

Section 5-4 Hart Brook (City of Lewiston)

Hart Brook

Hart Brook is a small 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 where it discharges to the Androscoggin River. The brook is approximately 3.7 miles long and its watershed encompasses approximately 2200 acres. It is highly developed and includes residential, commercial, industrial and undeveloped land uses.

Hart Brook (aka Dill Brook) is listed by DEP as an impaired stream. It is impaired for aquatic life (macroinvertebrates and algae), habitat, dissolved oxygen and E. coli. A Watershed Management Plan was completed in October 2008 which provides a plan for restoring the brook. 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. Therefore, a total maximum load (TMDL) report (“Maine Impervious Cover Total Maximum Daily Load Assessment (TMDL) for Impaired Streams” September 2012) has also been completed for this brook.

Monitoring History

- The Maine DEP Biological Monitoring Program has been monitoring the brook since 2003. This data is available on DEP’s website.
- Limited monitoring was done as part of the TMDL and Watershed Management Plan development.
- The City of Lewiston joined the Volunteer River Monitoring Program in 2011. Due to staff changes, the City dropped out of the program in 2012, but rejoined in 2013.
- In July 2014, the City reported to DEP that a sanitary sewer interceptor pipe issue was causing overflow to Hart Brook. The problem was caused by a hole in the pipe which was later addressed by lining the pipe.

Methods and Sampling Sites

City staff and interns monitor Hart Brook at six sites on the mainstem and two tributary sites. All of the sites are VRMP approved.

Monitoring is conducted biweekly from June to August. The monitors take measurements of water temperature and dissolved oxygen using a YSI meter. Conductivity is measured with either a YSI meter or an Oakton EC 11+/11 Testr conductivity pen. Grab samples for *E. coli* are collected and transported to the Lewiston-Auburn Water Pollution Control Authority.

Table 5-4-1: City of Lewiston sampling sites on Hart Brook.

VRMP Site ID	Organization Site Code	Sample Location	Class
Hart Brook-ADL04-VRMP	HB-1	Pike Industries	B
Hart Brook-ADL14-VRMP	HB-2	Goddard Road	B
Hart Brook-ADL19-VRMP	HB-3	Olive Street	B
Hart Brook-ADL28-VRMP	HB-4	Westminster Street	B
Hart Brook-ADLUA04-VRMP	HB-5	Trib - Morningside Street	B
Hart Brook-ADL23-VRMP	HB-6	Foch Street & Route 196	B
Hart Brook-ADLUB02-VRMP	HB-7	Trib - Mitchell Street & Swale Lane	B
Hart Brook-ADL30-VRMP	HB-8	Saratoga Street & Enterprise Street	B

Hart Brook Sampling Sites

City of Lewiston

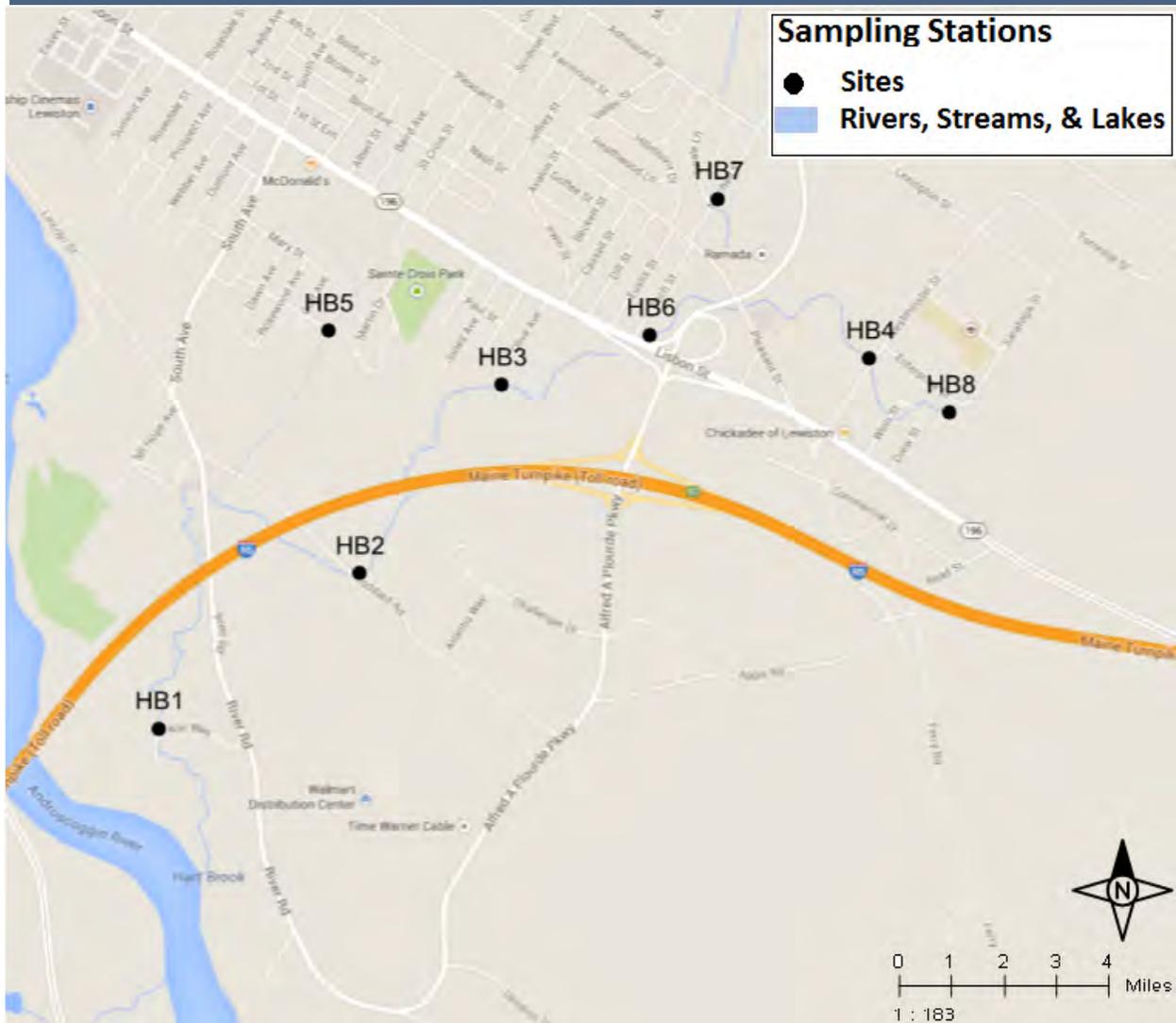


Figure 5-4-1: Map of Hart Brook sampling sites.

Results

Refer to Appendices A-1 and A-2 in discussion of individual site data and trends at the end of this report.

Dissolved Oxygen

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

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

2014 Results:

Dissolved oxygen was measured 4-6 times on the Hart Brook main stem and tributaries. For the main stem sites, sampling sites HB-1, HB-2, and HB-4; there were 3-4 measurements that did not meet the Class B concentration criterion of 7 mg/l and percent saturation criterion of 75% saturation. Values at these sites were low through June and July. Overall DO at these sites was poor. Sampling sites HB-3, HB-6 and HB-8 met Class B criterion for DO concentration and percent saturation on all sampling dates. Overall, DO at these sites was good. Sites HB-2 and HB-4 had low DO in 2013. Site HB-1 was much worse in 2014, perhaps due to the sewer issue. For the tributary sites, sampling sites HB-5 and HB-7, dissolved oxygen concentration and percent saturation were above the Class B criterion for all sampling dates.

Table 5-4-2: A summary of minimum, maximum, and average dissolved oxygen concentration (mg/l) values at Hart Brook monitoring stations.

Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
HB-1	B	6	5.6	2.2	8.4	7	4
HB-2	B	6	5.1	1.4	8.2	7	4
HB-3	B	6	9.3	8.0	11.9	7	0
HB-4	B	6	6.0	1.8	8.6	7	3
HB-5	B	5	8.9	8.0	10.5	7	0
HB-6	B	6	8.9	7.9	10.4	7	0
HB-7	B	6	9.1	8.2	10.6	7	0
HB-8	B	4	9.4	8.9	10.4	7	0

Table 5-4-3: A summary of minimum, maximum, and average dissolved oxygen saturation (%) values at Hart Brook monitoring sites.

Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
HB-1	B	6	57.3	21.9	85.6	75	4
HB-2	B	6	51.6	13.9	83.1	75	4
HB-3	B	6	94.2	82.9	123.5	75	0
HB-4	B	6	60.8	19.5	92.0	75	3
HB-5	B	5	91.2	84.1	107.2	75	0
HB-6	B	6	91.2	86.3	111.1	75	0
HB-7	B	6	92.2	84.8	109.6	75	0
HB-8	B	4	93.7	86.8	106.9	75	0

Figure 5-4-2: Graph of dissolved oxygen concentrations for main stem sites.

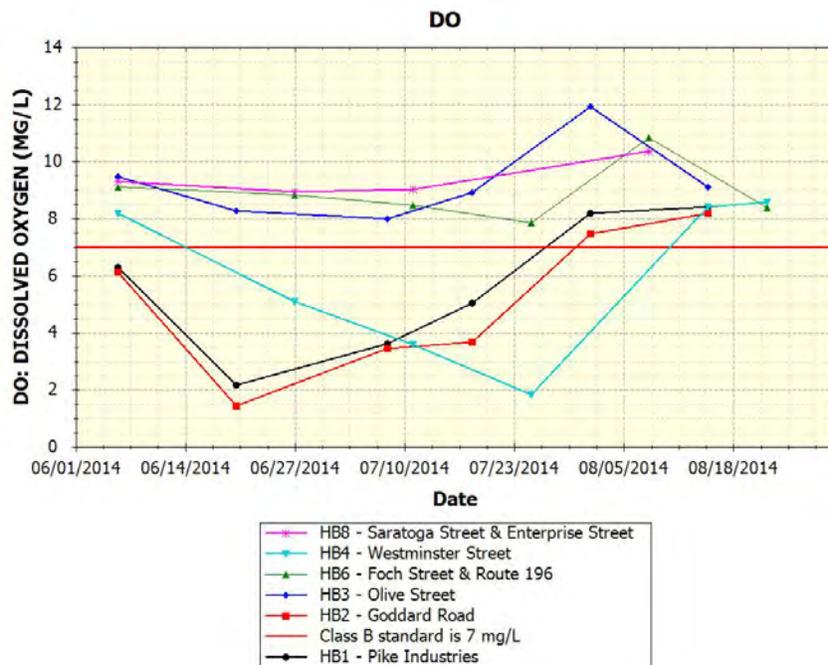


Figure 5-4-3: Graph of dissolved oxygen concentrations for tributaries.

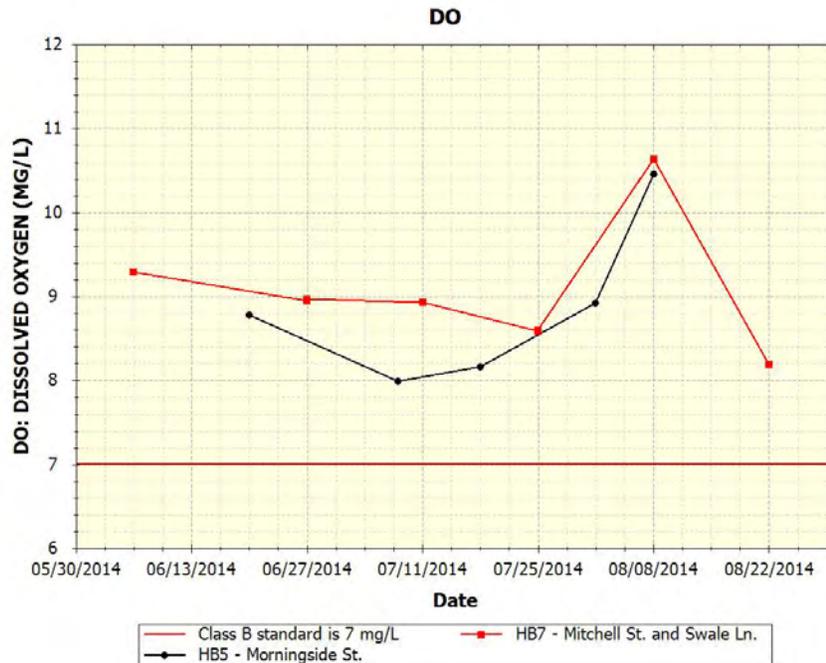


Figure 5-4-4: Graph of dissolved oxygen saturation for the main stem sites.

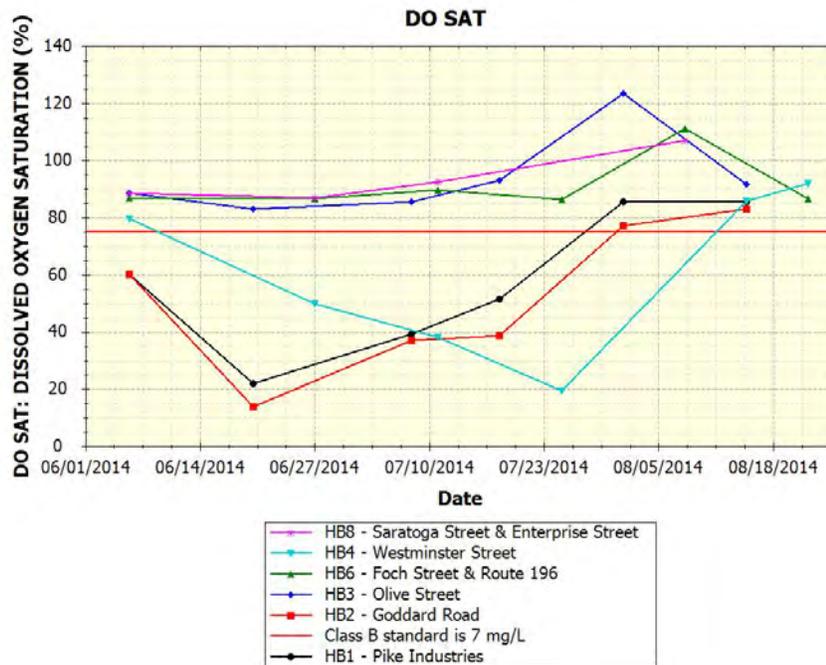
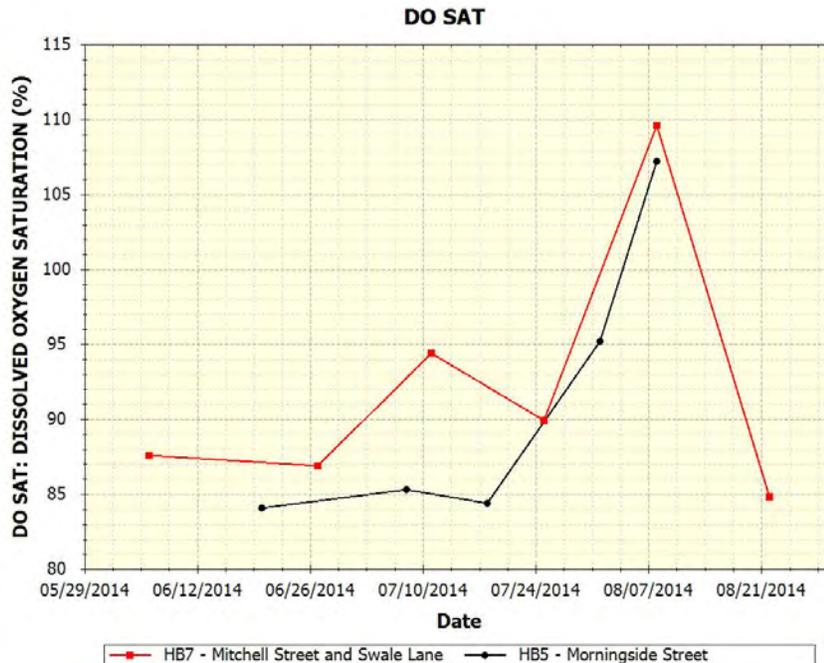


Figure 5-4-5: Graph of dissolved oxygen saturation for the tributaries.

Water Temperature

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

2014 Results:

Temperature was measured 4-6 times on the Hart Brook main stem and tributary sites. Temperature on the main stem sites all followed a similar pattern with generally sites HB-1, HB-2, and HB-3 appearing to have higher temperature compared to sites HB-4, HB-6 and HB-8. Maximum temperature occurred in early July and temperatures ranged from 16-18°C for July and August. Overall temperatures on the main stem sites were good to excellent in 2014. This was perhaps due to higher than normal flows in 2014. Temperatures at the tributary sites were similar with temperatures in the 17-18°C range for July and August. Overall, temperatures were good for an urban stream.

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

Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
HB-1	B	6	16.2	12.7	18.7	n/a	n/a
HB-2	B	6	15.9	12.4	18.4	n/a	n/a
HB-3	B	6	16.1	12.5	18.8	n/a	n/a
HB-4	B	6	16.0	14.0	17.7	n/a	n/a
HB-5	B	5	16.6	13.6	18.2	n/a	n/a
HB-6	B	6	16.1	12.7	17.9	n/a	n/a
HB-7	B	6	16.0	12.9	17.6	n/a	n/a
HB-8	B	4	15.0	13.5	16.3	n/a	n/a

Figure 5-4-6: Graph of temperatures for the main stem sites.

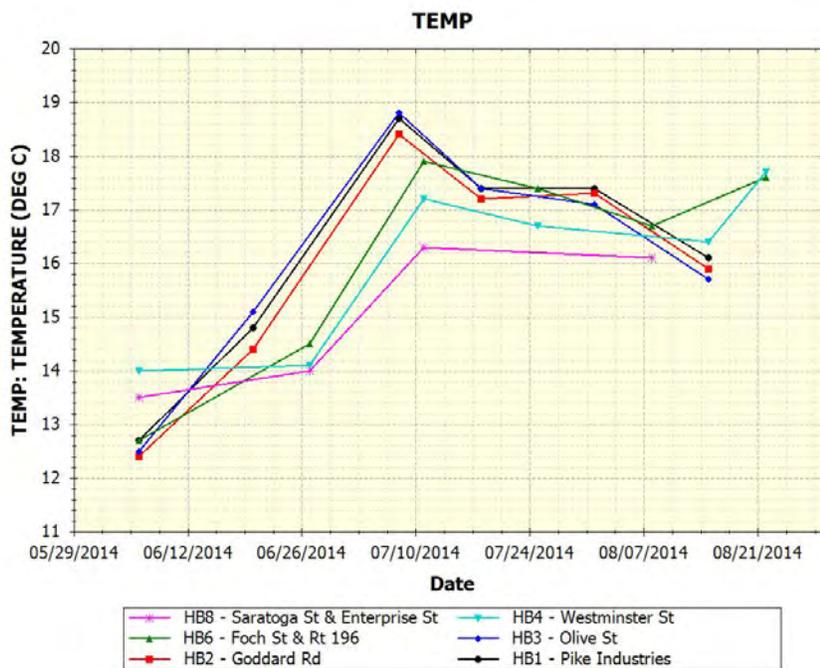
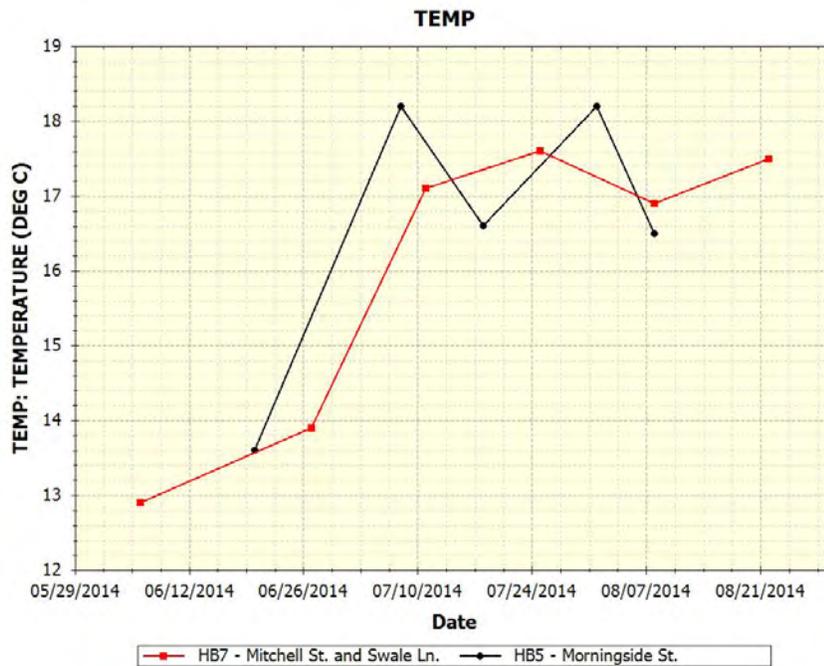


Figure 5-4-7: Graph of temperatures for the tributaries.

Specific Conductance

Specific conductance is related to the amount of dissolved materials in the water. While there are no numerical standards, a relationship exists between conductivity and chloride which has numerical criteria. If enough samples of chloride and conductivity are taken, a regression may be developed. 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 in surface and groundwater from road maintenance practices.

2014 Results:

Specific conductance was measured 5 times at the Hart Brook main stem and tributary sampling sites. Highest values occurred in the main stem sites: HB-1 (774 $\mu\text{S}/\text{cm}$), HB-2 (942 $\mu\text{S}/\text{cm}$), HB-3 (965 $\mu\text{S}/\text{cm}$), and HB-4 (728 $\mu\text{S}/\text{cm}$). The mean values for the main stem sites ranged from 465-606 $\mu\text{S}/\text{cm}$). Almost all the values ranged high to very high. For the tributary sites, mean values ranged from 392-534 $\mu\text{S}/\text{cm}$ with maximum values of 561 $\mu\text{S}/\text{cm}$ and 572 $\mu\text{S}/\text{cm}$. Overall, specific conductance is very high. Generally, urban streams have high specific conductance due to pollutants from stormwater runoff that includes road salt. High specific conductance at the lower sites in 2014 is likely related to the sewer issue.

Table 5-4-5: A summary of minimum, maximum, and specific conductance ($\mu\text{S}/\text{cm}$) values at Hart Brook monitoring sites.

Site	Class	# of Observations	Average	Minimum	Maximum	Criterion	# Exceeding
HB-1	B	5	571	409	774	n/a	n/a
HB-2	B	5	606	365	942	n/a	n/a
HB-3	B	5	532	36	965	n/a	n/a
HB-4	B	5	553	326	728	n/a	n/a
HB-5	B	5	392	303	561	n/a	n/a
HB-6	B	5	524	416	673	n/a	n/a
HB-7	B	5	534	481	572	n/a	n/a
HB-8	B	3	465	374	515	n/a	n/a

Figure 5-4-8: Graph of specific conductivity for the main stem sites.

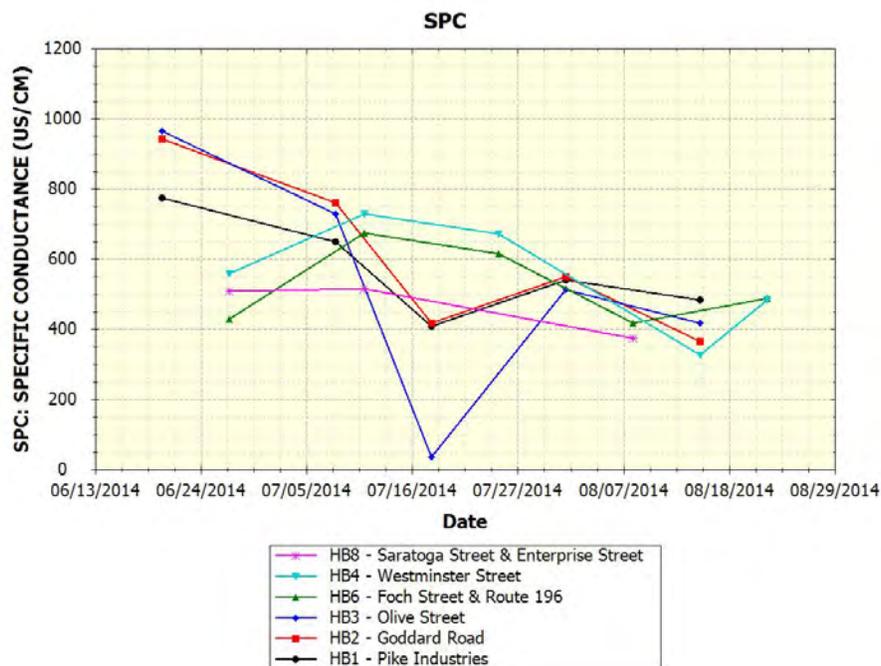
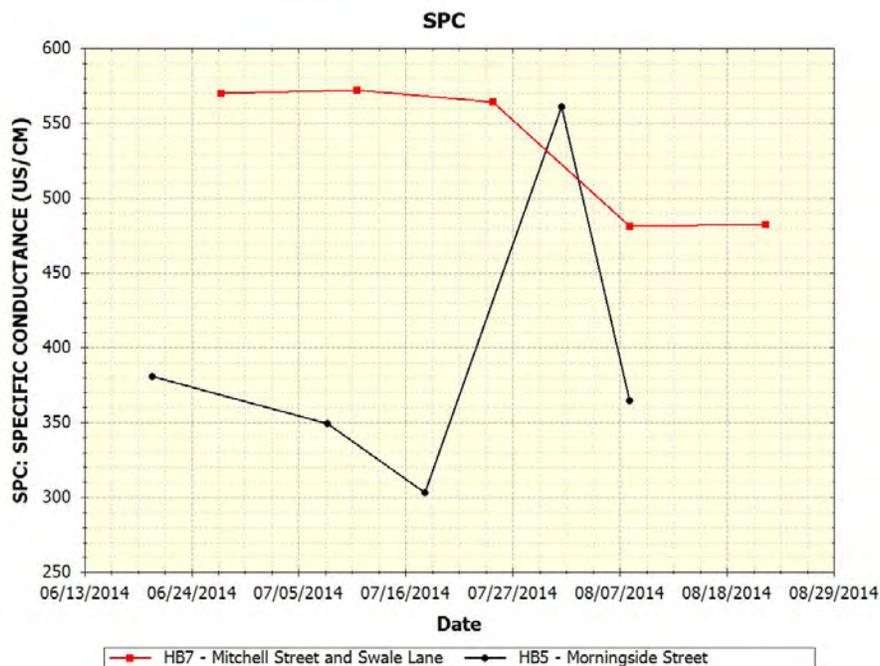


Figure 5-4-9: Graph of specific conductivity for the tributaries.

Bacteria

Enterococcus bacteria are used as the indicator organism for marine waters and *E. coli* bacteria are used for freshwaters. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms including bacteria and viruses that can cause gastrointestinal illnesses. Monitoring should include at least 6 samples and include a mix of dry and storm event sampling.

Class B criteria for bacteria are as follows: “Between May 15th and Sept 30th, *E. coli* of human and domestic origin shall not exceed a geometric mean of 64/100 ml (milliliters) or an instantaneous level of 236/100 ml.” Class SB criteria are as follows: “Between May 15th and September 30th, the numbers of enterococcus bacteria of human and domestic animal origin in these waters may not exceed a geometric mean of 8 per 100 milliliters or an instantaneous level of 54 per 100 milliliters.” Geometric means are calculated instead of average because it is more appropriate to use this calculation for something like bacteria where there may be one or more very high or low values that can skew the mean

2014 Results:

Escherichia coli bacteria were sampled 4 times at all sampling sites, except site HB-8. All samples at sites HB-1 and HB-2 were above the analysis limit (>2419 MPN/100ml). This is likely due to the sewer issue in 2014. For the other sampling sites, the bacteria instantaneous criterion of 236 MPN/100 ml was exceeded 1-3 times at each site. The geometric mean criterion of 64 MPN/100 ml was exceeded for all the sites that the mean was calculated. Ideally, at least 6 samples should be taken to calculate the geometric mean and samples should include both wet and dry weather conditions. Bacteria results were overall fair to poor.

Table 5-4-6: A summary of minimum, maximum, and geometric means for bacteria (MPN/100 mL) values at Hart Brook monitoring sites.

Site	Class	# of Observations	Geometric Mean	Minimum	Maximum	Criterion Inst/Geo	# Exceeding
HB-1	B	4	2419	2419	2419	236/64	4
HB-2	B	4	2419	2419	2419	236/64	4
HB-3	B	4	823	157	1300	236/64	1
HB-4	B	4	98	59	248	236/64	1
HB-5	B	4	289	135	687	236/64	2
HB-6	B	4	191	72	308	236/64	2
HB-7	B	4	290	144	816	236/64	3
HB-8	B	2	NA*	150	276	236/64	1

*Not enough samples to calculate GeoMean

Figure 5-4-8: Graph of *E. Coli* for the main stem sites.

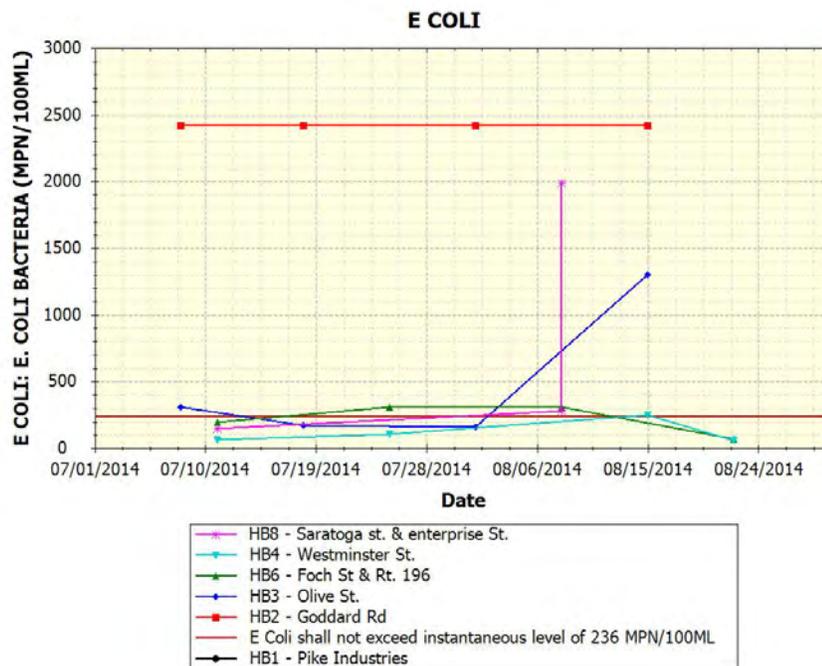
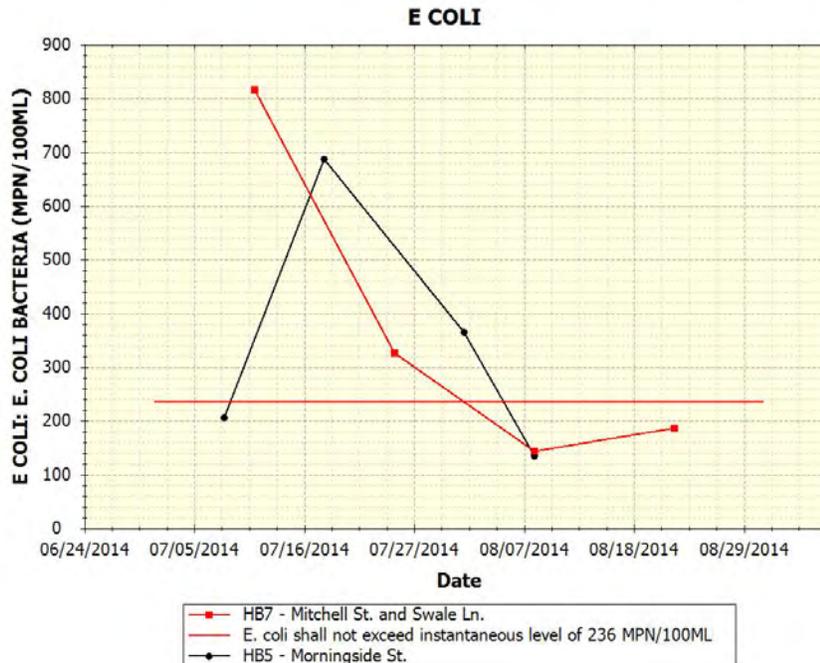


Figure 5-4-8: Graph of *E. coli* for the tributaries.

Discussion and Recommendations

There are numerous sources of pollution and other stresses to Hart Brook sites monitored by the City of Lewiston that could potentially have an impact on water quality. Some of those sources of pollution and stress may include:

- Non-point source pollution (e.g., septic 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), 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:

- **The interns did a good job of getting out early in the morning. It is important to get some values early in the morning (before 8:00 am), particularly during the warmer summer months. Over a 24 hour period, the lowest readings occur in the early morning and highest readings in mid to late afternoon. This occurs because oxygen is used up during the night due to plant respiration and during the day, plant life is photosynthesizing. It would be**

worthwhile to monitor 2x/day (early morning and mid-afternoon) at least a couple of times during July-August to determine if there are significant differences. Significant differences (at least 2 mg/l) may indicate nutrient loading issues.

- **It would be worthwhile to take water samples for chloride to determine if winter salt is a problem. Potential sources of the high conductivity may also be tracked by walking the stream and periodically measuring conductivity.**
- **If bacteria sampling is going to continue, at least 6 samples should be obtained and include both wet and dry weather conditions in order to calculate a valid geometric mean.**
- **Continue monitoring at all stations to develop a long term trend database.**

Appendix A-1. 2014 water quality data for "Approved" and "Non-Approved" sites. Non-Approved sites do not yet meet official VRMP sample location criteria and/or require further inspection and review.

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

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

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

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	** D.O. Sat. (%)	** D.O. (MG/L)	** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/100ML)	Enterococci (MPN/100ML)
Hart Brook - City of Lewiston: Approved Sites																
HB-1	HART BROOK-ADL04-VRMP	6/6/2014	8:04 AM	N			12.7	60.1	6.3							
HB-1	HART BROOK-ADL04-VRMP	6/6/2014	8:04 AM	D			12.7	74	6.3							
HB-1	HART BROOK-ADL04-VRMP	6/20/2014	7:54 AM	N			14.8	21.9	2.16	774						
HB-1	HART BROOK-ADL04-VRMP	6/20/2014	7:54 AM	D			14.7	21.1	2.15	774						
HB-1	HART BROOK-ADL04-VRMP	7/8/2014	7:46 AM	N			18.7	39.1	3.62	650					2419.6	
HB-1	HART BROOK-ADL04-VRMP	7/8/2014	7:46 AM	D			18.6	38.7	3.61	651						
HB-1	HART BROOK-ADL04-VRMP	7/18/2014	7:42 AM	N			17.4	51.5	5.05	409					2419.6	
HB-1	HART BROOK-ADL04-VRMP	8/1/2014	7:49 AM	N			17.4	85.6	8.2	540					2419.6	
HB-1	HART BROOK-ADL04-VRMP	8/15/2014	8:05 AM	N			16.1	85.5	8.42	482					2419.6	
HB-2	HART BROOK-ADL14-VRMP	6/6/2014	8:31 AM	N			12.4	60.1	6.13							
HB-2	HART BROOK-ADL14-VRMP	6/20/2014	8:16 AM	N			14.4	13.9	1.43	942						
HB-2	HART BROOK-ADL14-VRMP	7/8/2014	8:08 AM	N			18.4	36.9	3.46	760					2419.6	
HB-2	HART BROOK-ADL14-VRMP	7/18/2014	8:05 AM	N			17.2	38.6	3.67	418					2419.6	
HB-2	HART BROOK-ADL14-VRMP	8/1/2014	8:12 AM	N			17.3	77.2	7.46	548					2419.6	
HB-2	HART BROOK-ADL14-VRMP	8/15/2014	8:20 AM	N			15.9	83.1	8.19	364.6					2419.6	
HB-3	HART BROOK-ADL19-VRMP	6/20/2014	8:36 AM	N			15.1	82.9	8.3	965.0						
HB-3	HART BROOK-ADL19-VRMP	7/8/2014	8:29 AM	N			18.8	85.4	8.0	729.0					307.6	
HB-3	HART BROOK-ADL19-VRMP	7/18/2014	8:21 AM	N			17.4	93.0	8.9	35.6					173	
HB-3	HART BROOK-ADL19-VRMP	8/1/2014	8:48 AM	N			17.1	123.5	11.9	512.0					157	
HB-3	HART BROOK-ADL19-VRMP	8/15/2014	8:40 AM	N			15.7	91.7	9.1	418.1					1300	
HB-4	HART BROOK-ADL28-VRMP	6/6/2014	8:58 AM	N			14.0	79.7	8.2							
HB-4	HART BROOK-ADL28-VRMP	6/27/2014	8:21 AM	N			14.1	49.9	5.1	558.0						
HB-4	HART BROOK-ADL28-VRMP	7/11/2014	8:16 AM	N			17.2	38.0	3.6	728.0					61.3	
HB-4	HART BROOK-ADL28-VRMP	7/25/2014	7:49 AM	N			16.7	19.5	1.8	672.0					105	
HB-4	HART BROOK-ADL28-VRMP	8/15/2014	9:03 AM	N			16.4	85.9	8.4	326.1					248	
HB-4	HART BROOK-ADL28-VRMP	8/22/2014	8:41 AM	N			17.7	92.0	8.6	483.0					59.1	
HB-5	UNNAMED TRIBUTARY TO HART	6/20/2014	8:54 AM	N			13.6	84.1	8.8	380.6						

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	** D.O. Sat. (%)	** D.O. (MG/L)	** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	Total Diss. Solids (MG/L)	** TSS (MG/L)	E Coli Bacteria (MPN/100ML)	Enterococci (MPN/100ML)
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	7/8/2014	8:46 AM	N			18.2	85.3	8.0	349.0					206	
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	7/18/2014	8:40 AM	N			16.6	84.4	8.2	303.0					687	
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	8/1/2014	9:07 AM	N			18.2	95.2	8.9	561.0					365	
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	8/8/2014	8:58 AM	N			16.5	107.2	10.5	364.6					135	
HB-6	HART BROOK - ADL23 - VRMP	6/6/2014	9:28 AM	N			12.7	86.8	9.11							
HB-6	HART BROOK - ADL23 - VRMP	6/27/2014	8:10 AM	N			14.5	86.7	8.83	429.3						
HB-6	HART BROOK - ADL23 - VRMP	7/11/2014	7:44 AM	N			17.9	89.7	8.47	673					193.5	
HB-6	HART BROOK - ADL23 - VRMP	7/25/2014	8:16 AM	N			17.4	86.3	7.86	614					307.6	
HB-6	HART BROOK - ADL23 - VRMP	8/8/2014	8:42 AM	N			16.7	111.1	10.84	416.3					308	
HB-6	HART BROOK - ADL23 - VRMP	8/22/2014	8:18 AM	N			17.6	86.6	8.38	487					72.3	
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/6/2014	9:59 AM	N			12.9	87.6	9.29							
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/27/2014	7:50 AM	N			13.9	86.9	8.97	570						
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/27/2014	7:50 AM	D			13.9	87.1	8.95	542						
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/11/2014	8:00 AM	N			17.1	94.4	8.93	572					816.4	
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/25/2014	8:28 AM	N			17.6	89.9	8.59	564					325.5	
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/25/2014	8:28 AM	D			17.6	90.5	8.6	708					325.5	
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	8/8/2014	8:31 AM	N			16.9	109.6	10.64	481.4					144	
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	8/22/2014	8:29 AM	N			17.5	84.8	8.19	482					186	
HB-8	HART BROOK - ADL30 - VRMP	6/6/2014	10:13 AM	N			13.5	88.5	9.3							
HB-8	HART BROOK - ADL30 - VRMP	6/27/2014	8:32 AM	N			14	86.8	8.95	507						
HB-8	HART BROOK - ADL30 - VRMP	7/11/2014	8:30 AM	N			16.3	92.4	9.03	515					150	
HB-8	HART BROOK - ADL30 - VRMP	8/8/2014	8:10 AM	N			16.1	106.9	10.37	374					276	
HB-8	HART BROOK - ADL30 - VRMP	8/8/2014	8:10 AM	D			15.9	106.5	10.53	384					1986	

Appendix A-2. 2014 observational data and quality assurance/quality control (QA/QC) notes for "approved" and "non-approved" sites.

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

Refer to Appendix A-1 for water quality data

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (°C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Water Appearance	Comments
Hart Brook - City of Lewiston: Approved Sites														
HB-6	HART BROOK - ADL23 - VRMP	6/6/2014	9:28 AM	N	BASEFLOW	LOW	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-6	HART BROOK - ADL23 - VRMP	6/27/2014	8:10 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	CLOUDY, HEAVY RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-6	HART BROOK - ADL23 - VRMP	7/11/2014	7:44 AM	N	BASEFLOW	LOW		WADING	CLEAR	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-6	HART BROOK - ADL23 - VRMP	7/25/2014	8:16 AM	N	BASEFLOW	LOW	11.11	WADING	CLEAR	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-6	HART BROOK - ADL23 - VRMP	8/8/2014	8:42 AM	N	BASEFLOW	LOW	15	WADING	CLEAR		LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-6	HART BROOK - ADL23 - VRMP	8/22/2014	8:18 AM	N	BASEFLOW	LOW	17.22	WADING	PARTLY CLOUDY		CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-8	HART BROOK - ADL30 - VRMP	6/6/2014	10:13 AM	N	BASEFLOW	LOW	16.11	WADING	CLEAR	CALM	CLOUDY, LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-8	HART BROOK - ADL30 - VRMP	6/27/2014	8:32 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	CLOUDY, HEAVY RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-8	HART BROOK - ADL30 - VRMP	7/11/2014	8:30 AM	N	BASEFLOW	LOW		WADING	CLEAR	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-8	HART BROOK - ADL30 - VRMP	8/8/2014	8:10 AM	N	BASEFLOW	LOW	15	WADING	CLEAR	CALM	LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-8	HART BROOK - ADL30 - VRMP	8/8/2014	8:10 AM	D				WADING						WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/6/2014	9:59 AM	N	BASEFLOW	LOW	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/27/2014	7:50 AM	N	BASEFLOW	MEDIUM	13.89	WADING	CLEAR	CALM	CLOUDY, HEAVY RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	6/27/2014	7:50 AM	D				WADING						WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/11/2014	8:00 AM	N	BASEFLOW	LOW		WADING	CLEAR	CALM	CLEAR	CASCADE	CLEAR	WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/25/2014	8:28 AM	N	BASEFLOW	LOW	11.11	WADING	CLEAR	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	7/25/2014	8:28 AM	D				WADING						WADEABLE/MID-DEPTH
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	8/8/2014	8:31 AM	N	BASEFLOW	MEDIUM	15	WADING	CLEAR	CALM	LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (°C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Water Appearance	Comments
HB-7	HART BROOK - UNNAMED TRIBUTARY - ADLUB02 - VRMP	8/22/2014	8:29 AM	N	BASEFLOW	LOW	17.22	WADING	PARTLY CLOUDY	CALM	CLEAR	RIFFLE	CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	6/6/2014	8:04 AM	N	BASEFLOW	LOW	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	6/6/2014	8:04 AM	D				WADING						WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	6/20/2014	7:54 AM	N	BASEFLOW	LOW	15	WADING	CLEAR	BREEZE	CLEAR	CASCADE	CLEAR	WADEABLE/MID-DEPTH D.O. METER- DID NOT RECORD TIME OF CALIBRATION. CALIBRATION VALUE OK.
HB-1	HART BROOK-ADL04-VRMP	6/20/2014	7:54 AM	D				WADING						WADEABLE/MID-DEPTH D.O. METER- DID NOT RECORD TIME OF CALIBRATION. CALIBRATION VALUE OK.
HB-1	HART BROOK-ADL04-VRMP	7/8/2014	7:46 AM	N	BASEFLOW	MEDIUM	22.22	WADING	CLEAR	CALM	CLEAR, LIGHT RAIN	CASCADE	CLEAR	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	7/8/2014	7:46 AM	D				WADING						SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	7/18/2014	7:42 AM	N	BASEFLOW	MEDIUM	12.78	WADING	CLEAR	CALM	PARTLY CLOUDY	RIFFLE	CLEAR	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	8/1/2014	7:49 AM	N	STORMFLOW	MEDIUM	13.89	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	CLEAR	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-1	HART BROOK-ADL04-VRMP	8/15/2014	8:05 AM	N	BASEFLOW	MEDIUM	11.11	WADING	MOSTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY	RUN	DARKLY STAINED	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-2	HART BROOK-ADL14-VRMP	6/6/2014	8:31 AM	N	BASEFLOW	MEDIUM	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	MILKY	WADEABLE/MID-DEPTH
HB-2	HART BROOK-ADL14-VRMP	6/20/2014	8:16 AM	N	BASEFLOW	MEDIUM	15	WADING	CLEAR	BREEZE	CLEAR	RUN	MILKY	WADEABLE/MID-DEPTH D.O. METER-DID NOT RECORD TIME OF CALIBRATION. CALIBRATION VALUE OK.
HB-2	HART BROOK-ADL14-VRMP	7/8/2014	8:08 AM	N	BASEFLOW	MEDIUM	22.22	WADING	CLEAR	CALM	CLEAR, LIGHT RAIN	RUN	MILKY	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-2	HART BROOK-ADL14-VRMP	7/18/2014	8:05 AM	N	BASEFLOW	MEDIUM	12.78	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	GREEN - PHYTOPLANKTON BLOOM	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-2	HART BROOK-ADL14-VRMP	8/1/2014	8:12 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	OPAQUE	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	Flow	Stage	Air Temp (°C)	Sample Location	Current Weather	Air Condition	Past 24HR Weather	Habitat	Water Appearance	Comments
HB-2	HART BROOK-ADL14-VRMP	8/15/2014	8:20 AM	N	BASEFLOW	LOW	11.11	WADING	MOSTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY	RUN	OPAQUE	CONCENTRATION IS ACTUALLY >2419.6. VALUE FOR USE IN GEOMETRIC MEAN., SEWER BREAK UPSTREAM WADEABLE/MID-DEPTH
HB-3	HART BROOK-ADL19-VRMP	6/6/2014	8:47 AM	N	BASEFLOW	LOW	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-ADL19-VRMP	6/20/2014	8:36 AM	N	BASEFLOW	LOW	15	WADING	CLEAR	BREEZE	CLEAR	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH D.O. METER-DID NOT RECORD TIME OF CALIBRATION. CALIBRATION VALUE OK.
HB-3	HART BROOK-ADL19-VRMP	7/8/2014	8:29 AM	N	BASEFLOW	LOW	22.22	WADING	CLEAR	CALM	CLEAR, LIGHT RAIN	RUN	MEDIUM STAINED	WADEABLE/MID-DEPTH
HB-3	HART BROOK-ADL19-VRMP	7/18/2014	8:21 AM	N	BASEFLOW	LOW	12.78	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	CLEAR	HAD DEBRIS BLOCKAGE AT CULVERT WHICH DID NOT ALLOW FOR A WELL MIXED SAMPLE TO BE TAKEN WADEABLE/MID-DEPTH
HB-3	HART BROOK-ADL19-VRMP	8/1/2014	8:48 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-3	HART BROOK-ADL19-VRMP	8/15/2014	8:40 AM	N	BASEFLOW	LOW	11.11	WADING	MOSTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	6/6/2014	8:58 AM	N	BASEFLOW	LOW	16.11	WADING	PARTLY CLOUDY	CALM	CLOUDY, LIGHT RAIN	CASCADE	CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	6/27/2014	8:21 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	CLOUDY, HEAVY RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	7/11/2014	8:16 AM	N	BASEFLOW	LOW		WADING	CLEAR	CALM	CLEAR	RUN	GREEN - PHYTOPLANKTON BLOOM	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	7/25/2014	7:49 AM	N	BASEFLOW	LOW	11.11	WADING	CLEAR	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	8/15/2014	9:03 AM	N	BASEFLOW	MEDIUM	11.11	WADING	MOSTLY CLOUDY	CALM	CLEAR, PARTLY CLOUDY	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-4	HART BROOK-ADL28-VRMP	8/22/2014	8:41 AM	N	BASEFLOW	LOW	17.22	WADING	PARTLY CLOUDY	CALM	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	6/20/2014	8:54 AM	N	BASEFLOW	LOW	15	WADING	CLEAR	BREEZE	CLEAR	RUN	CLEAR	WADEABLE/MID-DEPTH D.O. METER-DID NOT RECORD TIME OF CALIBRATION. CALIBRATION VALUE OK.
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	7/8/2014	8:46 AM	N	BASEFLOW	LOW	22.22	WADING	CLEAR	CALM	CLEAR, LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	7/18/2014	8:40 AM	N	BASEFLOW	LOW	12.78	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	CLEAR	PROBE WAS INADVERTANTLY SHUT OFF BETWEEN HB#3 AND HB#5 SAMPLES. PROBE WAS RECALIBRATED BEFORE HB#5 WADEABLE/MID-DEPTH
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	8/1/2014	9:07 AM	N	BASEFLOW	LOW	13.89	WADING	CLEAR	CALM	PARTLY CLOUDY	RUN	CLEAR	WADEABLE/MID-DEPTH
HB-5	UNNAMED TRIBUTARY TO HART BROOK-ADLUA04-VRMP	8/8/2014	8:58 AM	N	BASEFLOW	LOW	15	WADING	CLEAR		LIGHT RAIN	RUN	CLEAR	WADEABLE/MID-DEPTH