

Section 5-3 Hart Brook (City of Lewiston)

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

Overview

Hart Brook is listed on the MeDEP 2010 Integrated Water Quality Report as an impaired stream. As such, a draft total daily maximum load (TMDL) report has been completed for this brook. A Watershed Management Plan (WMP) has also been completed and approved. This project will be used to gather further data with which to monitor the water quality and comply with the Watershed Management Plan.

The project area will include the entire Hart Brook Watershed. Hart Brook is a small Class B urban stream located in Lewiston, Maine. The brook originates in the area of Pond Road, meanders through the Valley Section neighborhoods, the Industrial Park, the Goff Brook neighborhoods, crosses under I-95, and then follows River Road to its discharge point in the Androscoggin River. The brook is approximately 3.7 miles long and its watershed encompasses approximately 2200 acres, including residential, commercial, industrial, and undeveloped land.

The overall purpose of monitoring is to assess water quality as it pertains towards meeting water quality classification standards. Limited monitoring was done as part the TMDL and Watershed Management Plan development. The Clean Water Act requires that a TMDL, which is an assessment of impairments and pollutant loading reductions needed to meet water quality standards, be developed for impaired waters. Continued monitoring by the City will be used to assess current conditions and progress toward improvement.

Methods

The City of Lewiston monitored Hart Brook in 2011 at five sites (Table 5-3-1 and Figure 5-3-1). All of the sites are VRMP approved sites.

Table 5-3-1: City of Lewiston sampling sites at Hart Brook.

VRMP Site ID	Organization Site Code	Sample Location	Class
HART BROOK-HB-1-VRMP	HB-1	Pike Industries	B
HART BROOK-HB-2-VRMP	HB-2	Goddard Road	B
HART BROOK-HB-3-VRMP	HB-3	Olive Street	B
HART BROOK-HB-4-VRMP	HB-4	Westminster Street	B
HART BROOK-HB-5-VRMP	HB-5	Morningside Street	B

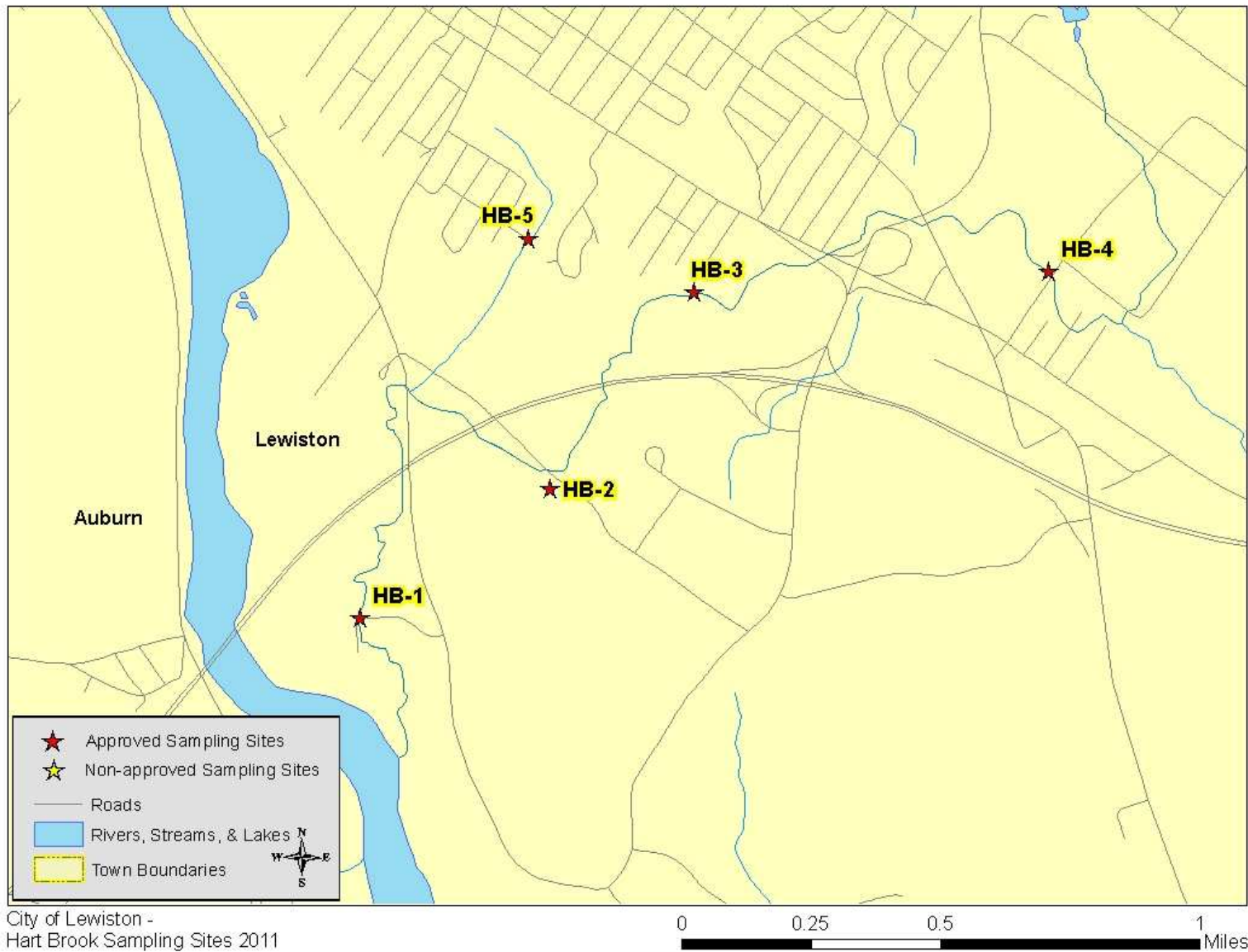


Figure 5-3-1: Map of City of Lewiston sampling sites at Hart Brook.

Monitoring was conducted from June through August 1-3 times per month. At each site, the monitors made direct measurements for water temperature and dissolved oxygen using a handheld YSI 550A meter. Conductivity was measured using an Oakton EC 11+ Testr conductivity pen. Due to high nutrient inputs and possible diurnal dissolved oxygen issues, monitoring was done in the morning and afternoon on most sampling dates. Morning sampling occurred between 7:30-9:00 am, and afternoon sampling between 1:00-3:00 pm.

Results

Refer to Appendices A-1 and A-2 in discussion of individual site data and trends, as well as graphed data (Figures 5-3-2 through 5-3-5), at the end of this section of the report.

Dissolved Oxygen

Dissolved oxygen was measured 5-6 dates at each of the five sampling sites (Table 5-3-2 and Table 5-3-3). On 3-4 dates, monitoring was done both in the morning and afternoon. Monitoring occurred from June to August. Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met.

Table 5-3-2: A summary of minimum, maximum, and average dissolved oxygen concentration (mg/l) values at City of Lewiston monitoring sites at Hart Brook.

Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
HB-1	Y	10	6.3	10.7	8.1
HB-2	Y	10	3.1	10.9	4.9
HB-3	Y	10	6.6	10.3	8.4
HB-4	Y	8	2.8	9.6	7.0
HB-5	Y	10	7.1	9.1	8.5

Table 5-3-3: A summary of minimum, maximum, and average dissolved oxygen saturation (%) values at City of Lewiston monitoring sites at Hart Brook.

Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
HB-1	Y	10	67.3	104.0	82.9
HB-2	Y	10	28.9	99.3	52.1
HB-3	Y	10	73.0	102.5	86.8
HB-4	Y	8	23.4	112.7	75.0
HB-5	Y	10	67.5	94.1	86.8

Dissolved oxygen concentrations measured at Hart Brook ranged from 2.8 mg/l to 10.9 mg/l. At site HB-1, the lowest readings occurred in July. Only 2 dates (both in July) had values below the Class B standard of 7.0 mg/l. All 3 sampling dates in July also had percent saturation below the Class B standard of 75% saturation. At site HB-2, all the values except for early June were well below the Class B standard. Percent saturation was also below standard for all dates, except for the early June and am mid-June sample events. Site HB-3 met standards for both concentration

and percent saturation on all dates, except for one sample event in late July. Site HB-4 met standards for both concentration and percent saturation on 4 of 8 sampling events. It did not meet standards from mid-June to mid-August, with the exception of the early July am and pm sample events. Site HB-5 met standards for concentration on all dates. It did not meet standard for percent saturation on only one date in early June.

Overall, dissolved oxygen was lowest at sites HB-2 and HB-4. Site HB-2 (which had the lowest values) is lower in the watershed, so may be experiencing cumulative effects of watershed development. Site HB-4 had the second worst dissolved oxygen. This site is furthest up in the watershed in an area of intense development. The reason for the better values at site HB-3 is not known, although it may be due to specific site conditions there (e.g. better flow). Site HB-1 is furthest down in the watershed and is much larger at this point, as well as it may perhaps be experiencing recovery as it goes through a wooded area. Site HB-5 is on another branch of the brook which may not be as highly impacted.

In regards to diurnal dissolved oxygen, this was not found to be a particular issue. To qualify as having a diurnal dissolved oxygen problem, dissolved oxygen must increase from the am to pm sampling by ≥ 2.0 mg/l. Sites HB-1 and HB-2 had the most significant swings in oxygen. Two dates at site HB-1 had a 1.0-1.6 mg/l increase and one date at site HB-2 had a 2.0 mg/l increase. Site HB-4 had very large increases in temperature from am to pm sampling times. Because warmer water holds less oxygen than cooler water, the large increases in temperature may have compensated for potential oxygen swings. Interestingly, dissolved oxygen at sites HB-4 and HB-5 generally decreased slightly in the pm sampling. It is expected that dissolved oxygen generally goes up during the day. Lastly, the time between the am and pm sampling events was only a 5-6 hour period. More significant changes may have been documented if sampling had taken place both earlier (well before 8:00 am) and later in the day.

Water Temperature

Temperature was measured 10 times at each of the five sampling sites (Table 5-3-4). Monitoring occurred from June to August. Maine's Regulations Relating to Temperature (06-096 CMR Chapter 582) require that discharge of pollutants not raise the temperature of any river and stream above the EPA criteria for indigenous species (23°C maximum and 19°C weekly average) or 0.3°C (0.5°F) above the temperature that would naturally occur outside a mixing zone established by the Board of Environmental Protection. Pollutant is defined in statute as many things including dirt and heat.

Table 5-3-4: A summary of minimum, maximum, and average temperature (°C) values at City of Lewiston monitoring sites at Hart Brook.

Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
HB-1	Y	10	12.8	19.2	16.9
HB-2	Y	10	12.8	20.0	17.2
HB-3	Y	10	12.5	19.1	17.3
HB-4	Y	10	12.8	27.4	19.7
HB-5	Y	10	12.6	18.5	16.0

Temperature measured at Hart Brook ranged from 12.5°C to 27.4°C (Celsius). Site HB-1 had moderate temperatures, ranging from 15.8-19.2°C from mid-June to August. Sites HB-2 and HB-3 were similar with mid-June to August temperature ranging from 15.9-20.0°C and 16.4-19.1°C respectively. Site HB-4 had the highest temperatures with ranges from 15.9-27.4°C from mid-June to August. The highest temperature recorded at this site was 27.4 °C (6/17/11) which was a 12.0°C increase from am to pm. This seems like it may be an error. However the site experienced large increases in temperature from am to pm on 2 other sampling dates. On 7/1/11, temperature increased from 17.0-26.5°C and on 8/12/11, it went from 16.4-24.1°C. Site HB-5 had slightly lower values overall compared to Sites HB-1 through HB-3. Temperature here ranged from 14.7-18.5°C from mid-June to August. Exclusive of Site HB-4, the other sites saw daytime temperatures increases from 0.6-3.9°C.

Specific Conductance

Specific conductance was measured 8-10 times at each of the five sampling sites (Table 5-3-5). Monitoring occurred from June to August. Specific conductance is related to the amount of dissolved materials in the water. While there are no numerical standards, a relationship exists between conductivity and chloride which has numerical criteria. In general, streams located in urban areas tend to have high specific conductance due to polluted urban stormwater runoff. This may also in large part be due to salt buildup in surface and groundwater from road maintenance practices.

Table 5-3-5: A summary of minimum, maximum, and average specific conductance (uS/cm) values at City of Lewiston monitoring sites at Hart Brook.

Site	Approved Site	# of Samples	Minimum Value	Maximum Value	Average Value
HB-1	Y	10	349	600	496
HB-2	Y	10	554	906	720
HB-3	Y	10	396	1063	792
HB-4	Y	8	486	1140	746
HB-5	Y	10	191	412	301

Most Maine streams and rivers in undeveloped watersheds have specific conductance values that are lower or much lower than 100 us/cm. All of the Hart Brook sites had high to extremely high conductivity values. Sites HB-5 had the lowest values and HB-1 the second lowest. It is likely that Hart Brook is being impacted by winter salt that may be getting into the groundwater.

Discussion and Recommendations

There are numerous sources of pollution and other stresses to the No Name Brook and Sucker Brook sites monitored by the No Name Pond Watershed Association that could potentially have an impact on water quality. Some of those sources of pollution and stress may include:

- Nonpoint source pollution (e.g., sewage systems, eroded soil, fertilizers, pesticides, heavy metals, petroleum residues, road salt, wildlife and pet feces) and polluted stormwater

originating from urban impervious surfaces (e.g., streets, parking lots, driveways, rooftops) (even though urban development and roads are fairly sparse in the watershed), agriculture, and forestry.

- Ponds and impoundments (which often create more pond-like aquatic habitat conditions that may have higher water temperatures and lower dissolved oxygen concentrations than free-flowing waters).
- Natural effects of wetlands (such as contributing waters to a stream/river that have low dissolved oxygen levels due to the decomposition of large amounts of organic matter, respiration of abundant plant matter, and low re-aeration rates that is characteristic of many wetlands).

The following are recommendations for future monitoring:

- Investigate the very high conductivity by tracking conductivity in the stream. This is done by walking the stream and taking conductivity readings along the way.
- Investigate the high temperatures at Site HB-4 and recommend mitigation.
- Continue monitoring at all stations to develop a long term trend database.

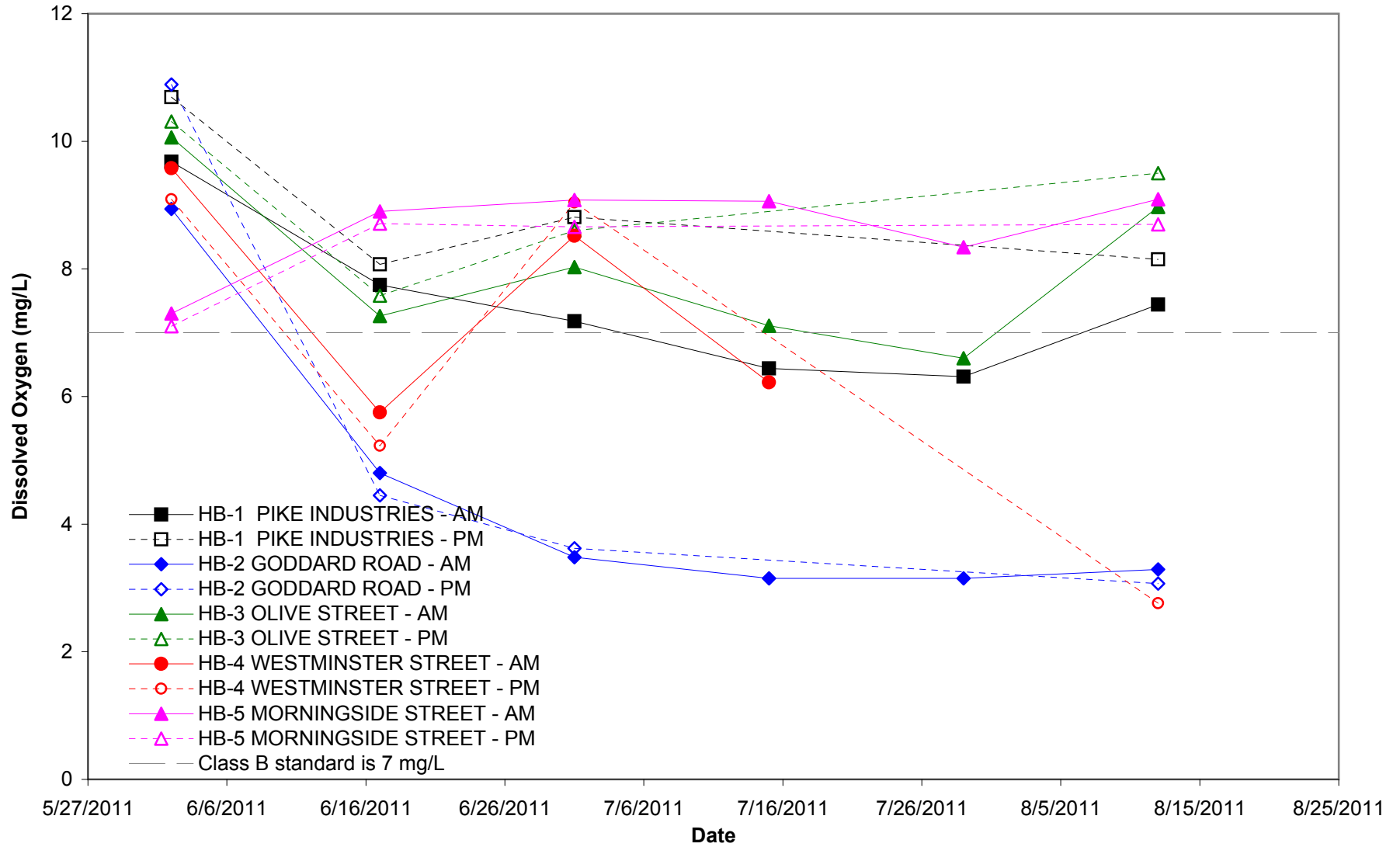


Figure 5-3-2. Dissolved oxygen concentrations at City of Lewiston approved monitoring sites on Hart Brook in 2011.

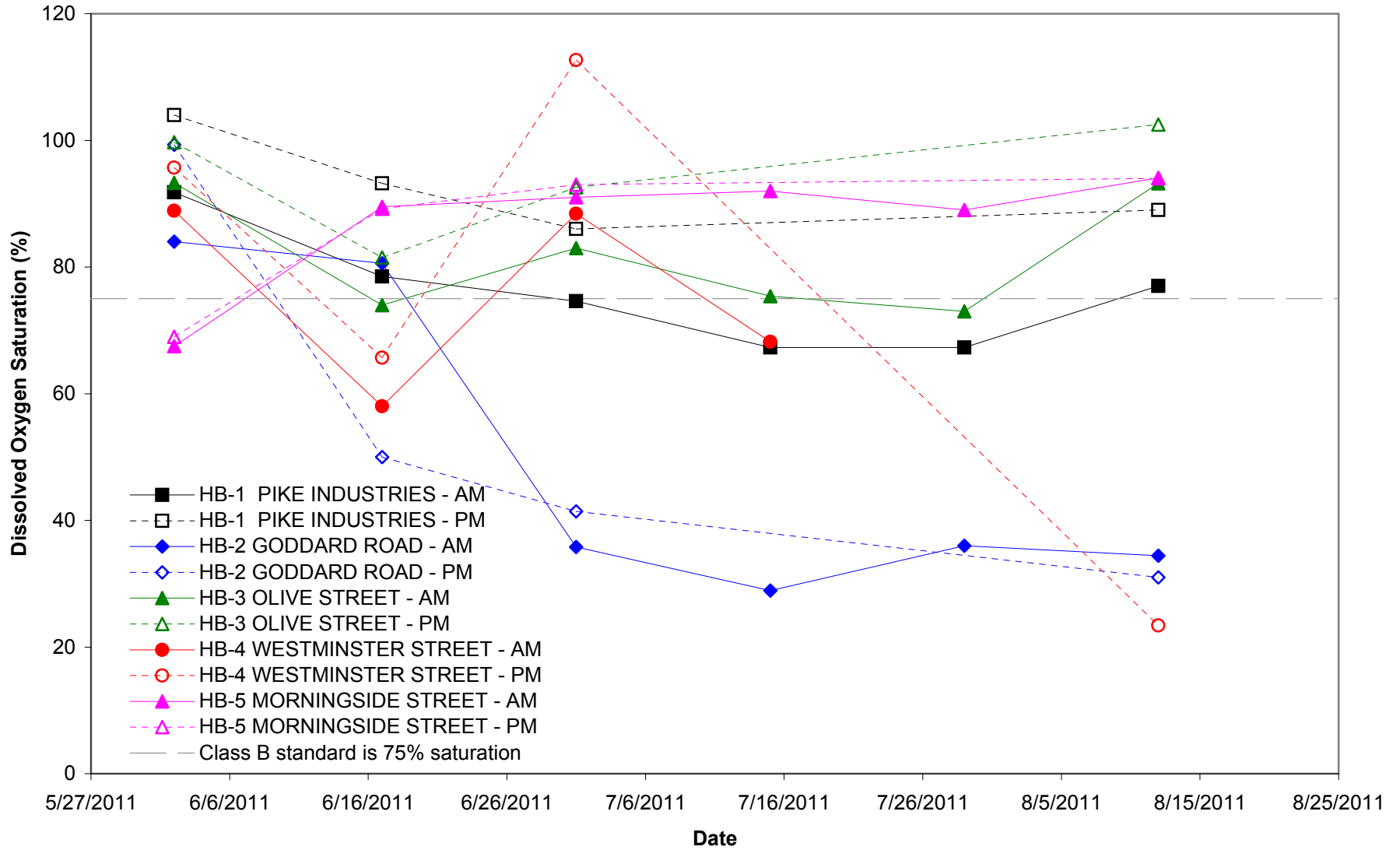


Figure 5-3-3. Dissolved oxygen saturations at City of Lewiston approved monitoring sites on Hart Brook in 2011.

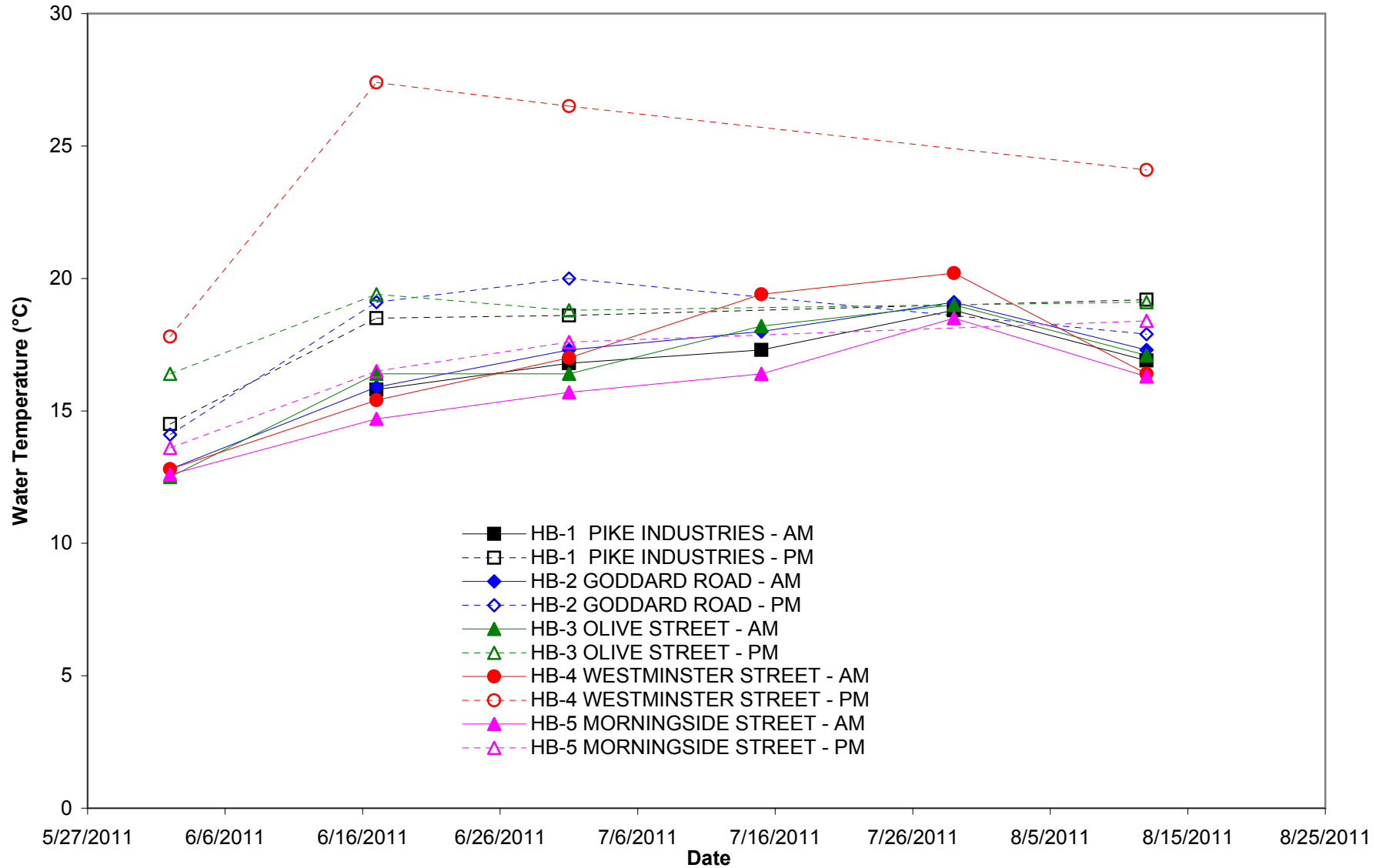


Figure 5-3-4. Water temperature at City of Lewiston approved monitoring sites on Hart Brook in 2011.

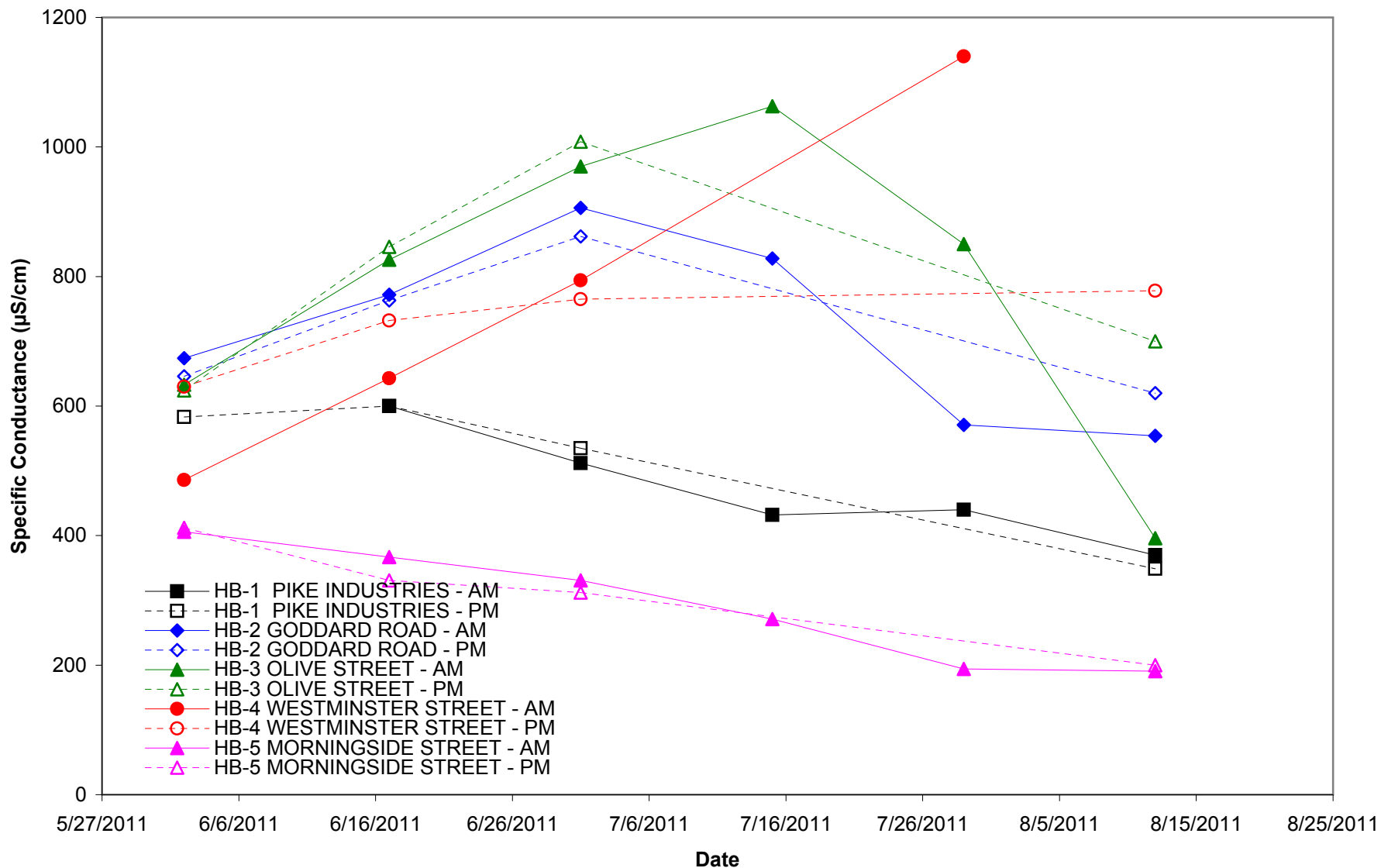


Figure 5-3-5. Specific conductance at City of Lewiston approved monitoring sites on Hart Brook in 2011.

Appendix A-1. 2011 water quality data for "Approved" and "Non-Approved" sites. Non-Approved sites do not yet meet official VRMP sample location criteria and/or require further inspection and review.

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

** "N" = normal environmental sample ; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "Turb" = turbidity

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

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	** D.O. Sat. (%)	** D.O. (MG/L)	** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/100ML)
Hart Brook - City of Lewiston (Approved Sites)														
HB-1 PIKE INDUSTRIES	HART BROOK-HB-1-VRMP	6/2/2011	9:00 AM	N			12.8	91.8	9.68	545				
HB-1	HART BROOK-HB-1-VRMP	6/2/2011	2:30 PM	N			14.5	104	10.69	583				
HB-1	HART BROOK-HB-1-VRMP	6/17/2011	8:00 AM	N			15.8	78.5	7.75	600				
HB-1	HART BROOK-HB-1-VRMP	6/17/2011	1:32 PM	N			18.5	93.2	8.07	600				
HB-1	HART BROOK-HB-1-VRMP	6/17/2011	1:32 PM	D				93.2	8.07	600				
HB-1	HART BROOK-HB-1-VRMP	7/1/2011	8:05 AM	N			16.8	74.6	7.18	512				
HB-1	HART BROOK-HB-1-VRMP	7/1/2011	2:30 PM	N			18.6	86	8.81	535				
HB-1	HART BROOK-HB-1-VRMP	7/15/2011	8:10 AM	N			17.3	67.3	6.44	432				
HB-1	HART BROOK-HB-1-VRMP	7/15/2011	8:10 AM	D			17.5	66.9	6.5	440				
HB-1	HART BROOK-HB-1-VRMP	7/29/2011	8:05 AM	N			18.8	67.3	6.31	440				
HB-1	HART BROOK-HB-1-VRMP	8/12/2011	8:22 AM	N			16.9	77	7.44	370				
HB-1	HART BROOK-HB-1-VRMP	8/12/2011	2:00 PM	N			19.2	89	8.15	349				
HB-2 GODDARD ROAD	HART BROOK-HB-2-VRMP	6/2/2011	8:45 AM	N			12.8	84	8.94	674				
HB-2	HART BROOK-HB-2-VRMP	6/2/2011	2:00 PM	N			14.1	99.3	10.89	646				
HB-2	HART BROOK-HB-2-VRMP	6/17/2011	8:10 AM	N			15.9	80.6	4.8	772				
HB-2	HART BROOK-HB-2-VRMP	6/17/2011	1:25 PM	N			19.1	50	4.45	763				
HB-2	HART BROOK-HB-2-VRMP	7/1/2011	7:55 AM	N			17.3	35.8	3.48	906				
HB-2	HART BROOK-HB-2-VRMP	7/1/2011	2:40 PM	N			20	41.4	3.62	862				
HB-2	HART BROOK-HB-2-VRMP	7/15/2011	8:00 AM	N			18	28.9	3.15	828				
HB-2	HART BROOK-HB-2-VRMP	7/29/2011	8:15 AM	N			19.1	36	3.15	571				
HB-2	HART BROOK-HB-2-VRMP	7/29/2011	8:15 AM	D			19.1	36	3.15	571				
HB-2	HART BROOK-HB-2-VRMP	8/12/2011	8:00 AM	N			17.3	34.4	3.29	554				
HB-2	HART BROOK-HB-2-VRMP	8/12/2011	2:05 PM	N			17.9	31	3.07	620				
HB-3 OLIVE STREET	HART BROOK-HB-3-VRMP	6/2/2011	8:30 AM	N			12.5	93.3	10.06	633				
HB-3	HART BROOK-HB-3-VRMP	6/2/2011	2:20 PM	N			16.4	99.7	10.31	624				
HB-3	HART BROOK-HB-3-VRMP	6/2/2011	2:20 PM	D			16.3	99.6	10.27	629				
HB-3	HART BROOK-HB-3-VRMP	6/17/2011	7:40 AM	N			16.4	74	7.26	826				
HB-3	HART BROOK-HB-3-VRMP	6/17/2011	1:38 PM	N			19.4	81.5	7.58	846				
HB-3	HART BROOK-HB-3-VRMP	7/1/2011	7:40 AM	N			16.4	83	8.03	970				

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	** D.O. Sat. (%)	** D.O. (MG/L)	** Spec. Cond. (US/CM)	Salinity(PPTH)	Turbidity (NTU)	** TSS (MG/L)	E Coli Bacteria (MPN/100ML)
HB-3	HART BROOK-HB-3-VRMP	7/1/2011	2:10 PM	N			18.8	92.6	8.6	1008				
HB-3	HART BROOK-HB-3-VRMP	7/15/2011	8:35 AM	N			18.2	75.4	7.11	1063				
HB-3	HART BROOK-HB-3-VRMP	7/29/2011	8:10 AM	N			19	73	6.6	850				
HB-3	HART BROOK-HB-3-VRMP	8/12/2011	8:15 AM	N			17.1	93.2	8.97	396				
HB-3	HART BROOK-HB-3-VRMP	8/12/2011	2:18 PM	N			19.1	102.5	9.5	700				
HB-4 WESTMINSTER STREET	HART BROOK-HB-4-VRMP	6/2/2011	7:35 AM	N			12.8	88.9	9.58	486				
HB-4	HART BROOK-HB-4-VRMP	6/2/2011	2:06 PM	N			17.8	95.7	9.09	630				
HB-4	HART BROOK-HB-4-VRMP	6/17/2011	7:30 AM	N			15.4	58	5.75	643				
HB-4	HART BROOK-HB-4-VRMP	6/17/2011	1:45 PM	N			27.4	65.7	5.23	732				
HB-4	HART BROOK-HB-4-VRMP	7/1/2011	8:20 AM	N			17	88.4	8.52	794				
HB-4	HART BROOK-HB-4-VRMP	7/1/2011	2:20 PM	N			26.5	112.7	9.04	765				
HB-4	HART BROOK-HB-4-VRMP	7/15/2011	8:20 AM	N			19.4	68.2	6.22					
HB-4	HART BROOK-HB-4-VRMP	7/29/2011	8:20 AM	N			20.2			1140				
HB-4	HART BROOK-HB-4-VRMP	8/12/2011	8:08 AM	N			16.4							
HB-4	HART BROOK-HB-4-VRMP	8/12/2011	2:24 PM	N			24.1	23.4	2.76	778				
HB-5 MORNINGSIDE STREET	HART BROOK-HB-5-VRMP	6/2/2011	8:00 AM	N			12.6	67.5	7.3	406				
HB-5	HART BROOK-HB-5-VRMP	6/2/2011	1:50 PM	N			13.6	69	7.1	412				
HB-5	HART BROOK-HB-5-VRMP	6/17/2011	7:50 AM	N			14.7	89.5	8.9	367				
HB-5	HART BROOK-HB-5-VRMP	6/17/2011	1:17 PM	N			16.5	89.2	8.71	331				
HB-5	HART BROOK-HB-5-VRMP	7/1/2011	8:16 AM	N			15.7	91	9.08	331				
HB-5	HART BROOK-HB-5-VRMP	7/1/2011	2:00 PM	N			17.6	93	8.66	312				
HB-5	HART BROOK-HB-5-VRMP	7/15/2011	7:53 AM	N			16.4	92	9.06	271				
HB-5	HART BROOK-HB-5-VRMP	7/29/2011	8:00 AM	N			18.5	89	8.34	194.2				
HB-5	HART BROOK-HB-5-VRMP	8/12/2011	7:45 AM	N			16.3	94.1	9.09	190.6				
HB-5	HART BROOK-HB-5-VRMP	8/12/2011	2:32 PM	N			18.4	94	8.7	200				

Appendix A-2. 2011 observational data and quality assurance/quality control (QA/QC) notes for "approved" and "non-approved" sites.
 ** "N" = normal environmental sample; "D" = field duplicate; "D.O." = dissolved oxygen; "Spec. Cond" = specific conductance; "Turb"= turbidity
 Refer to Appendix A-1 for water quality data

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (° C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Tide Stage	Water Appearance	Comments
Hart Brook - City of Lewiston (Approved Sites)															
HB-1 PIKE INDUSTRIES	HART BROOK-HB-1-	6/2/2011	9:00 AM	N	BASE FLOW	LOW	15.6	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/1.5 FT BELOW SURFACE
HB-1	HART BROOK-HB-1-	6/2/2011	2:30 PM	N	BASE FLOW	LOW	22.2	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/1.5 FT BELOW SURFACE
HB-1	HART BROOK-HB-1-	6/17/2011	8:00 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR		CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	6/17/2011	1:32 PM	N	BASE FLOW	LOW	27.8	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-1	HART BROOK-HB-1-	6/17/2011	1:32 PM	D				BANK							NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-1	HART BROOK-HB-1-	7/1/2011	8:05 AM	N	BASE FLOW	LOW	19.4	BANK	CLEAR	CALM	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	7/1/2011	2:30 PM	N	BASE FLOW	LOW	23.9	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION.
HB-1	HART BROOK-HB-1-	7/15/2011	8:10 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	7/15/2011	8:10 AM	D				BANK							WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	7/29/2011	8:05 AM	N	BASE FLOW	LOW	18.9	BANK	CLOUDY	CALM	CLOUDY	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	8/12/2011	8:22 AM	N	BASE FLOW	LOW	18.3	BANK	CLEAR	CALM	FOGGY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-HB-1-	8/12/2011	2:00 PM	N	BASE FLOW	LOW	26.7	BANK	CLEAR	CALM	CLEAR, CLOUDY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION AND THERE WAS NO INDICATION ON THE DATASHEET THAT METER WAS CALIBRATED.
HB-2 GODDARD RD	HART BROOK-HB-2-	6/2/2011	8:45 AM	N	BASE FLOW	LOW	15.6	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/1.5 FT BELOW SURFACE
HB-2	HART BROOK-HB-2-	6/2/2011	2:00 PM	N	BASE FLOW	LOW	22.2	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	6/17/2011	8:10 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR		CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	6/17/2011	1:25 PM	N	BASE FLOW	LOW	27.8	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-2	HART BROOK-HB-2-	7/1/2011	7:55 AM	N	BASE FLOW	LOW	19.4	BANK	CLEAR	CALM	CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	7/1/2011	2:40 PM	N	BASE FLOW	LOW	23.9	BANK	CLEAR	CALM	CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION.
HB-2	HART BROOK-HB-2-	7/15/2011	8:00 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR	CALM	CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	7/29/2011	8:15 AM	N	BASE FLOW	LOW	18.9	BANK	CLOUDY	CALM	CLOUDY	RIFFLE		MILKY	WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	7/29/2011	8:15 AM	D				BANK							WADEABLE/MID-DEPTH
HB-2	HART BROOK-HB-2-	8/12/2011	8:00 AM	N	BASE FLOW	LOW	18.3	BANK	CLEAR	CALM	FOGGY, LIGHT RAIN	RUN		MILKY	WADEABLE/MID-DEPTH

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (° C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Tide Stage	Water Appearance	Comments
HB-2	HART BROOK-HB-2-V	8/12/2011	2:05 PM	N	BASE FLOW	LOW	26.7	BANK	CLEAR	CALM	CLEAR, CLOUDY, LIGHT RAIN	RUN		MILKY	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION AND THERE WAS NO INDICATION ON THE DATASHEET THAT METER WAS CALIBRATED.
HB-3 OLIVE STREET	HART BROOK-HB-3-V	6/2/2011	8:30 AM	N	BASE FLOW	LOW	15.6	WADING	CLEAR	BREEZE	CLEAR	RIFFLE		CLEAR	NON-WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	6/2/2011	2:20 PM	N	BASE FLOW	LOW	22.2	BANK	CLEAR	BREEZE	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	6/2/2011	2:20 PM	D				BANK							WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	6/17/2011	7:40 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR		CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	6/17/2011	1:38 PM	N	BASE FLOW	LOW	27.8	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-3	HART BROOK-HB-3-V	7/1/2011	7:40 AM	N	BASE FLOW	LOW	19.4	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	7/1/2011	2:10 PM	N	BASE FLOW	LOW	23.9	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION.
HB-3	HART BROOK-HB-3-V	7/15/2011	8:35 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	7/29/2011	8:10 AM	N	BASE FLOW	LOW	18.9	WADING	CLOUDY	CALM	CLOUDY	RIFFLE		MILKY	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	8/12/2011	8:15 AM	N	BASE FLOW	LOW	18.3	BANK	CLEAR	CALM	FOGGY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-HB-3-V	8/12/2011	2:18 PM	N	BASE FLOW	LOW	26.7	BANK	CLEAR	CALM	CLEAR, CLOUDY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION AND THERE WAS NO INDICATION ON THE DATASHEET THAT METER WAS CALIBRATED.
WESTMINSTER STREET	HART BROOK-HB-4-V	6/2/2011	7:35 AM	N	BASE FLOW	LOW	15.6	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-HB-4-V	6/2/2011	2:06 PM	N	BASE FLOW	LOW	22.2	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-HB-4-V	6/17/2011	7:30 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR		CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-HB-4-V	6/17/2011	1:45 PM	N	BASE FLOW	LOW	27.8	BANK	CLEAR	BREEZE	CLEAR	RUN		CLEAR	NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-4	HART BROOK-HB-4-V	7/1/2011	8:20 AM	N	BASE FLOW	LOW	19.4	BANK	CLEAR	CALM	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-HB-4-V	7/1/2011	2:20 PM	N	BASE FLOW	LOW	23.9	BANK	CLEAR	CALM	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION.
HB-4	HART BROOK-HB-4-V	7/15/2011	8:20 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR	CALM	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-HB-4-V	7/29/2011	8:20 AM	N	BASE FLOW	LOW	18.9	BANK	CLOUDY	CALM	CLOUDY	RIFFLE		CLEAR	WADEABLE/MID-DEPTH, WADEABLE/MID-DEPTH; DISSOLVED OXYGEN VALUE NOT INCLUDED-VALUE VERY LOW AND MAY NOT BE REAL.
HB-4	HART BROOK-HB-4-V	8/12/2011	8:08 AM	N	BASE FLOW	LOW	18.3	BANK	CLEAR	CALM	FOGGY, LIGHT RAIN	RIFFLE		MILKY	WADEABLE/MID-DEPTH, WADEABLE/MID-DEPTH; DISSOLVED OXYGEN VALUE NOT INCLUDED-VERY LOW AND MAY NOT BE REAL.
HB-4	HART BROOK-HB-4-V	8/12/2011	2:24 PM	N	BASE FLOW	LOW	26.7	BANK	CLEAR	CALM	CLEAR, CLOUDY, LIGHT RAIN	RUN		MILKY	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION AND THERE WAS NO INDICATION ON THE DATASHEET THAT METER WAS CALIBRATED.

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (° C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Tide Stage	Water Appearance	Comments
MORNINGSIDE STREET	HART BROOK-HB-5	6/2/2011	8:00 AM	N	BASE FLOW	LOW	15.6	BANK	CLEAR	BREEZE	CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	6/2/2011	1:50 PM	N	BASE FLOW	LOW	22.2	BANK	CLEAR	BREEZE	CLEAR	RUN		MILKY	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	6/17/2011	7:50 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR		CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	6/17/2011	1:17 PM	N	BASE FLOW	LOW	27.8	BANK	CLEAR	BREEZE	CLEAR	RIFFLE		MILKY	NON-WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION. DID NOT ALLOW DO METER TO WARM-UP FOR 20 MIN (ONLY 15 MIN).
HB-5	HART BROOK-HB-5	7/1/2011	8:16 AM	N	BASE FLOW	LOW	19.4	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	7/1/2011	2:00 PM	N	BASE FLOW	LOW	23.9	BANK	CLEAR	CALM	CLEAR	RUN		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION.
HB-5	HART BROOK-HB-5	7/15/2011	7:53 AM	N	BASE FLOW	LOW	21.1	BANK	CLEAR	CALM	CLEAR	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	7/29/2011	8:00 AM	N	BASE FLOW	LOW	18.9	WADING	CLOUDY	CALM	CLOUDY	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	8/12/2011	7:45 AM	N	BASE FLOW	LOW	18.3	BANK	CLEAR	CALM	FOGGY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH
HB-5	HART BROOK-HB-5	8/12/2011	2:32 PM	N	BASE FLOW	LOW	26.7	BANK	CLEAR	CALM	CLEAR, CLOUDY, LIGHT RAIN	RIFFLE		CLEAR	WADEABLE/MID-DEPTH DID NOT RECORD DO READING/VALUE AFTER CALIBRATION AND THERE WAS NO INDICATION ON THE DATASHEET THAT METER WAS CALIBRATED.