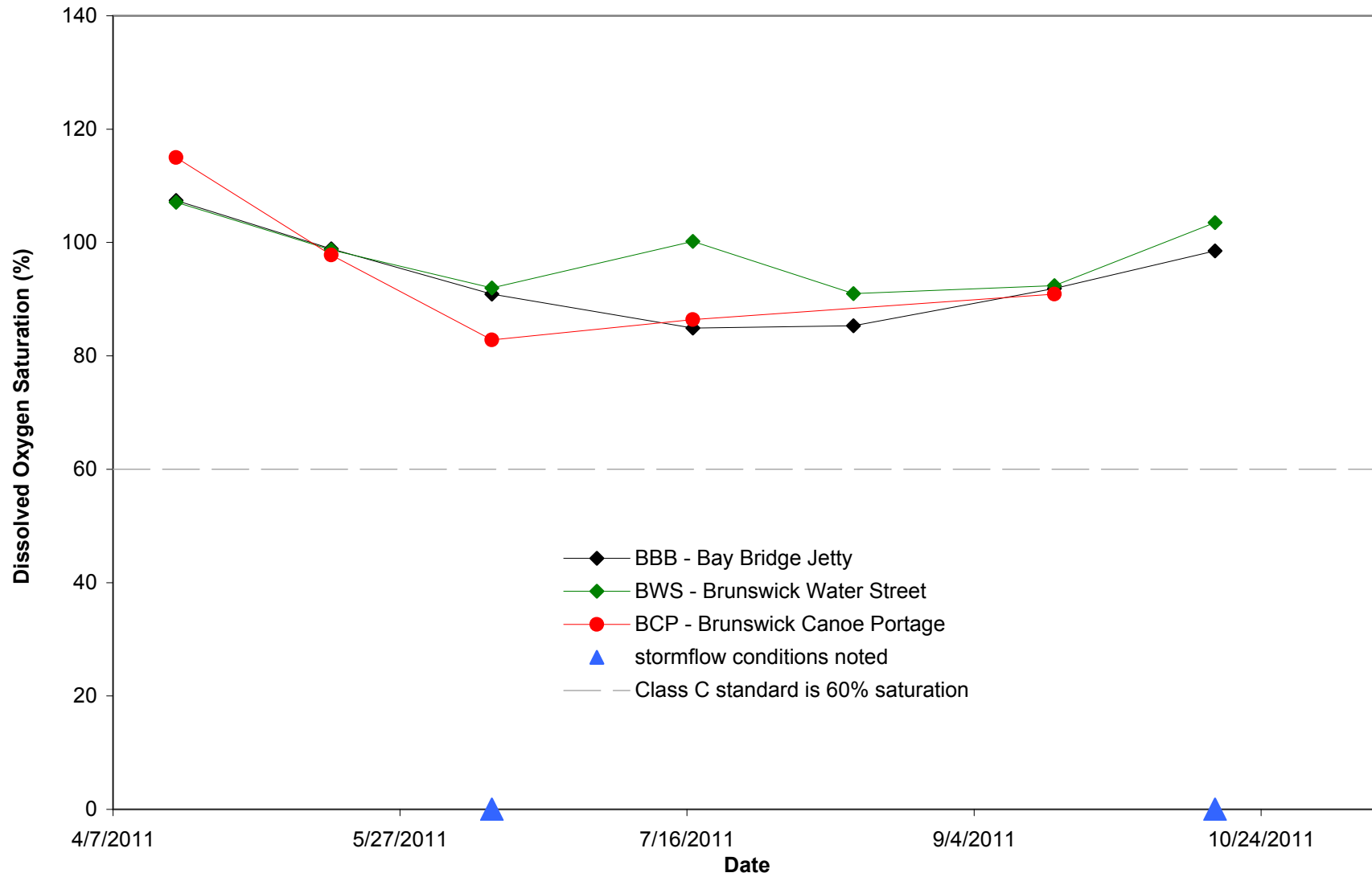


Figure 5-1-7. Dissolved oxygen % saturations at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

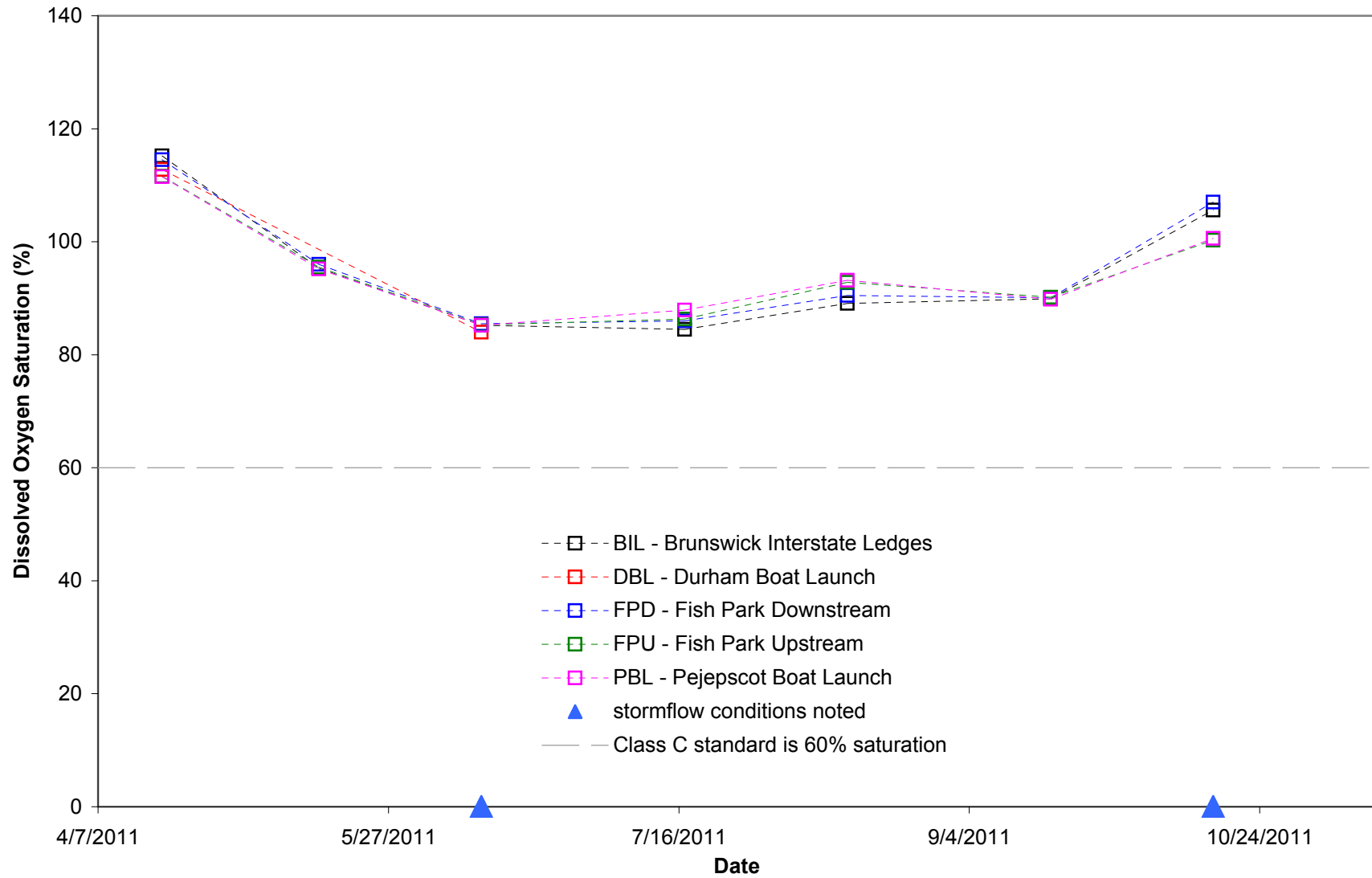


Figure 5-1-8. Dissolved oxygen % saturations at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

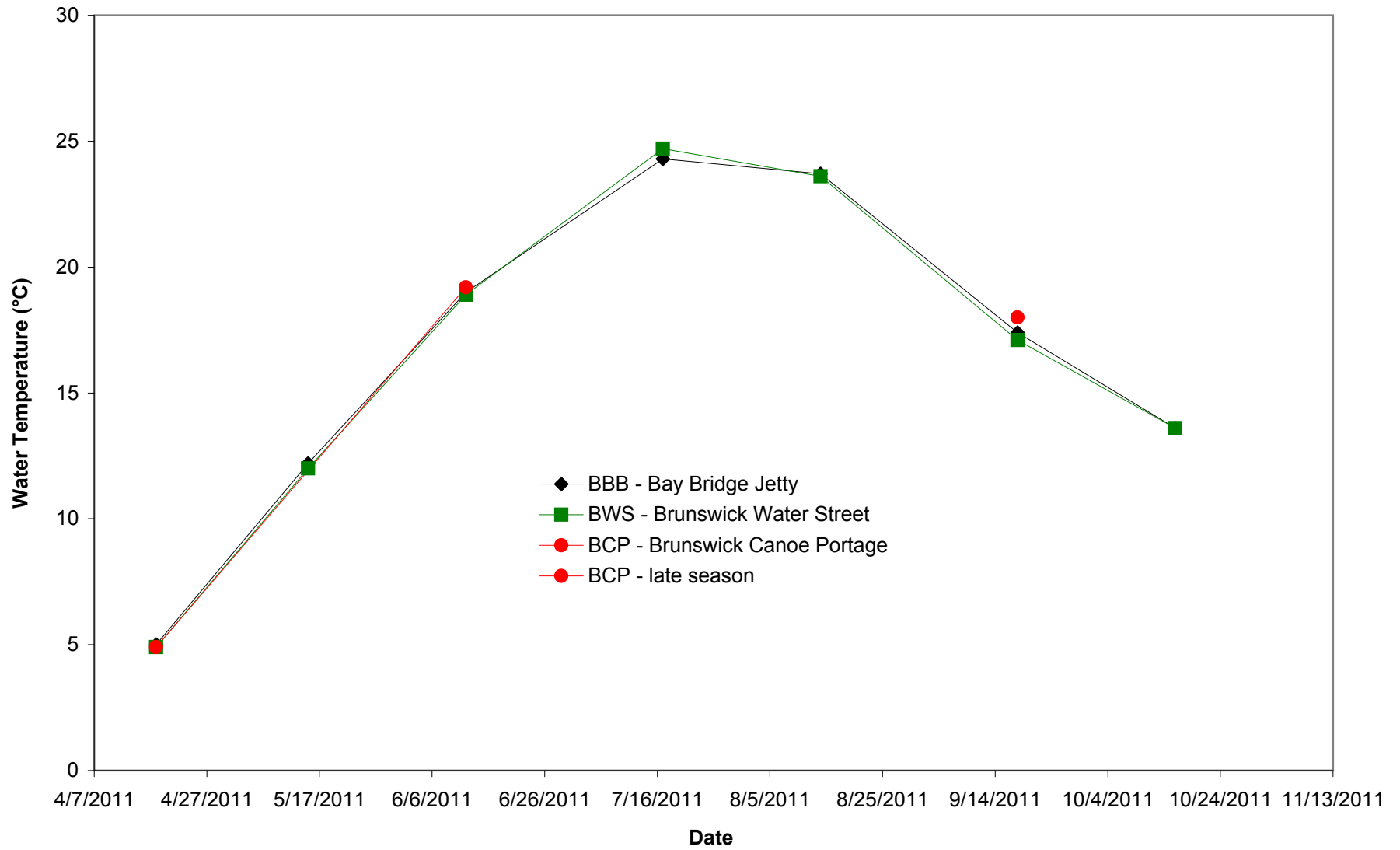


Figure 5-1-9. Water temperatures at Friends of Merrymeeting Bay approved monitoring sites on the Androscoggin River for 2011.

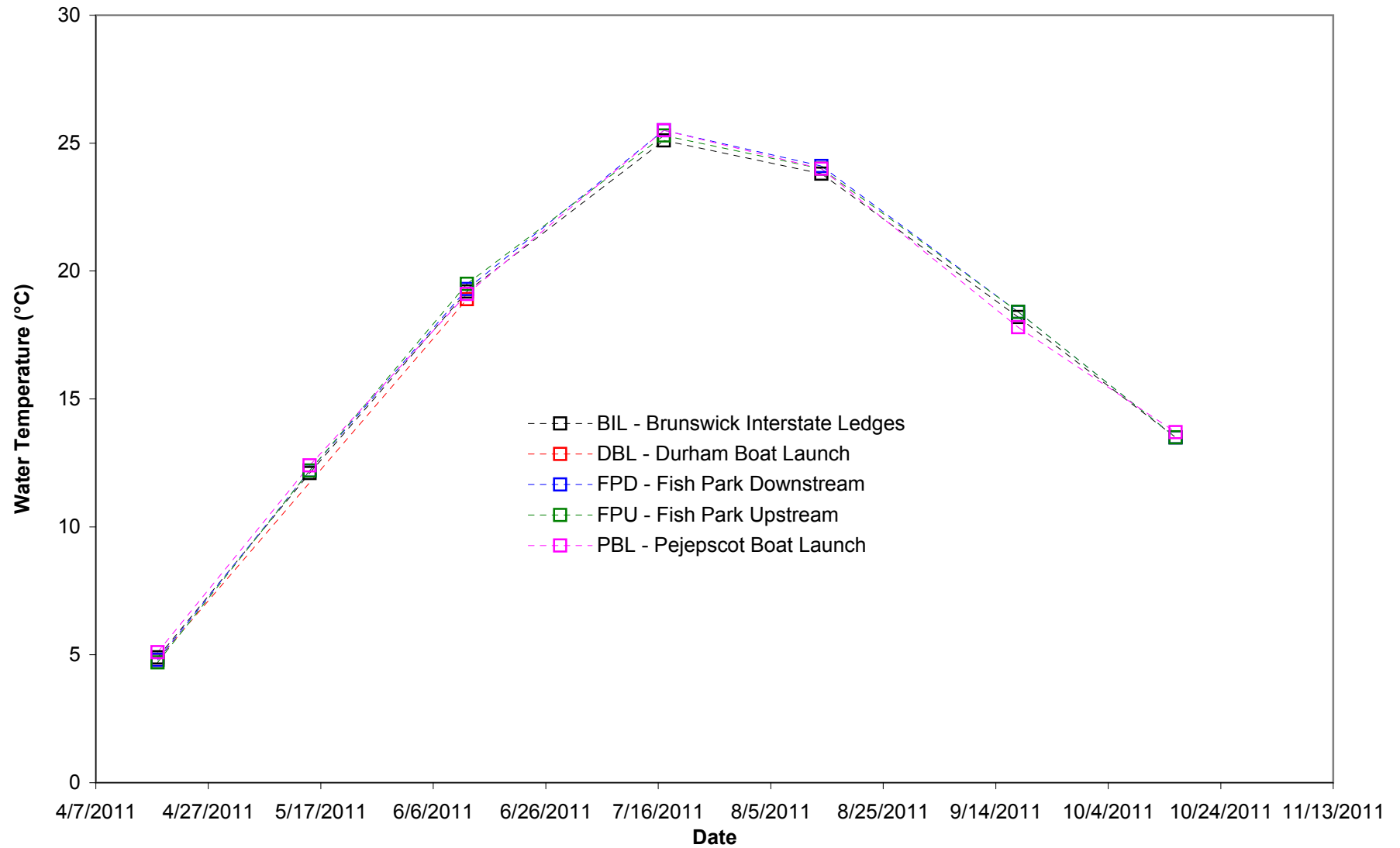


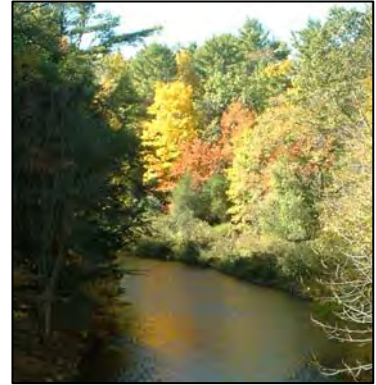
Figure 5-1-10. Water temperatures at Friends of Merrymeeting Bay non-approved monitoring sites on the Androscoggin River for 2011.

Appendix 7
Maine Volunteer River Monitoring Program (VRMP)
Quality Assurance Program Plan (2009-2014)



Maine Volunteer River Monitoring Program (VRMP) Quality Assurance Program Plan (2009-2014)

Maine Department of Environmental Protection
Bureau of Land and Water Quality
Division of Watershed Management &
Division of Environmental Assessment



Prepared By:

Jeff Varricchione, Biologist, Division of Watershed Management
and
Lisa Vickers, Environmental Specialist, Division of Watershed Management
State of Maine, Department of Environmental Protection
312 Canco Road, Portland, Maine 04103, (207) 822-6300

June 10, 2009

Review & Approval Signatures:

Biologist, Div. of Watershed Management:	_____	_____
	Jeffrey T. Varricchione, Maine DEP	Date
Division Director, Div. of Environmental Assessment:	_____	_____
	David L. Courtemanch, Maine DEP	Date
Chair, QA Program/Project Plan Review Team:	_____	_____
	Malcolm C. Burson, Maine DEP	Date
Quality Assurance Officer (USEPA):	_____	_____
	Arthur Clark, US Environmental Protection Agency, Region 1	Date
Project Officer (USEPA):	_____	_____
	Jennie Bridge, US Environmental Protection Agency, Region 1	Date

Appendix 8

Recent Letters of Support

Recent Letters of Support (Please click on title to link to web files)

Times Record Editorial July 17, 2011 (pdf file 58 KB)
2011 Letters of support for Andro Upgrade proposal

Brunswick (pdf file 58 KB)

Topsham Resolution (pdf file 49 KB)
Support letter (pdf file 56 KB)

Lewiston (pdf file 52 KB)

Durham (pdf file 108 KB)

Auburn Sewage District (pdf file 44 KB)
Brunswick Topsham Land Trust (pdf file 128 KB)

**OPINION > LETTERS****Another year of data, now what?**[Print Page](#)

Published:
Friday, July 16, 2010 2:11 PM EDT

When the Maine Board of Environmental Protection rejected in February 2009 upgrading the water quality classification for the lower Androscoggin River from Class C to Class B, it gave this as its reason: "More data is needed to support a change in the classification."

Never mind that the section of the Androscoggin River from Worumbo Dam in Lisbon Falls to its mouth in Merrymeeting Bay by then had been actively monitored by well-trained volunteers of the Friends of Merrymeeting Bay for 10 years. Or that the data they collected showed that for six years the lower Androscoggin had been meeting Class B dissolved oxygen standards and "nearly always" had met Class B bacteria level standards.

"More data is needed" — which is a polite bureaucratic way of saying "Come back later ... and maybe we'll consider it then."

The BEP's refusal begs the question: Who benefits from delaying upgrading the lower Androscoggin to the Class B standard that six years of data show is already being met more often than not?

It's not the people who swim, fish, canoe or kayak on that stretch of river. They would vigorously argue in favor of a higher standard because it means the river that inspired the 1972 federal Clean Water Act is that much closer to being healthy again. They place a high value on the return of bald eagles and osprey to that stretch of river; they welcome its resurgence of fish species that once roiled its waters by the hundreds of thousands.

Nor is it the municipalities along that stretch of river, who've spent millions upgrading their sewage treatment plants and sewer lines precisely because their citizens want to do what's right for the river. Auburn, Lewiston, Durham, Topsham, Brunswick, all wrote letters of support in for Friends of Merrymeeting Bay's 2009 petition to upgrade the lower Androscoggin to a Class B river.

They were joined by Androscoggin River Alliance, Brunswick-Topsham Land Trust, Merrymeeting Audubon Society, the Conservation Law Foundation, Natural Resources Council of Maine, Friends of Casco Bay, Maine Audubon, Maine Rivers, Atlantic Salmon Foundation and a number of private citizens — all writing letters of support.

So who benefits from the Androscoggin being kept a Class C river, instead of a Class B?

Anyone with even a casual understanding of Maine history — specifically, the power the paper and pulp industries have had over the decades in guiding our environmental policies — might identify paper companies with mills upriver in Jay and Rumford as prime suspects.

But if Class B standards are currently being met — as six years of data suggested — it would mean that existing industries along the river already are meeting clean water requirements. Presumably, then, they have nothing to fear and would not have to spend additional money to accomplish the upgrade.

No matter, the BEP made its ruling and called upon citizen groups such as Friends of Merrymeeting Bay and the Department of Environmental Protection "to work cooperatively to obtain the data necessary" to justify reclassification of the lower Androscoggin to Class B standards.

Well, that's exactly what took place last year, from April to mid-October. Friends of Merrymeeting Bay volunteers, working closely with the DEP, increased the frequency of sampling from monthly to every other week. They increased the sampling sites from three to 10.

The results verified the previous finding that the lower Androscoggin River consistently meets Class B standards for dissolved oxygen and E. coli bacteria.

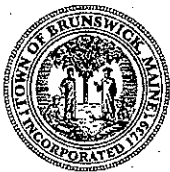
What, then, are we waiting for? Isn't the point of federal and state clean water laws to improve water quality? Shouldn't the Department of Environmental Protection and its board be leading that charge?

Instead, they, along with the Legislature's Natural Resources Committee, seem content to regard the lower Androscoggin "the poor stepchild of Maine's rivers" — as Ed Friedman, chairman of Friends of Merrymeeting Bay, so aptly expressed in his testimony seeking the upgrade in 2009.

letters@timesrecord.com

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[x] Close Window



Town of Brunswick, Maine

INCORPORATED 1739
OFFICE OF THE TOWN MANAGER

GARY L. BROWN, MANAGER

28 FEDERAL STREET
BRUNSWICK, MAINE 04011
TELEPHONE 725-6659
FAX # 725-6663

March 2, 2010

Honorable Seth Goodall
Honorable Robert Duchesne
Natural Resources Committee
Cross State Office Building, Room 214
3 State House Station
Augusta, ME 04333

Dear Senator Goodall, Rep. Duchesne & members of the Natural Resources Committee:

At their meeting on March 1, 2010, the Brunswick Town Council decided unanimously to update their letter of support from September 15, 2008, for reclassification of the lower Androscoggin River between Durham Boat Launch or Worumbo Dam to its mouth in Merrymeeting Bay, from Class C to Class B, as proposed by Friends of Merrymeeting Bay (FOMB).

Last summer, at the request of your committee, FOMB, in cooperation with the DEP, conducted intensive water quality monitoring on this river segment, increasing from their earlier protocols both number of sample sites and sampling frequency. FOMB data gathered in 2009 supports their previous upgrade proposal, which we recommended in our 2008 letter. In that the recent more thorough data set also shows the river in attainment of Class B conditions, we have no hesitation in our continued support of the upgrade.

Reclassification will result in the maintenance of Class B standards, which FOMB data clearly show continue to be met on this river section. Reclassification will bring the river into compliance with the law [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.*"], providing the river with increased protection against future degradation and enable its condition to continually improve.

As you know, classification upgrades are appropriate where it is socially or ecologically desirable to attain higher standards and when the technological and financial capacity exists to achieve those higher standards within a reasonable time. Because the river already meets Class B standards (i.e., it is clearly technologically and financially feasible to meet them) and because there are also clear social and economic benefits from a cleaner river, the requested classification is appropriate.

The experience of other communities around the nation has shown time and again the tremendous potential for social, recreational, environmental and economic benefit from river restoration.

Therefore, on behalf of the Brunswick Town Council, we implore the Natural Resources Committee to send to the full legislature as soon as possible, legislation proposing a reclassification of this lower Androscoggin river segment from Class C to Class B.

Your kind and prompt consideration of our request is sincerely appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Gary L. Brown".

Gary L. Brown
Town Manager

cc: Brunswick Town Council
FOMB

RESOLUTION OF THE BOARD OF SELECTMEN
OF THE TOWN OF TOPSHAM

Whereas, since 1750 Topsham has benefited from the wild power of the Androscoggin; and

Whereas, due to his love for the Androscoggin, Senator Muskie saw the need for, and is generally recognized as the Congressman most responsible for the drafting and passage of the Federal Clean Water Act; and

Whereas, sadly, the Androscoggin has not been accorded the protections of the Clean Water Act and fails to meet minimal environmental standards; and

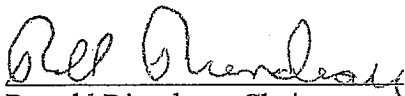
Whereas, it is in the clear social, recreational, environmental and economic interest of the State of Maine and of the communities which are situated near to it that the Androscoggin be accorded all of the benefits and entitlements of the Clean Water Act and that the provisions of the Act be strictly enforced on behalf of the River.

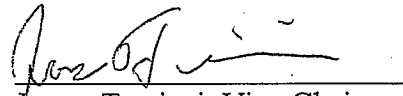
NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF SELECTMEN OF THE TOWN OF TOPSHAM AS FOLLOWS:

The State of Maine should take all necessary actions to ensure that the Androscoggin River receives the same protection as that accorded to the other rivers in the State of Maine.

The Board of Selectmen shall support the Androscoggin River Alliance in its efforts to restore the Androscoggin to a condition which will enable the citizens of Topsham to enjoy all of the benefits which the River can provide to them. The Board shall offer this Resolution to demonstrate such support.

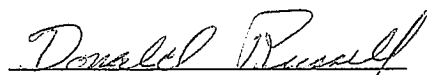
Adopted by the Board of Selectmen of the Town of Topsham by the vote of its members on this 4th day of February, 2010.


Ronald Riendeau, Chairman


James Trusiani, Vice Chair


Steve Edmondson


Sandra Consolini


Donald Russell



Office of the Town Manager
100 Main Street
Topsham, ME 04086

James L. Ashe
Town Manager
Phone: 207-725-5821
Fax: 207-725-1731
jashe@topshammaine.com

March 5, 2010

Senator Seth Goodall
Representative Robert Duchesne
Natural Resources Committee
Cross State Office Building, Room 214
3 State House Station
Augusta, ME 04333

Dear Sen. Goodall, Rep. Duchesne & members of the Natural Resources Committee,

At their meeting on March 4, 2010, the Topsham Selectmen decided unanimously to update their letter of support from September 18, 2008 for reclassification of the lower Androscoggin River between Durham Boat Launch or Worumbo Dam to its mouth in Merrymeeting Bay, from Class C to Class B, as proposed by Friends of Merrymeeting Bay (FOMB).

Last summer at the request of your committee, FOMB in cooperation with the DEP conducted intensive water quality monitoring on this river segment increasing from their earlier protocols both number of sample sites and sampling frequency. FOMB data gathered in 2009 supports their previous upgrade proposal which we recommended in our 2008 letter. In that the recent more thorough data set also shows the river in attainment of Class B conditions, we have no hesitation in our continued support of the upgrade.

Reclassification will result in the maintenance of Class B standards, which FOMB data clearly show continue to be met on this river section. Reclassification will bring the river into compliance with the law [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.*"], providing the river with increased protection against future degradation and enable its condition to continually improve.

As you know, classification upgrades are appropriate where it is socially or ecologically desirable to attain higher standards and when the technological and financial capacity exists to achieve those higher standards within a reasonable time. Because the river already meets Class B standards (i.e., it is clearly technologically and financially feasible to meet them) and because there are also clear social and economic benefits from a cleaner river, the requested classification is appropriate.

The experience of other communities around the nation has shown time and again the tremendous potential for social, recreational, environmental and economic benefit from river restoration.

Therefore, on behalf of the Topsham Board of Selectmen, we implore the Natural Resources Committee to send to the full legislature as soon as possible, legislation proposing a reclassification of this lower Androscoggin river segment from Class C to Class B.

Your kind and prompt consideration of our request is sincerely appreciated.

Sincerely,

James Ashe
Town Manager

Cc: Topsham Board of Selectmen
FOMB



Executive Department
Laurent F. Gilbert, Sr.
Mayor



February 26, 2010

Senator Seth A. Goodall, (Chair)
Joint Standing Committee on Natural Resources
100 State House Station
Augusta, ME 04333-0100

RE: Reclassification of the Androscoggin River

Dear Senator Goodall:

I am writing on behalf of the City of Lewiston. In the fall of 2008, the City supported a petition submitted by Friends of Merrymeeting Bay (FOMB) to reclassify the the Androscoggin River from the Durham boat launch or Worumbo Dam to its mouth at Merrymeeting Bay from Class C to Class B.

LD 330 Section 24 passed in 2009, required additional water quality data be collected on the lower Androscoggin to substantiate and support the classification upgrade. We understand from April-October of 2009 this additional data was collected. This Friends of Merrymeeting Bay (FOMB) effort was done in cooperation with DEP partly under the auspices of their Volunteer River Monitoring Program (VRMP). We also understand a report will be presented to the Natural Resources Committee next week outlining the results of the effort. FOMB reports results of the intensive monitoring supports the previous request to upgrade this section of the Androscoggin River from Class C to Class B. More than one hundred samples were taken during the period in 2009 and the water quality results statistically support the recommendation to upgrade this section of the river.

As stated in the October 1, 2008 letter to Ernest Hilton (then Chair of the Board of Environmental Protection), The taxpayers of the City of Lewiston have invested millions of dollars into the effort to clean up the river. These investments have occurred at a time when every dollar paid by the public is increasingly difficult to part with. Those investments have come through the City's aggressive combined sewer overflow (CSO) program and the sewer user fees going directly to our jointly owned wastewater treatment plant. Not only does the City of Lewiston value the river and understand the potential benefit of this request, we have demonstrated our financial commitment to the same. It is gratifying to see the data results demonstrate our efforts are working!

Again, as stated in 2008, we further understand classification upgrades are appropriate where it is socially or ecologically desirable to attain higher standards and when the

technological and financial capacity exists to achieve those higher standards within a reasonable time. Given that the river already meets Class B standards and because there is also clear social and ecological benefit from a cleaner river, the requested classification appears appropriate. The experience other communities around the nation has shown time and again the tremendous potential for social, recreational, environmental and economic benefit from river restorations.

We understand that such an upgrade request, given the current conditions that have been measured, would not require any additional financial impact, now or in the future, on the citizens of our community. If that understanding is correct on behalf of the City, we encourage the Committee to move forward with the reclassification of the Androscoggin River below Lewiston/Auburn to Class B.

Sincerely,



Laurent F. Gilbert Sr.

Mayor

To: Ernest Hilton, Chair
Maine Board of Environmental Protection

From: Board of Selectmen, Durham, Maine

Re: Reclassification of the Androscoggin River pursuant to
38 MRSA, secs. 464 and 465

Date: September 16, 2008

The Board of Selectmen of the Town of Durham is pleased to advise you of its enthusiastic support of the reclassification of the Androscoggin River from the Durham Boat launch or Worumbo Dam to its mouth at Merrymeeting Bay from Class C to Class B as set forth in the petition of the Friends of Merrymeeting Bay.

Reclassification will result in the maintenance of Class B standards that are presently being met in this section of the river as well as in other sections. Reclassification will also provide the river with increased protection against degradation in the future that will enable its condition to continue to improve.

As you know, upgrades to reclassification are appropriate where it is socially or ecologically desirable to attain higher standards and when the technological and financial capacity exists to achieve those higher standards within a reasonable time.


In light of the tremendous potential for social, recreational, environmental and economic benefit to be derived by the entire river valley, and in particular the Town of Durham, from an improved river, and the fact that the data shows the river presently attains Class B status, demonstrating that it is clearly technologically and financially feasible to attain Class B status, the requested reclassification is appropriate.

Therefore, on behalf of the Town of Durham, we, the Board of Selectmen, do hereby implore the Board of Environmental Protection to approve the reclassification of the Androscoggin River to Class B at your meeting now scheduled for September 18, 2008.

Your kind consideration of this request is sincerely appreciated.

Board of Selectmen
for the Town of Durham

By: 

By: 

By: 



AUBURN SEWERAGE DISTRICT

268 COURT ST. - P.O. BOX 414

AUBURN, MAINE 04212-0414

September 17, 2008

Chairman Ernest Hilton
Maine Board of Environmental Protection
17 State House Station
Augusta, ME 04333

RE: Proposal to reclassify a portion of the Androscoggin River

Dear Mr. Hilton and Members of the Board,

This letter is written neither in support or opposition to the proposal submitted by the Friends of Merrymeeting Bay (FOMB) to reclassify, from Class C to Class B, the lower Androscoggin River from its mouth in Merrymeeting Bay to the Durham Boat Launch or Worumbo Dam. We strongly believe FOMB should be commended for the interest and efforts to collect water quality data along this section of river with the goal of demonstrating that Class B standards are being met.

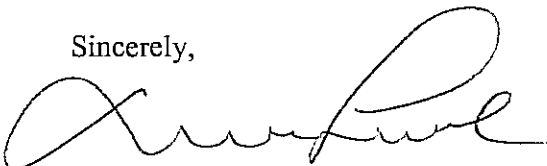
We also believe that water quality on sections of the Androscoggin River currently meet or exceed the current classification and meet those of Class B. We also believe the Board of Environmental Protection needs to give strong consideration to reclassifying portions of the Androscoggin River. To this end we believe the Maine Department of Environmental Protection should, at minimum, immediately establish a water quality monitoring program on the Androscoggin River from Merrymeeting Bay to the base of Gulf Island Dam.

The Cities of Lewiston and Auburn have invested millions of dollars in recent years in efforts to improve water quality of the Androscoggin River. In addition millions of public and private dollars have been invested in public access trails, and numerous private investments along the river are also evident. We recognize that clean rivers enhance the local economy and vitality of all communities surrounding them. A clean, healthy river attracts people, new businesses, and increases property value.

The original estimated cost of the separation improvements required in Auburn as detailed in our CSO Master Plan (prepared in 1999) was \$19.2 M. Through December 31, 2007, capital improvements have exceeded \$13M coming from local property taxes and sewer user fees. This investment has separated nearly 25 miles of sewers, or 81% of the projected full separation effort. Completion of the separation work in Auburn is projected for the year 2013.

On behalf of the Trustees of the Auburn Sewerage District we wish to be on record as neither supporting nor opposing the FOMB proposal to reclassify the lower Androscoggin River from Class C to Class B. We strongly urge the MDEP to immediately establish a water quality monitoring program on the Androscoggin River from Merrymeeting Bay to the base of Gulf Island Dam to be prepared with the data to reclassify the Androscoggin River from Class C to Class B in the very near future.

Sincerely,



Normand R. Lamie, P.E.
General Manager
Auburn Sewerage District



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Brad Saloon, Vice President
Dana Cary, Treasurer
Heidi Dunbar, Secretary

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Ted Allen
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Rick Wilson

September 16, 2008

Ernest Hilton, Chairman
Maine Board of Environmental Protection
17 State House Station
Augusta, ME 04333

Re: Reclassification of the Androscoggin River pursuant to 38 MRSA, secs. 464 and 465

Dear Chairman Hilton,

The Board of Directors of the Brunswick-Topsham Land Trust is pleased to advise you of its support for the reclassification of the Androscoggin River from the Durham Boat launch or Worumbo Dam to its mouth at Merrymeeting Bay, from Class C to Class B, as set forth in the petition of the Friends of Merrymeeting Bay (FOMB). The BTLT Board voted in favor of this reclassification at its September 15, 2008 board meeting.

Reclassification will result in the maintenance of Class B standards, which FOMB data show are presently being met in this section of the river. Because the river already meets Class B standards, the BTLT Board of Directors believes the requested reclassification is appropriate and desirable to help ensure that the Androscoggin River's water quality will continue to improve into the future.

The Androscoggin River is a significant natural resource in the communities of Brunswick and Topsham and it is important to the BTLT that its water quality and associated wildlife habitat and recreational resources remain healthy and improve into the future. The BTLT holds two easements on the banks of the Androscoggin River in Brunswick totaling 36 acres as well as 40-acre Cow Island located in the middle of the river between Brunswick and Topsham. Because of this land ownership, we are particularly vested in maintaining and improving the health of the Androscoggin River.

On a personal note, having grown up on the Androscoggin River in Turner and Auburn in the 1970s and 1980s, I can attest firsthand to how far the health of the river has come; yet, as I continue to live on the river today (now in Topsham), I am often reminded of how far it still has to go. When I am out on


(over)

the river or walking on its banks with my young children, I will frequently get questions like -- "why can't we go swimming in the river" or "why can't we eat that fish". These innocent questions remind me that even though we have come so far in cleaning up this beautiful river, there is still a lot to be done.

Therefore, on behalf of the Brunswick-Topsham Land Trust Board of Directors, I would like to urge the Board of Environmental Protection to approve the reclassification of the Androscoggin River (from the Durham Boat launch or Worumbo Dam to its mouth at Merrymeeting Bay) from Class C to Class B at your meeting scheduled for September 18, 2008.

Please contact me with any questions. Your consideration of this request is sincerely appreciated.

Sincerely,



Angela Twitchell
Executive Director

Appendix 9
NMI Studies - Economic Benefits of Clean Rivers

NEWS RELEASE – September 13, 2006
Northeast-Midwest Institute, Washington DC

Buffalo Area Homeowners to Benefit from River Clean-up

Contact: Nicole Mays, Northeast-Midwest Institute (202 584 3378)
Dr. John Braden, University of Illinois (217 333 5501)

Buffalo, NY. Residential property values near the Buffalo River could increase by as much as \$140 million if contamination in the river is eliminated, according to a study conducted by the University of Illinois and the Northeast-Midwest Institute.

Findings of the study will be officially released September 15, 2006 at a community forum in Buffalo. The forum will be open to the public and feature a presentation by Dr. Braden concerning the results of the two-year study. Other speakers include Buffalo Mayor Byron Brown; State Senator Mark Schroeder; Mary Beth Giancarlo Ross of U.S. EPA's Great Lakes National Program Office; Abby Snyder of New York State's Department of Environmental Conservation; Jill Spisiak Jedlicka with Buffalo Niagara Riverkeeper; Helen Domske with New York Sea Grant and University at Buffalo; and Nicole Mays of the Northeast-Midwest Institute.

Pollution from past industrial and municipal discharges and disposal of waste earned the Lower Buffalo River designation as one of 43 "Great Lakes Areas of Concern (AOC)" by the International Joint Commission, the U.S.-Canadian government organization concerned with water quality. The major sources of pollution are contaminated bottom sediments and non-point source pollution. Contaminants of concern include PCBs, PAHs, heavy metals and industrial organics. PCBs (polychlorinated biphenyls) are known to affect human reproduction, fetal development, and neurological functions, and harm fish and other aquatic species.

Through a two year study, the Northeast-Midwest Institute in Washington, D.C. and economists from the University of Illinois and Georgia State University have gauged the economic value to local homeowners of clean-up of the Buffalo River AOC. The study focuses on the benefits to homeowners specifically in Buffalo, Cheektowaga, Lackawanna, Hamburg, and West Seneca, as well as Blaisdell and Sloan. The results of the study suggest that eliminating the pollution would make the area a more desirable place to live and increase property values.

Researchers collected data from housing sales in Erie County in the years 2002 through 2004, and directly surveyed 850 recent home buyers in Erie County. Results of the study of housing sales data indicate that the polluted state of the river currently is depressing single-family, owner-occupied property values by \$80 to \$140 million¹, or six to nine percent of the assessed residential property values in the area studied. Clean-up could be expected to raise the property values commensurately. The negative effects of the pollution appear concentrated near the river and to its south. Further to the north in Buffalo and Cheektowaga, property values seem to be affected more by other industrial areas, highways, and rail corridors than by the pollution in the Buffalo River.

These housing sales data findings were further bolstered by homeowner responses to direct surveys on their willingness to pay more for residential properties if the AOC were cleaned up. Based on the responses to the surveys, residents within five miles both north and south of the river would be willing to pay on average approximately 15% more for homes if the contaminated area were cleaned up. Relative to the median property value in the area, this translates into a \$543 million addition to the assessed values of current properties.

The estimated benefits of Buffalo River clean-up generated in the study apply only to single-family residential property owners living within five miles of the river. However, preliminary analysis of multi-family properties suggests that current prices are depressed proportionately more than for single-family homes and could benefit from river cleanup. In addition, river improvements might attract new residents and businesses to the area.

The study was funded by the Great Lakes National Program Office, U.S. Environmental Protection Agency and the College of ACES, University of Illinois at Urbana-Champaign.

¹ All dollar values are expressed in year 2004 (4th quarter) purchasing power. Subsequent inflation in housing prices would increase the current dollar values.

Disclaimer: Until the methods and results described here have been reviewed by qualified scientific peers and published in the peer-reviewed literature, they must be considered preliminary. The opinions, findings, and conclusions of this study are solely those of the authors and do not necessarily reflect the views of the sponsors.

NEWS RELEASE – September 19, 2006
Northeast-Midwest Institute, Washington DC

Sheboygan Area Homeowners to Benefit from River Clean-up

Contact: Nicole Mays, Northeast-Midwest Institute (202 584 3378)
Dr. John Braden, University of Illinois (217 333 5501)

Sheboygan, WI. Residential property values near the Sheboygan River could increase by as much as \$108 million if contamination in the river and neighboring land areas were eliminated, according to a study conducted by the University of Illinois and the Northeast-Midwest Institute.

Findings of the study will be officially released September 21, 2006 at a community forum in Sheboygan. The forum will be open to the public and feature a presentation by Dr. Braden concerning the results of the two-year study. Other speakers include Sheboygan Mayor Juan Perez; State Senator Joe Leibham; Marc Tuchman of U.S. EPA's Great Lakes National Program Office; James McNelly of Wisconsin's Department of Natural Resources; Jon Gumtow with the Sheboygan River Basin Partnership; and Nicole Mays of the Northeast-Midwest Institute.

Pollution from past industrial discharges and disposal of waste earned the Sheboygan River designation as one of 43 "Great Lakes Areas of Concern (AOC)" by the International Joint Commission, the U.S.-Canadian government organization concerned with water quality. The major sources of pollution are contaminated bottom sediments and non-point source pollution. Contaminants of concern include PCBs, PAHs, and heavy metals. PCBs (polychlorinated biphenyls) are known to affect human reproduction, fetal development, and neurological functions, and harm fish and other aquatic species.

Through a two year study, the Northeast-Midwest Institute in Washington, D.C. and economists from the University of Illinois and Georgia State University have gauged the economic value to local homeowners of clean-up of the Sheboygan River AOC. The study focuses on the benefits to homeowners specifically in Sheboygan, Sheboygan Falls, Kohler, and the surrounding townships. The early results of the study suggest that eliminating the pollution in the AOC would make neighboring towns a more desirable place to live and increase property values significantly.

Researchers collected data for housing sales in Sheboygan County in the years 2002 through 2004, and directly surveyed 850 recent home buyers in Sheboygan County. Results of the study of housing sales data indicate that the polluted state of the river currently is depressing single-family, owner-occupied property values by \$8 to \$108 million¹, or one to seven percent of the assessed residential property values in the area studied. Clean-up could be expected to raise the property values commensurately. The negative effects of the pollution appear greatest close to the river and diminish with distance from the river, with properties east of the Waelderhaus Dam suffering the highest reduction in values.

These housing sales data findings were further bolstered by homeowner responses to direct surveys on their willingness to pay more for residential properties if the AOC were cleaned up. Based on the responses to the surveys, residents within five miles both north and south of the river would be willing to pay on average approximately 10% more for homes if the contaminated area if the area were cleaned up.

The estimated benefits of Sheboygan River AOC clean-up generated in the study apply only to single-family residential property owners living within five miles of the river, though cleanup of the AOC east of the Waelderhaus Dam would likely have a positive effect on other property types as well. Property value increases are however, only one of the ways that benefits from remediation of the Sheboygan River AOC would be realized by local residents. Clean-up might also attract new residents and businesses to the area.

The study was funded by the Great Lakes National Program Office, U.S. Environmental Protection Agency and the College of ACES, University of Illinois at Urbana-Champaign. The results are preliminary and will be refined through further analysis.

¹ All dollar values are expressed in year 2004 (4th quarter) purchasing power. Subsequent inflation in housing prices would increase the current dollar values.

Disclaimer: Until the methods and results described here have been reviewed by qualified scientific peers and published in the peer-reviewed literature, they must be considered preliminary. The opinions, findings, and conclusions of this study are solely those of the authors and do not necessarily reflect the views of the sponsors.

Appendix 10

Applied Biomonitoring Qualifications

Applied Biomonitoring
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Applied Biomonitoring is an environmental consulting firm specializing in innovative, state-of-the-art environmental monitoring and assessment services coupled with timely client communication and scientific credibility. We have conducted numerous field studies to support projects for federal regulatory agencies, state and local authorities (including Maine DEP) and private industry.

Michael H. Salazar, Principal of Applied Biomonitoring, has been a leader in state-of-the-art environmental monitoring methodology with over 30 years of experience. Michael Salazar, in collaboration with his associate Sandra Salazar, have the ability to provide clients a wide range of environmental services, including monitoring and assessment, work plan development, experimental planning and design, data analysis and interpretation, peer review, and meeting facilitation. Our primary area of expertise is analysis and interpretation of tissue, water and sediment chemistry data with respect to chemical bioavailability and associated effects on aquatic organisms.

Applied Biomonitoring is recognized as a national and international expert in characterizing and understanding the processes of bioaccumulation and associated biological effects. We are also leaders in conducting field bioassays with caged bivalves. This unique experience and expertise to design, plan, and conduct in-situ field assessments has been developed over the past 30 years by conducting more than 40 transplant studies.

In addition to services directly associated with monitoring and assessment, Applied Biomonitoring has conducted numerous peer reviews, prepared countless technical reports and guidance manuals, and provided oversight and management on many high-profile projects. Applied Biomonitoring has the unparalleled capability of conducting on-the-spot literature searches for many environmental issues. An electronic database of over 15,000 citations with an emphasis on exposure and effects measurements and assessment techniques is maintained at the Applied Biomonitoring offices.

Our primary fields of experience and expertise include:

- Work plan & criteria development
- Environmental monitoring & assessment
- Bioaccumulation & bioeffects interpretation
- In-situ field studies with caged bivalves
- Ecological risk and damage assessment
- Sediment evaluation
- Teaching & technology transfer
- Meeting facilitation
- Electronic database & literature summaries
- In-situ temperature monitoring

Environmental Monitoring & Assessment

Applied Biomonitoring has provided an extensive review of the EPA Region 10 Interim Sediment Quality Guidelines for tributyltin (TBT) and participated in a number of discussion groups to evaluate that document and is frequently contacted by the Seattle districts of EPA and the COE for technical guidance. We have been contracted by EPA to evaluate updates of Ambient Water Quality Criteria for TBT, cadmium, and copper, and contracted by Environment Canada to review two TBT assessment documents. As part of a project to evaluate the potential effects of ammonia for the City of Winnipeg using caged bivalves, Applied Biomonitoring conducted an intensive review of the EPA Ambient Water Quality Criteria for ammonia. Most recently, Applied Biomonitoring has focused on bivalve bioaccumulation, bioeffects, and pathways of exposure for metals. We have developed extensive working expertise on the relative differences in metal accumulation among various marine and freshwater mussel species.

Field Bioassays, Field Monitoring and Toxicity Testing

Applied Biomonitoring is a recognized leader in the development of *in-situ* monitoring techniques that permit synoptic collection of chemical exposure and biological effects data. Since the first pilot study conducted in 1973, Mr. Salazar has conducted 60 transplant studies using 18 marine, estuarine, and freshwater bivalve species. Results of these studies have been used by the US Navy in their risk assessment for TBT, NOAA and the US EPA in their evaluations of Superfund sites in Puget Sound, Washington; Tampa, Florida, Sault Ste. Marie, Michigan, and the Sudbury River in Massachusetts, and most recently by the Washington State Department of Natural Resources for a programmatic evaluation of herring stocks in Puget Sound.

The *in-situ* transplant approach has become a well-established monitoring tool accepted by both industry and regulatory agencies. Both Mr. and Mrs. Salazar have developed the standard protocols for conducting field studies with caged bivalves. This extensively peer reviewed document appeared for the first time in American Society for Testing and Materials (ASTM) 2001 Annual Book of Standards. The methods have also been accepted by the American Public Health Association in their Standard Methods for the Examination of Water and Wastewater, and Environment Canada for monitoring pulp and paper and mining effluents. Applied Biomonitoring has worked with scientists at Environment Canada's St. Lawrence Center for the past 6 years to develop environmental monitoring and assessment systems for endocrine disrupting chemicals. Biomarkers have been developed to quantify estrogenic effects and a benthic cage was developed to assess long-term effects under environmentally realistic conditions.

Relevant Project List:

- Lynn Lake Peer Review (2009)
- Duwamish River Mussel Study (2009)
- Motiva Oil Spill Assessment & Review (2006, 2007)
- Blanchard Seafood Study (2006)
- Puget Sound Naval Shipyard Caged Mussel Study (2005)
- Devil's Lake Canal Diversion (2005)
- Lynn Lake, Manitoba, Canada Caged Mussel Study (2004, 2005, 2009)

- Review of TBT Documents for Environment Canada (2004)
- Review of EPA Ambient Water Quality Criteria for Copper (2003)
- Kennebec River, ME Caged Mussel Study (2003)
- Androscoggin River, ME Caged Mussel Study (2003)
- Santa Barbara Shell Mound Study (2003)
- Bear Creek, WA Mussel Study (2003)
- Capitol Regional District Tissue Residue Effects Database (2002)
- San Diego Bay Dietary Copper Study (2002)
- Montreal Dietary Copper Study (2002)
- Developing a Benthic Cage for Long-term, In-situ Tests with Freshwater and Marine Bivalves (2002)
- Bonney Lake Fluoride (2002)
- Assessing Acute WET Test Variability (2001)
- Assist in Sampling Plan Development and Interpret Tissue Residues of PAHs (2001)
- PCB Site Monitoring (2001, 2002, 2003)
- Port Valdez Monitoring (2001)
- Review of Interlaboratory Variability Study, EPA Short-term Chronic & Acute Whole Effluent Toxicity Test Methods (2001)
- Environmental Monitoring for Sewage Treatment Plant (2001)
- Review of EPA Ambient Water Quality Criteria for Cadmium (2000)
- Caged Mussel Study in Augusta, ME (2000)
- Caged Clam Study at Sault Ste. Marie, MI (2000)
- Potential Toxicity and Risk to Aquatic Organisms and Human Health from Exposure to Fiberglass (2000)
- Caged Mussel Study at Cherry Point, WA (1998, 1999, 2000)
- City of Winnipeg Ammonia Study, Winnipeg, MB, Canada (1999)
- Environment Canada Effluent Monitoring Studies, Montreal, Canada (1999, 2000, 2001, 2002, 2003, 2004)
- Technical Review of Biomonitoring Study Work Plan for MCCDC Quantico, VA (1999)
- Critique of San Francisco Estuary Institute Mussel Watch (1999)
- Review of EPA Tissue Residue Effects Database (1998)
- Caged Bivalve Pilot Study at Port Alice, Vancouver Is, BC (1997)
- Caged Bivalve Pilot Study at Port Valdez, AK (1997)
- Critical Evaluation of Bivalve Mollusc Biomonitoring (1997)
- Review of EPA Ambient Water Quality Criteria for TBT (1997)