2019 Annual Aquifer Monitoring Report
Evergreen Spring
Fryeburg, Maine

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2019 ANNUAL AQUIFER MONITORING REPORT
EVERGREEN SPRING
FRYEBURG, MAINE

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1.0 INTRODUCTION

Nestle Waters North America Inc. (d/b/a/ Poland Spring) has contracted with Luetje Geological Services (LGS) of Freeport, Maine, and McDonald Morrissey Associates, LLC. (MMA) of Concord, New Hampshire, independent hydrogeologic consulting firms, to collect and compile data from the Wards Brook Aquifer. Poland Spring is not required to submit these data to the Town of Fryeburg, but started to do so voluntarily with the December 2008 monthly report. Annual reports are compiled after the end of each calendar year summarizing final data and drawing conclusions about hydrologic conditions in the Wards Brook Aquifer. Poland Spring purchases spring water in Fryeburg from the Fryeburg Water Company (FWC). The FWC also services other residential, commercial, industrial and public water users from Evergreen Spring in Fryeburg.

Hydrogeologic data collection from locations in and around the Wards Brook Aquifer began in 2003 by Woodard & Curran (W&C) for Pure Mountain Springs Company (PMS). LGS assumed responsibility for the monthly monitoring program in July 2008, and continues to conduct monitoring of the Wards Brook Aquifer on behalf of Poland Spring. The primary role for LGS is monthly data collection and preparation of monthly and annual reports. MMA was contracted to perform data analysis, program review, and general oversight of site monitoring and reporting.

In August 2005, Emery & Garrett Groundwater, Inc. submitted a report (*Groundwater Flow Model, Wards Brook Aquifer, Fryeburg, Maine, 2005)* to the Town of Fryeburg Planning Board. This report was funded by the Fryeburg Aquifer Resource Committee (FARC). To date, this appears to be the most comprehensive investigation and report pertaining to the Wards Brook Aquifer. Emery & Garrett used groundwater and geologic data collected by several entities including:

- PMS and W&C;
- Poland Spring;
- FWC;
- WE Corporation (WE);
- SF Corporation, LLC (SF); and
- U.S. Geological Survey (USGS).

As part of its effort, Emery & Garrett created, on behalf of the Town of Fryeburg, a groundwater model of the Wards Brook Aquifer. To simplify the report and present findings to the public, Emery and Garrett likened the Wards Brook Aquifer to a bank account, with income (groundwater recharge), fixed expenses (FWC needs for its customers other than PMS and appropriate minimum flow through Wards Brook drainage), and discretionary expenses (water used for other FWC customers, other water users of the aquifer, and excess flow through Wards Brook drainage). Emery & Garrett concluded that available discretionary expenses (withdrawals) from the Wellhead Protection Area as delineated, after all other "fixed expenses" were met, totaled approximately 293 million gallons per year (equivalent to 804,000 gallons per day over the course of a calendar year) during an average precipitation year. Emery & Garrett then imposed an arbitrary safety factor of 25%, arriving at a conservative "discretionary expense" value of 220 million gallons per year (equivalent to 603,000 gallons per day over the course of a calendar year).

In 2018, Emery and Garrett updated and re-calibrated the numerical model of the Wards Brook Aquifer, incorporating the latest groundwater and surface water information. They concluded that "the original permissible withdrawal of 603,000 gallons per day [i.e. 220 million gallons per year] is sustainable and ensures that groundwater discharge to Wards Brook will exceed 400 gallons per minute under any non-extreme climatic scenario[1]". Poland Spring purchases well below the "discretionary expense" value. In 2019, Poland Spring purchased approximately 118 million gallons.

2.0 AQUIFER MONITORING PROGRAM

This annual report is a compilation of data for the period from January 2019 through December 2019. Also included is the entire record of water elevations (2003 – present) measured at MW-108 (Figure 3), showing typical seasonal groundwater fluctuations in the Wards Brook Aquifer and is discussed further in Section 4.0.

Data are presented for eleven monitoring wells, four surface water stations, two rain gauges (an on-site rain gauge located at the load-out facility and data obtained from the Fryeburg Eastern Slopes Airport (ICAO Station KIZG, Northeast Regional Climate Center), and withdrawal data from PBH-1. Locations of all data collection stations are shown in Figure 1. Table 1 summarizes data collection stations and monitoring frequency.

3.0 PRECIPITATION

Precipitation is recorded on-site adjacent to PBH-1 using an Onset Data Logging Rain Gauge (RG). The location of the on-site rain gauge is shown in Figure 1. A photograph showing the on-site rain gauge (Photograph C) appears in Appendix A. The on-site rain gauge has a self-tipping bucket that is activated with every 0.01 inches of precipitation. The gauge is also wrapped with a heat tape that melts snowfall and allows measurement of precipitation through the winter months.

Precipitation data are also recorded at the Fryeburg Eastern Slopes Airport (ICAO Station KIZG, Northeast Regional Climate Center) and compared to precipitation measurements taken by the on-site rain gauge. The Fryeburg Eastern Slopes Airport is approximately two miles to the south of the on-site rain gauge. Table 2 summarizes 2019 precipitation data available and used in the monthly reports.

Examination of Table 2 shows that there is a correlation between precipitation data collected at both locations. For the 2019 calendar year, the on-site rain gauge recorded a total of 49.70 inches of precipitation, 7.99 inches more than was recorded in 2018, and approximately two inches above the 25 year mean. The Fryeburg Eastern Slopes Airport gauging station recorded 45.42 inches of precipitation, 4.72 inches more than was recorded in 2018. From 1992 to 2016, the Fryeburg area has received an average of approximately 48 inches of precipitation per year. This average was calculated from data primarily recorded at the Fryeburg Eastern Slopes Airport weather station (ICAO Station KIZG, Northeast Regional Climate Center). Data from the on-site rain gauge was used where gaps in the KIZG record occurred.

1. EGGI (2018), Recalibration and Application of the Numerical Model of the Wards Brook Aquifer, Fryeburg, Maine, submitted to the Town of Fryeburg.

4.0 GROUNDWATER LEVELS

Groundwater levels are measured in eleven monitoring wells at locations shown in Figure 1. These wells provide groundwater level data across and adjacent to the Wards Brook watershed. Photographs A and AA show a typical monitoring well in Fryeburg and the device used to measure the depth to water (water level indicator). Photographs appear in Appendix A.

Figures 2A through 2C show groundwater elevations measured from the monitoring well network for the 2019 calendar year. All elevations are referenced to the 1988 North American Vertical Datum (NAVD88). Figure 2A shows groundwater elevations ranging from 410-430 feet NAVD88, Figure 2B shows groundwater elevations ranging from 395-415 feet NAVD88, and Figure 2C shows groundwater elevations ranging from 375-395 feet NAVD88. Each hydrograph is accompanied by a bar graph showing monthly precipitation.

Groundwater level fluctuations are primarily driven by the timing and amount of precipitation in a given region. In general, the highest groundwater levels occur in the spring in response to recharge from spring rain and snow melt after the ground thaws. Groundwater levels tend to decline through the summer months, when evapotranspiration is greatest, and lowest groundwater levels occur near the end of the summer or early fall. After the trees drop their leaves and evapotranspiration decreases, groundwater levels generally rise until the ground freezes. Another period of low groundwater levels then occurs in late winter after the ground has been frozen for several months. Data tables showing all groundwater and surface water elevation data appear in Appendix B.

Groundwater levels as seen in Figures 2A thru 2C show groundwater level trends typically observed across the aquifer. A rise in groundwater levels that began in the fall of 2018 (fall recharge) extended into 2019 and peaked around late February 2019. This was followed by a slight drop in groundwater levels (no recharge) from late February to late March 2019. A rise in groundwater elevations was observed in the spring caused by snowpack melt and precipitation. Groundwater levels reached their seasonal maximum during the months of April and May 2019, after which elevations began to decline. Groundwater levels continued to decline throughout the summer, reaching seasonal low levels during the months of September thru November 2019. At most locations, groundwater levels began to rise again in response to late fall/early winter recharge.

Frozen conditions were observed at TW-2 and TW-9 during the January, February, and March 2019 monitoring rounds as seen in Figure 2B and Appendix B. TW-2 experienced frozen conditions again as observed during the December 2019 monitoring round. The water levels in TW-2 and 9 have consistently been above ground surface and will freeze in the well casing during the winter months if water is not overflowing the well casing.

Figure 3 shows the entire record of groundwater elevations for MW-108 (November 2003 – present) and demonstrates the typical seasonal groundwater fluctuations observed across the aquifer. Figure 3 also shows the hydrograph of OW-1214, a well located in Oxford, Maine and monitored by the United States Geological Survey. OW-1214 is a six inch diameter well screened from 35-38 feet below ground surface in stratified sand and gravel, and shows groundwater level fluctuations outside of the Fryeburg area but in the same general region and in a similar geologic environment. Inclusion of OW-1214 demonstrates the close correlation between water levels at both locations.

In addition on Figure 3, precipitation data are displayed in two plots below the hydrographs. Precipitation data is presented as monthly, annual totals, annual cumulative departure from mean (reset annually), and total precipitation departure from the mean (since 1992).

5.0 SURFACE WATER LEVELS

Surface water elevation is measured at four locations in and around the Wards Brook Aquifer watershed as seen in Figure 1. The surface water measuring locations are as follows:

- Saco River Monitoring Point (SRMP-1): surface water elevation is measured at the Route 113 bridge;
- Wards Pond Monitoring Point (WPMP-1): surface water elevation is measured at the Route 113 crossing;
- Lovewell Pond Staff Gauge (LPSG-1): surface water elevation is measured at the inlet from Wards Brook; and
- Wards Pond Staff Gauge (WPSG-2A): surface water elevation is measured near the center of the watershed in a bog located to the south of Wards Pond.

Appendix A includes a photograph (Photograph B) showing a typical staff gage used to measure surface water stage and a view of Lovewell Pond (Photograph BB) facing north from the boat ramp located off Route 113. The Lovewell Pond photograph is taken every June monitoring event to document conditions during the same time of year. 2019 surface water elevations from surface water stations appear in Figure 4. A data table summarizing surface water elevation data appears in Appendix B.

Examination of Figure 4 shows normal seasonal surface water fluctuations near the site. In general, there is typically a rise in surface water levels during spring melt, a decline through the summer months, another rise in the fall and early winter followed by frozen conditions during winter months. Frozen conditions were observed at all locations except for LPSG-1 during the winter months of 2019. LPSG-1 remained unfrozen due to moving water at this station. No measurement was taken during the April 2019 monitoring round at LPSG-1 due to flooded conditions.

In the 2018 Evergreen Spring Annual Report[2], LGS noted that water levels in Wards Pond (WPMP-1) had been artificially high due to the debris built up in the culvert under Route 113. LGS partially removed debris several times during 2018, however, continued beaver activity made this exercise futile. On May 23rd 2019, a beaver deterrent apparatus was deployed on the upstream side of the culvert on Route 113. Following this installation and the removal of all of the debris clogging the culvert, and as seen on Figure 4, water levels in Wards Pond fell by approximately two feet, and remained near this lower level thru 2019.

2. LGS (2018), 2018 Annual Aquifer Monitoring Report, Evergreen Spring, Fryeburg, Maine, submitted to the Town of Fryeburg.

6.0 WITHDRAWALS

In accordance with the contract with the Fryeburg Water Company, spring water volume withdrawn from PBH-1 is presented as total gallons recorded as offloaded at bottling facilities. Table 3 summarizes the 2019 monthly withdrawal volumes. Spring water withdrawals from PBH-1 totaled 118,338,772 gallons for the 2019 calendar year.

7.0 BIOLOGICAL MONITORING

To complement the biological investigations conducted by Normandeau Associates in the 2006 and 2008 field seasons, Poland Spring initiated a long-term biological monitoring program of Wards Brook beginning in 2009. Bio-monitoring, conducted every other year, was completed by Stantec in 2019 and appears in Appendix C.

8.0 FINDINGS

This report represents the eleventh annual report for Evergreen Spring in Fryeburg, Maine prepared on behalf of Poland Spring and is a summary of hydrologic data collected from the Wards Brook Aquifer through the 2019 calendar year. Poland Spring also provides these data voluntarily to the Town of Fryeburg, Fryeburg Water District and the Fryeburg Water Company on a monthly basis in the form of a monthly report that began with the December 2008 report. These data provide an on-going comprehensive summary of hydrologic conditions in the Wards Brook Aquifer. Findings for 2019 include the following:

- In 2019, Poland Spring purchased 118,338,772 gallons of spring water from the FWC;
- 118,338,772 gallons represents approximately 54% of the discretionary water available as determined by Emery & Garrett Groundwater, Inc.;
- Normal seasonal variations of groundwater levels were observed through 2019 at all monitoring well locations;
- Highest groundwater elevations for 2019 were observed in April and May, while the lowest groundwater elevations were primarily recorded between September and November;
- Surface water levels showed normal seasonal variation in 2019;
- Total precipitation for the 2019 calendar year was 49.70 inches, as recorded by the on-site rain gauge, 7.99 inches more than in 2018, and approximately two inches above the 20 year mean.

9.0 CONCLUSIONS

Based on our analysis of groundwater and surface water data collected in Fryeburg, Luetje Geological Services and McDonald Morrissey Associates have not observed any adverse impact to waters of the State, water-related natural resources and existing uses as a result of the sale of water by the Fryeburg Water Company to Poland Spring.

If you have any questions regarding the data, explanations, or interpretations included in this report, please do not hesitate to contact Ed Luetje (207) 415-9898.

Sincerely,

Luetje Geological Services, LLC

Ed Luetje C.G.

McDonald Morrissey Associates, Inc.

Daniel J. Morrissey

cc: Fryeburg Water Company (Mr. George Weston)
Emery & Garrett Groundwater, Inc. (Mr. Dan Tinkham)
Poland Spring (Mr. Joshua Bowe)
Town of Fryeburg (Ms. Katie Haley)
Maine Water Company (Mr. Rick Knowlton)

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TABLE 1
FRYEBURG MONITORING PROGRAM PLAN

Monitoring Station	Frequency
Monitoring Wells	
TW-2 [1]	Monthly
TW-9	Monthly
MW-101 [2]	Monthly
MW-103	Monthly
MW-105	Monthly
MW-107	Monthly
MW-108	Monthly
MW-109	Monthly
MW-110	Monthly
MW-113	Monthly
MW-114	Monthly
Surface Water Stations	
WPMP-1 [3]	Monthly
WPSG-2A [4]	Monthly
SRMP-1 [5]	Monthly
LPSG-1 [6]	Monthly
Precipitation	
RG – On-site Rain Gauge	Continuous
ICAO Station KIZG (Fryeburg Airport)	Continuous
Withdrawal Data	
PBH-1	Continuous

Notes:
1. TW refers to 'test well'.
2. MW refers to 'monitoring well'.
3. WPMP refers to 'Wards Pond Monitoring Point'.
4. WPSG refers to 'Wards Pond Staff Gauge'.
5. SRMP refers to 'Saco River Monitoring Point'.
6. LPSG refers to 'Lovewell Pond Staff Gauge'.

TABLE 2
2019 PRECIPITATION SUMMARY

MONTH	*ON-SITE RAIN GAUGE DATA (inches)*	*FRYEBURG EASTERN SLOPES AIRPORT (ICAO STATION KIZG)[1] (inches)*
Jan 2019	5.53	5.25
Feb 2019	3.11	2.77
Mar 2019	2.35	2.23
Apr 2019	4.70	5.00
May 2019	4.32	4.16
Jun 2019	4.93	5.26
Jul 2019	4.13	1.05
Aug 2019	5.80	5.45
Sep 2019	1.14	1.14
Oct 2019	6.67	6.81
Nov 2019	2.06	1.51
Dec 2019	4.96	4.79
2019 Total	**49.70**	**45.42**

Notes: 1. KIZG station updated data. KIZG data presented in the monthly reports is preliminary, and is rechecked for this annual report.

TABLE 3
PBH-1 2019 WITHDRAWAL SUMMARY

Month	Monthly Total (gal)
Jan 2019	6,000,434
Feb 2019	4,373,206
Mar 2019	11,051,979
Apr 2019	7,023,152
May 2019	10,544,651
Jun 2019	13,666,440
Jul 2019	15,599,850
Aug 2019	15,637,670
Sep 2019	11,444,795
Oct 2019	5,483,505
Nov 2019	5,770,640
Dec 2019	11,742,450
2019 Total	**118,338,772**

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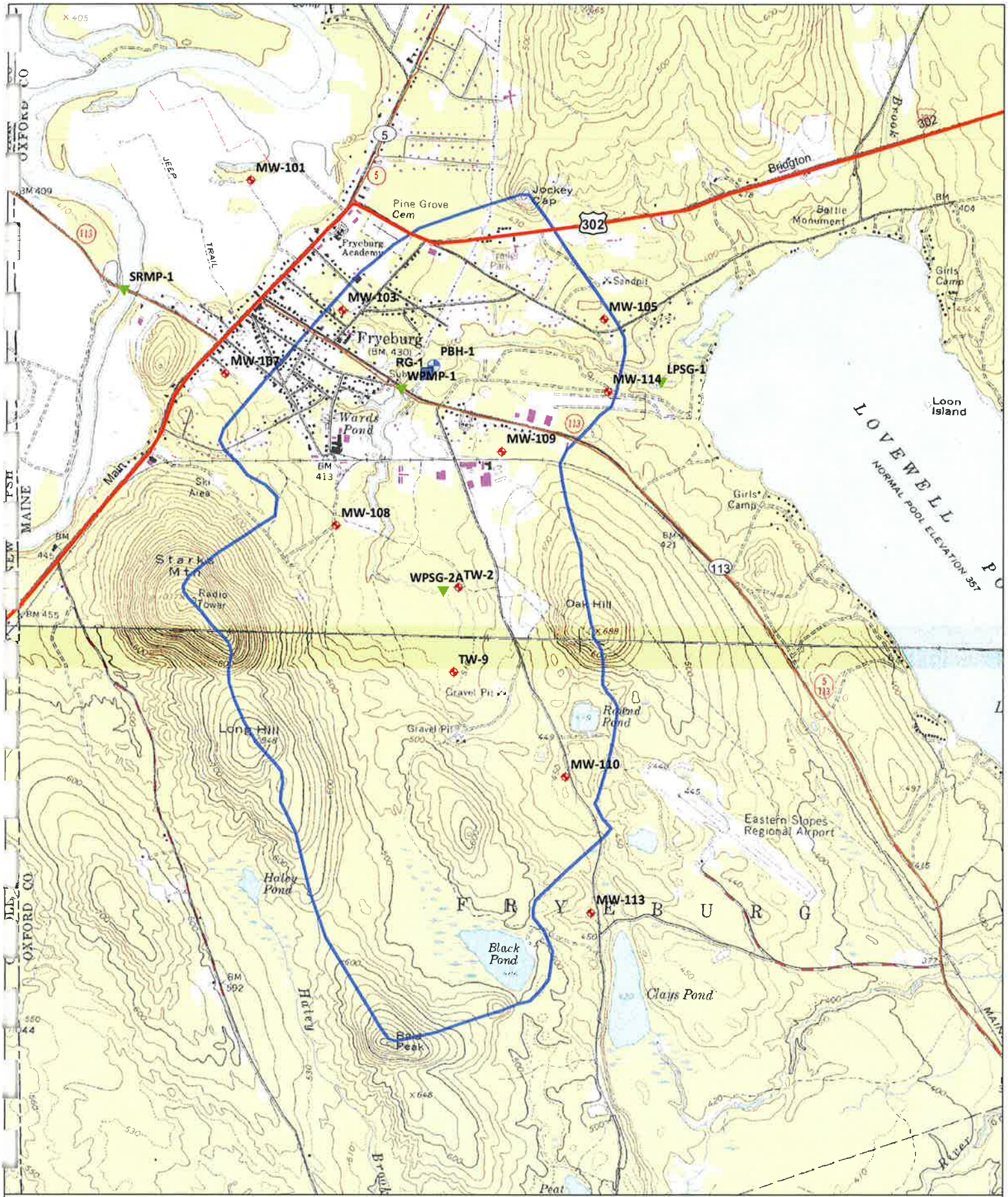
Figure 2B	Hydrograph for 2019 Groundwater Elevations (Elevation 395 – 415 Feet NAVD88)
Figure 2C	Hydrograph for 2019 Groundwater Elevations (Elevation 375 – 395 Feet NAVD88)
Figure 3	Hydrograph for MW-108 and OW-1214
Figure 4	Hydrograph for 2019 Surface Water



BOREHOLE
MONITORING WELL
RAIN GAUGE
SURFACE WATER STATION
WARDS BROOK WATERSHED (APPROXIMATE)

FIGURE 1
2019 ANNUAL AQUIFER MONITORING REPORT
EVERGREEN SPRING
FRYEBURG, MAINE

0 500 1,000 2,000 3,000 Feet

NOTES:
1. ALL GENERAL DATA LAYERS ACQUIRED FROM THE MAINE OFFICE OF GIS AND/OR ESRI ONLINE.

N

DATE:
1/27/2020

LUETJE GEOLOGICAL SERVICES
153 FLYING POINT ROAD
FREEPORT, MAINE 04032

FIGURE 2A
HYDROGRAPH FOR 2019 GROUNDWATER ELEVATIONS (ELEVATION 410 - 430 FEET NAVD88)

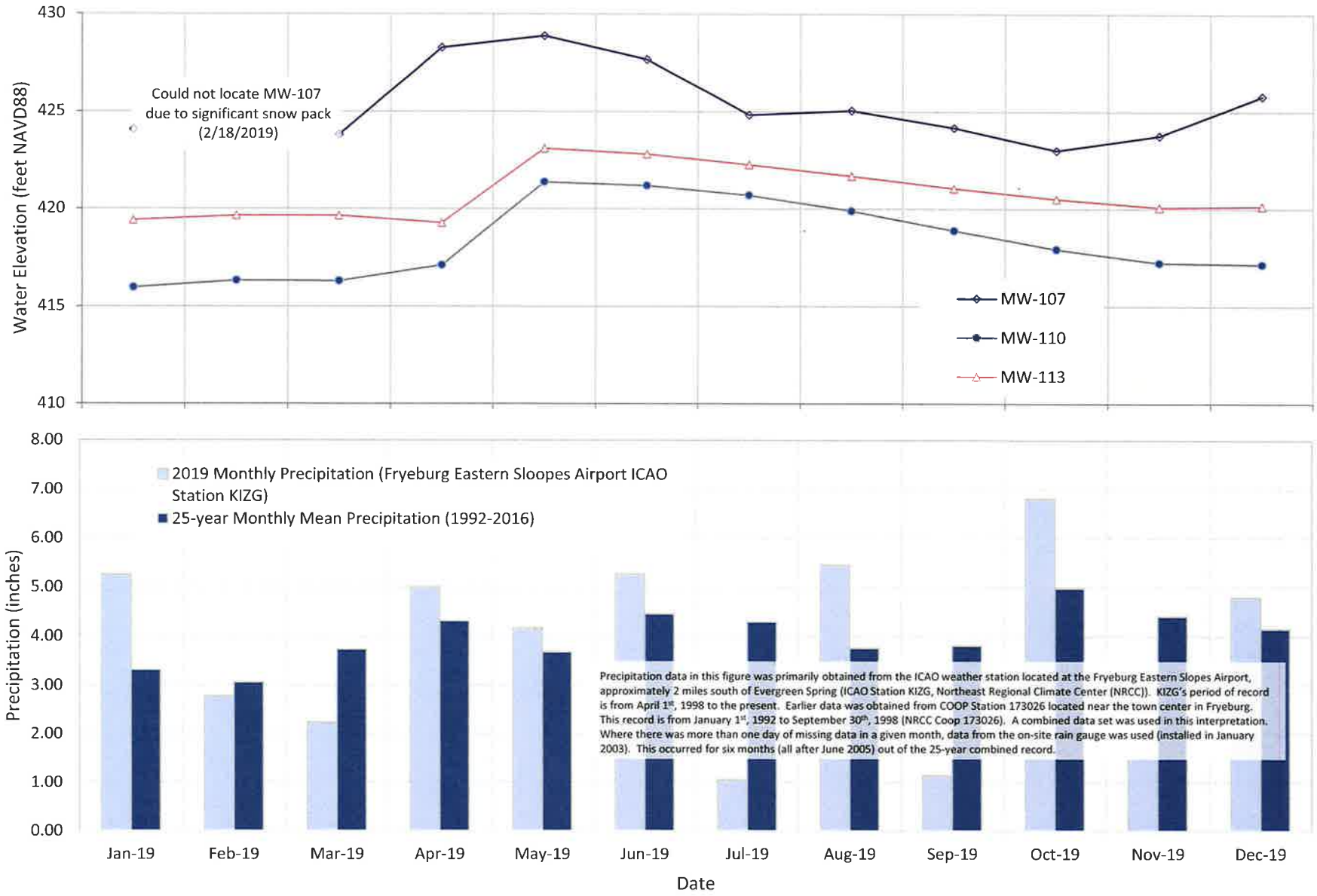


FIGURE 2B

HYDROGRAPH FOR 2019 GROUNDWATER ELEVATIONS (ELEVATION 395 - 415 FEET NAVD88)

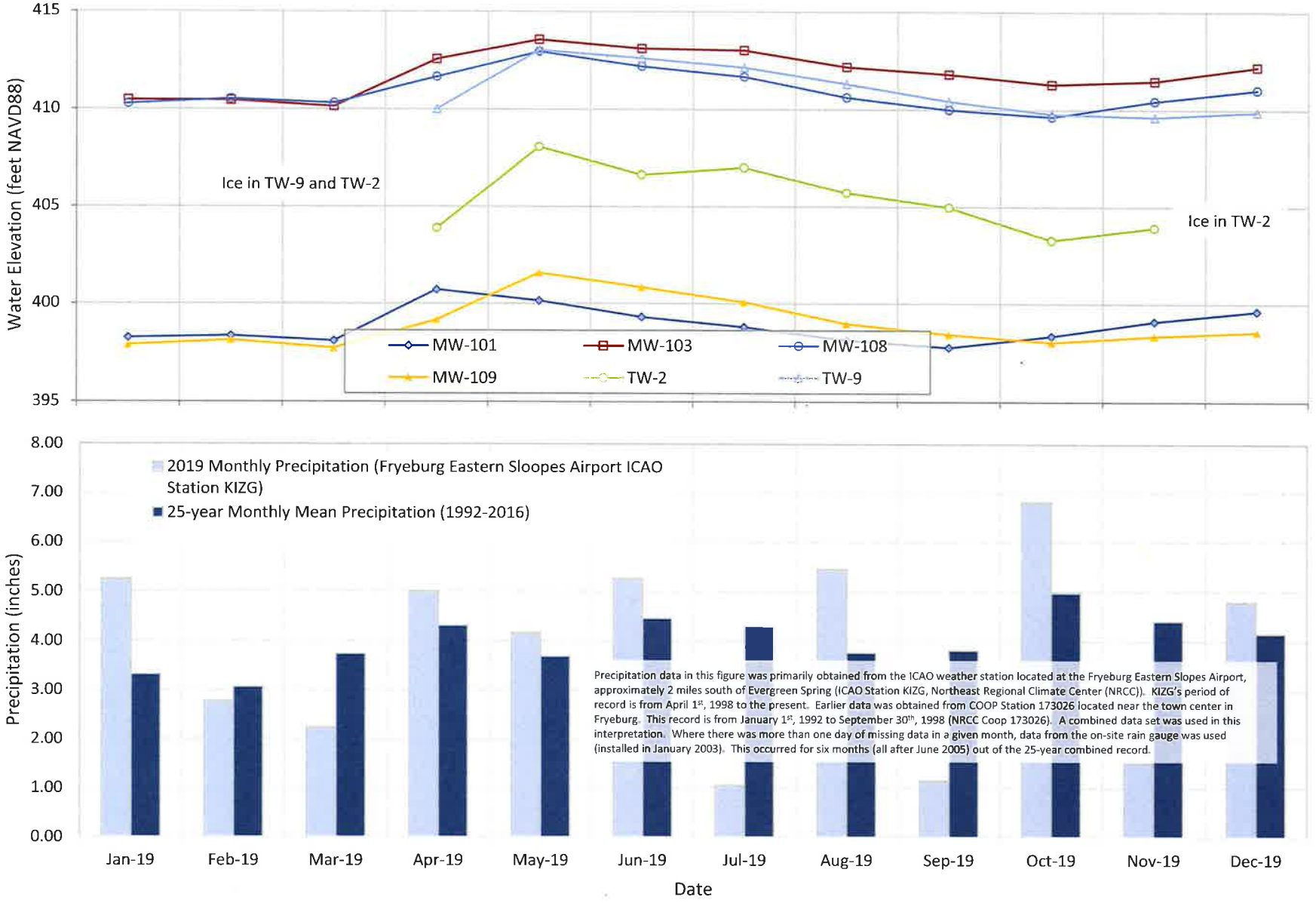


FIGURE 2C

HYDROGRAPH FOR 2019 GROUNDWATER ELEVATIONS (ELEVATION 375 - 395 FEET NAVD88)

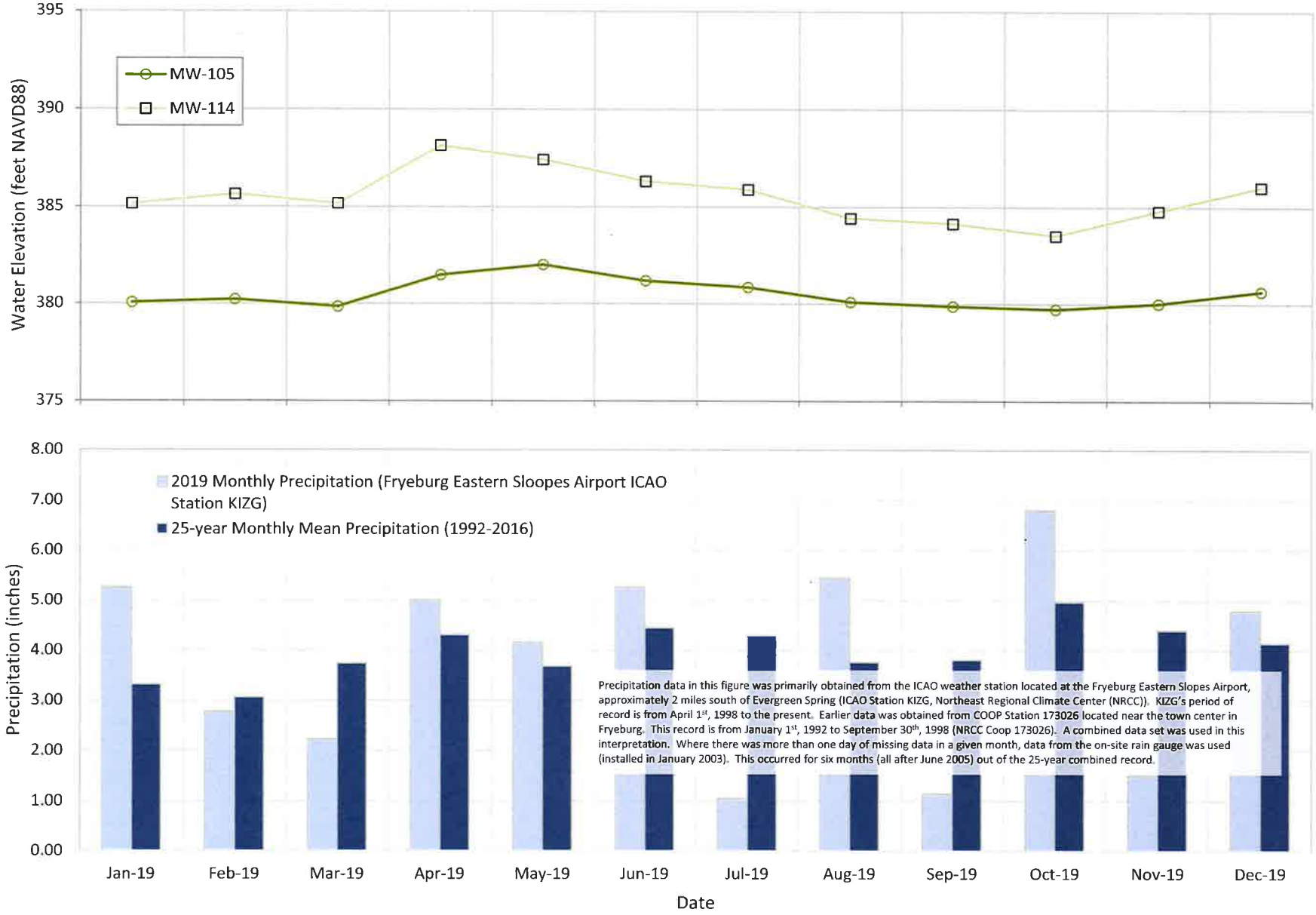


FIGURE 3
HYDROGRAPH FOR MW-108 AND OW-1214

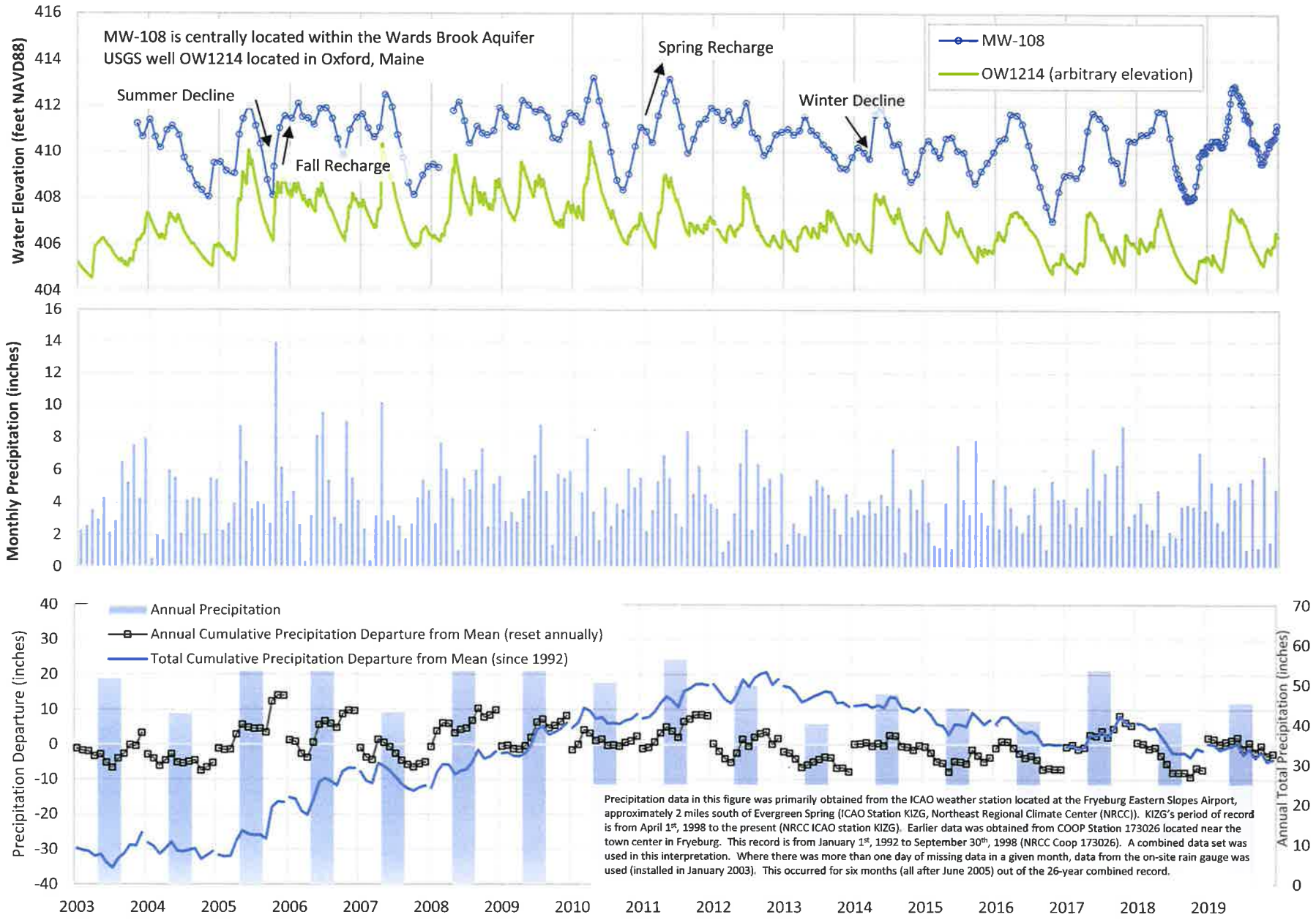
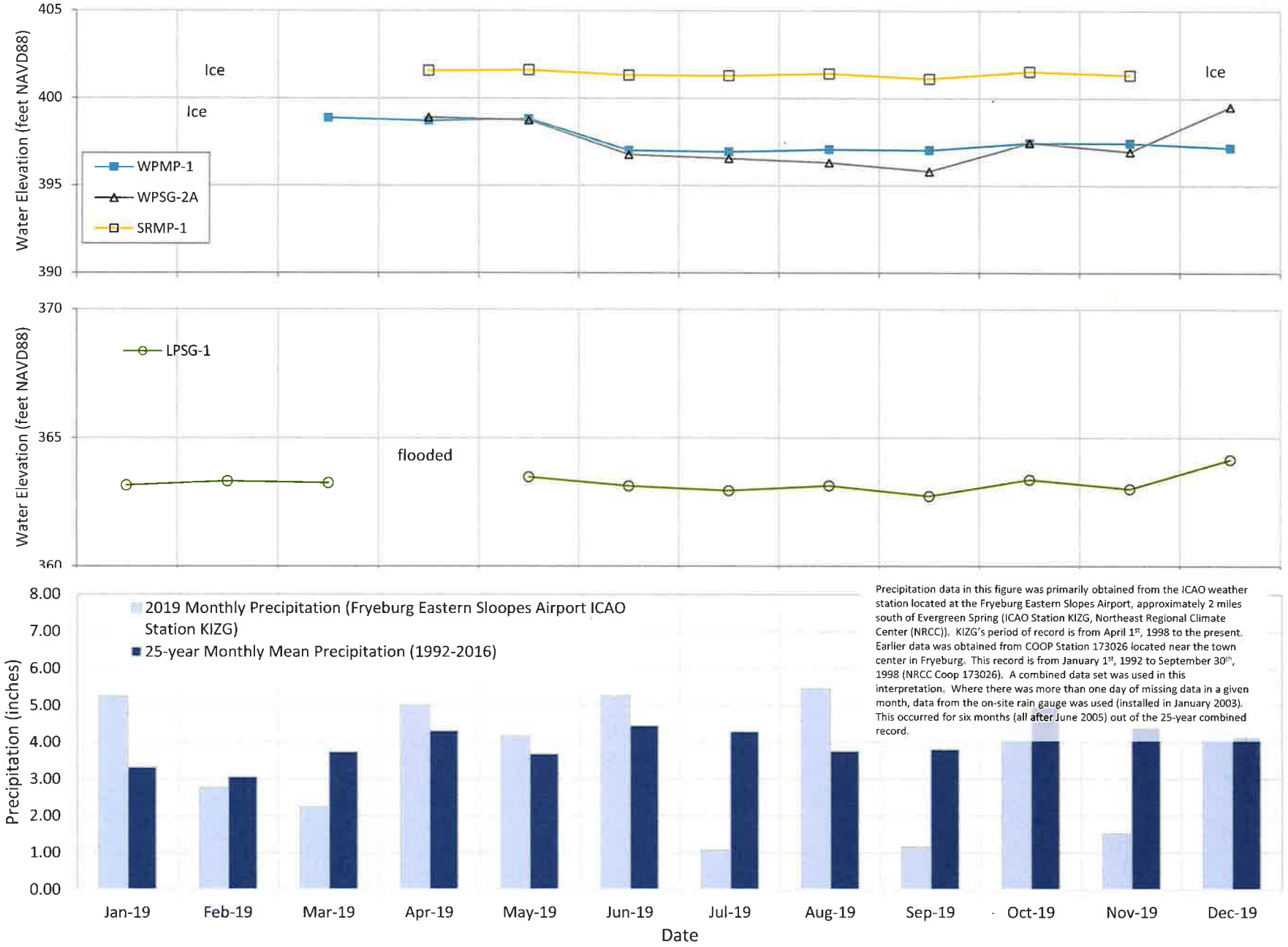


FIGURE 4
HYDROGRAPH FOR 2019 SURFACE WATER



Precipitation data in this figure was primarily obtained from the ICAO weather station located at the Fryeburg Eastern Slopes Airport, approximately 2 miles south of Evergreen Spring (ICAO Station KIZG, Northeast Regional Climate Center (NRCC)). KIZG's period of record is from April 1st, 1998 to the present. Earlier data was obtained from COOP Station 173026 located near the town center in Fryeburg. This record is from January 1st, 1992 to September 30th, 1998 (NRCC Coop 173026). A combined data set was used in this interpretation. Where there was more than one day of missing data in a given month, data from the on-site rain gauge was used (installed in January 2003). This occurred for six months (all after June 2005) out of the 25-year combined record.

Appendices

Appendix A	Photographs
Appendix B	Groundwater and Surface Water Elevation Data
Appendix C	2019 Evergreen Spring Biomonitoring Report

APPENDIX A

Photographs

Photographs A and AA: Measuring depth to water using a water level indicator at MW-114.

Photograph A

Photograph AA

Photograph B: WBSG-2 – Typical staff gage used for measuring surface water elevation.
Photograph BB: Lovewell Pond from boat ramp off Rt. 113 facing north (6/19/2019).

Photograph B

Photograph BB

Photograph C: On-site Rain Gage

APPENDIX B

Groundwater and Surface Water Elevation Data
Fryeburg, Maine

APPENDIX B
GROUNDWATER AND SURFACE WATER ELEVATION DATA
FRYEBURG, MAINE

Monitoring Wells	MW-101 [2]	MW-103	MW-105	MW-107	MW-108	MW-109	MW-110	MW-113	MW-114	TW-2	TW-9
Reference Elevation (feet NAVD88) [1]	408.32	421.42	404.98	432.05	419.88	420.08	461.84	441.11	405.25	404.19	409.17
1/17/2019	398.24	410.45	380.04	424.06	410.26	397.87	415.96	419.40	385.14	ice	ice
2/18/2019	398.34	410.44	380.21	NR	410.50	398.12	416.31	419.64	385.64	ice	ice
3/19/2019	398.08	410.13	379.84	423.80	410.29	397.72	416.29	419.64	385.15	ice	ice
4/19/2019	400.70	412.53	381.47	428.29	411.62	399.16	417.10	419.27	388.12	403.86	410.00
5/20/2019	400.13	413.53	382.00	428.89	412.91	401.56	421.36	423.09	387.41	408.08	412.99
6/19/2019	399.30	413.07	381.18	427.68	412.16	400.82	421.18	422.79	386.30	406.63	412.58
7/19/2019	398.80	412.99	380.84	424.82	411.64	400.06	420.69	422.25	385.88	407.00	412.12
8/19/2019	398.12	412.15	380.08	425.04	410.60	398.97	419.88	421.67	384.42	405.71	411.28
9/19/2019	397.76	411.78	379.87	424.16	409.98	398.43	418.87	421.04	384.14	404.96	410.41
10/18/2019	398.34	411.27	379.72	422.99	409.63	398.03	417.93	420.50	383.52	403.24	409.78
11/21/2019	399.09	411.44	380.01	423.75	410.43	398.35	417.23	420.07	384.80	403.90	409.62
12/20/2019	399.61	412.16	380.63	425.78	411.00	398.55	417.15	420.13	386.02	ice	409.89

Surface Water Stations	LPSG-1 [3]	WPMP-1 [4]	SRMP-1 [5]	WPSG-2A [6]
Reference Elevation (feet NAVD88)	364.83 364.76	401.22	418.85	402.50 402.33
1/17/2019	363.15	ice	ice	ice
2/18/2019	363.30	ice	ice	ice
3/19/2019	363.24	398.87	ice	ice
4/19/2019	flooded	398.70	401.57	398.90
5/20/2019	363.48	398.83	401.62	398.75
6/19/2019	363.12	397.01	401.32	396.77
7/19/2019	362.94	396.93	401.29	396.55
8/19/2019	363.13	397.06	401.41	396.30
9/19/2019	362.73	397.02	401.12	395.80
10/18/2019	363.37	397.44	401.54	397.45
11/21/2019	363.01	397.42	401.34	396.95
12/20/2019	364.15	397.17	ice	399.53

NOTES:

1. NAVD88 is the North American Vertical Datum 1988. Elevations are in feet NAVD. Measuring points were re-surveyed in November 2015 by Bliss Associates.

2. 'MW' refers to 'monitoring well'.

3. 'LPSG' refers to 'Lovewell Pond Staff Gauge'.
364.83 = old reference elevation (May, 2018)
364.76 = new reference elevation (May, 2019)

4. 'WPMP' refers to 'Wards Pond Monitoring Point'.
401.22 = reference elevation (November 2015, Bliss)

5. 'SRMP' refers to 'Saco River Monitorinng Point'.
418.85 = reference elevation (November 2015, Bliss)

6. 'WPSG' refers to 'Wards Pond Staff Gauge.
402.50 = old reference elevation (May, 2018)
402.33 = new reference elevation (May, 2019)

APPENDIX B
GROUNDWATER AND SURFACE WATER ELEVATION DATA
FRYEBURG, MAINE

MW-108 DATA

Date	Groundwater Elevation (NAVD88)	Date	Groundwater Elevation (NAVD88)	Date	Groundwater Elevation (NAVD88)	Date	Groundwater Elevation (NAVD88)	Date	Groundwater Elevation (NAVD88)	Date	Groundwater Elevation (NAVD88)
11/6/2003	411.23	4/10/2007	411.06	10/20/2010	409.03	4/18/2014	411.64	10/18/2017	408.71	2/15/2019	410.50
12/4/2003	410.67	5/8/2007	412.49	11/22/2010	410.24	5/19/2014	411.89	11/20/2017	410.53	2/18/2019	410.50
1/9/2004	411.38	6/12/2007	411.94	12/20/2010	411.08	6/19/2014	411.21	12/19/2017	410.50	2/23/2019	410.54
2/6/2004	410.65	7/11/2007	410.75	1/19/2011	410.90	7/21/2014	410.32	1/22/2018	410.80	3/5/2019	410.33
3/4/2004	410.18	8/9/2007	409.75	2/18/2011	410.42	8/18/2014	410.36	2/21/2018	410.81	3/12/2019	410.25
4/6/2004	410.93	9/5/2007	408.65	3/21/2011	411.58	9/22/2014	409.17	3/19/2018	411.02	3/19/2019	410.29
5/4/2004	411.12	10/4/2007	408.14	4/22/2011	412.56	10/20/2014	408.71	4/18/2018	411.80	3/20/2019	410.27
6/8/2004	410.73	11/18/2007	408.98	5/20/2011	413.18	11/20/2014	409.05	5/21/2018	411.76	3/28/2019	410.47
7/5/2004	409.73	12/14/2007	409.34	6/20/2011	412.22	12/19/2014	410.09	6/19/2018	410.67	4/4/2019	410.77
8/3/2004	409.23	1/11/2008	409.44	7/20/2011	411.12	1/19/2015	410.51	7/18/2018	409.37	4/11/2019	411.08
9/7/2004	408.53	2/8/2008	409.31	8/22/2011	409.96	2/20/2015	410.08	7/27/2018	409.11	4/16/2019	411.42
10/4/2004	408.33	3/20/2008	nr	9/21/2011	410.57	3/19/2015	409.78	8/2/2018	408.90	4/19/2019	411.62
11/8/2004	408.05	4/25/2008	411.79	10/19/2011	411.23	4/20/2015	410.62	8/6/2018	408.90	4/26/2019	412.18
12/6/2004	409.50	5/22/2008	412.15	11/21/2011	411.45	5/20/2015	410.67	8/16/2018	408.62	5/2/2019	412.66
1/6/2005	409.53	6/20/2008	411.34	12/21/2011	411.92	6/18/2015	410.07	8/20/2018	408.56	5/10/2019	412.85
2/7/2005	409.17	7/17/2008	410.38	1/20/2012	411.76	7/21/2015	409.99	8/21/2018	408.51	5/20/2019	412.91
3/21/2005	409.06	8/25/2008	411.11	2/20/2012	411.39	8/19/2015	409.11	8/30/2018	408.42	5/22/2019	412.82
4/14/2005	410.75	9/19/2008	410.83	3/20/2012	411.79	9/17/2015	408.65	9/7/2018	408.11	6/6/2019	412.56
5/5/2005	411.43	10/15/2008	410.75	4/20/2012	411.20	10/19/2015	409.18	9/13/2018	408.14	6/14/2019	412.46
6/6/2005	411.97	11/19/2008	410.93	5/18/2012	411.40	11/18/2015	409.55	9/19/2018	407.97	6/19/2019	412.16
7/8/2005	411.13	12/19/2008	411.91	6/20/2012	412.14	12/22/2015	410.01	9/20/2018	407.91	6/26/2019	412.23
8/2/2005	410.34	1/19/2009	411.54	7/20/2012	410.87	1/22/2016	410.53	9/29/2018	407.95	7/3/2019	411.91
9/7/2005	408.77	2/16/2009	411.11	8/17/2012	410.63	2/19/2016	410.64	10/7/2018	407.97	7/11/2019	411.52
10/5/2005	408.13	3/17/2009	411.09	9/18/2012	409.87	3/18/2016	411.67	10/10/2018	407.96	7/18/2019	411.69
10/11/2005	409.34	4/16/2009	412.23	10/17/2012	410.16	4/20/2016	411.62	10/19/2018	408.10	7/19/2019	411.64
11/8/2005	411.03	5/18/2009	412.03	11/19/2012	410.79	5/18/2016	411.24	10/23/2018	408.07	7/24/2019	411.46
12/7/2005	411.55	6/22/2009	411.75	12/20/2012	410.89	6/20/2016	410.32	11/2/2018	408.58	7/31/2019	411.38
1/10/2006	411.44	7/20/2009	411.83	1/21/2013	411.01	7/19/2016	409.38	11/18/2018	409.40	8/6/2019	411.35
2/13/2006	412.09	8/24/2009	411.50	2/20/2013	410.77	8/19/2016	408.52	11/19/2018	409.86	8/14/2019	410.46
3/7/2006	411.52	9/21/2009	410.63	3/22/2013	410.96	9/20/2016	407.67	11/20/2018	409.88	8/19/2019	410.60
4/5/2006	411.46	10/22/2009	410.54	4/19/2013	411.55	10/21/2016	407.03	11/30/2018	409.95	8/21/2019	410.49
5/5/2006	411.19	11/20/2009	411.20	5/20/2013	410.96	11/22/2016	408.30	12/6/2018	410.08	8/28/2019	410.41
6/6/2006	411.87	12/18/2009	411.70	6/19/2013	410.77	12/21/2016	408.99	12/13/2018	410.05	9/4/2019	410.36
7/6/2006	411.90	1/19/2010	411.57	7/22/2013	410.34	1/20/2017	409.04	12/19/2018	410.02	9/11/2019	410.31
8/8/2006	411.44	2/18/2010	411.31	8/19/2013	410.12	2/21/2017	408.91	12/20/2018	409.99	9/19/2019	410.05
9/5/2006	410.56	3/18/2010	412.26	9/19/2013	409.80	3/21/2017	409.34	12/27/2018	410.30	9/26/2019	409.77
10/4/2006	409.84	4/20/2010	413.22	10/21/2013	409.31	4/19/2017	410.97	1/2/2019	410.32	10/4/2019	409.52
11/7/2006	410.96	5/19/2010	412.22	11/20/2013	409.27	5/18/2017	411.72	1/8/2019	410.33	10/11/2019	409.53
12/12/2006	411.49	6/21/2010	411.18	12/20/2013	409.79	6/19/2017	411.50	1/16/2019	410.28	10/18/2019	409.63
1/10/2007	411.64	7/19/2010	409.99	1/20/2014	410.21	7/20/2017	411.11	1/17/2019	410.26	10/24/2019	409.91
2/8/2007	411.03	8/19/2010	408.76	2/20/2014	409.98	8/23/2017	409.68	1/25/2019	410.53	10/31/2019	410.02
3/12/2007	410.65	9/20/2010	408.35	3/19/2014	409.70	9/19/2017	409.56	2/9/2019	410.52	11/8/2019	410.44

APPENDIX B
GROUNDWATER AND SURFACE WATER ELEVATION DATA
FRYEBURG, MAINE

MW-108 DATA

Date	Groundwater Elevation (NAVD88)										
11/14/2019	410.27										
11/19/2019	410.41										
11/21/2019	410.43										
11/26/2019	410.55										
12/5/2019	410.60										
12/12/2019	410.66										
12/19/2019	410.95										
12/20/2019	411.00										
12/24/2019	411.21										

APPENDIX C

2019 Evergreen Spring Biomonitoring Report

Stantec

Evergreen Spring: 2019 Biological Monitoring Report

Fryeburg, Maine

February 20, 2020

Prepared for:

Nestle Waters North America Inc.
123 Preservation Way
Poland Spring, ME 04274

Prepared by:

Stantec Consulting Services Inc.
30 Park Drive
Topsham, ME 04086

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1.0 INTRODUCTION

Nestle Waters North America Inc. (Poland Spring) purchases water from Evergreen Spring, a spring site owned by the Fryeburg Water Company along Wards Brook and Route 113 in Fryeburg, Maine (Figure 1). Since 2009, Poland Spring continues to conduct voluntary monthly monitoring of groundwater levels of the underlying aquifer and the surface water levels of Wards Brook to assess potential impacts of the groundwater withdrawal operations on the overall hydrology of the spring site on a bi-annual basis. In 2007, Normandeau Associates, Inc. (Normandeau) conducted a baseline biological characterization of aquatic and wetland resources within Wards Brook and throughout Lovewell Pond to provide a preliminary assessment of potential impacts to wetland and aquatic resources as a result of groundwater withdrawal operations.[1]

To supplement the ongoing hydrological monitoring of the spring site and to augment the previous biological sampling completed by Normandeau, Poland Spring retained Stantec Consulting Services Inc. (Stantec) to initiate an on-site biological monitoring (biomonitoring) program in 2009. The purpose of the bi-annual biomonitoring is to assess possible stream habitat impacts potentially related to continued groundwater withdrawal operations through benthic macroinvertebrate monitoring generally on an every-other-year schedule. This biomonitoring program was voluntarily initiated as part of Poland Spring's commitment to maintaining sustainable yields of groundwater withdrawal and to avoid adverse impacts to the associated natural resources. This biomonitoring program is not part of any required condition associated with permits issued by the Maine Department of Environmental Protection (MDEP) or any other state or federal regulatory agency. This report presents the results of the 2019 biomonitoring.

2.0 2019 STREAM BIOMONITORING METHODOLOGY

To monitor the benthic habitats within Wards Brook, Stantec deployed one set of rock bags (i.e., 3 bags) to sample the macroinvertebrate community. Rock bags were deployed at the same approximate location as the previous biomonitoring events in run-riffle habitat approximately 0.6 miles downstream of the borehole and 100 feet upstream of a snowmobile bridge at the Grist Mill site (RB-1; Figure 2). Macroinvertebrate species vary in their tolerance to organic pollutants and stream habitat alterations. Through sampling and analyses of the macroinvertebrate communities, determinations of overall water quality based on these assemblages can be made. Long-term biological sampling of the macroinvertebrate communities can document potential changes in water quality over time. The RB-1 sampling site is similar in stream habitat to the Downstream Station sampled by Normandeau in 2007 and is in the same location that was sampled by Stantec on an every-other-year basis between 2009 and 2017. Deployment and retrieval of the rock bags was conducted in accordance with *Methods for*

[1] Normandeau Associates, Inc. December 2007. *Baseline Characterization of Natural Resources of Wards Brook and Lovewell Pond in Support of Assessment of Potential Groundwater Withdrawal Impacts.* Prepared for Town of Fryeburg.

Biological Sampling and Analysis of Maine's Rivers and Streams.[2] Rock bags were deployed for a 24–32-day portion of the low flow season (i.e., July through September). This biomonitoring methodology is consistent with the approach implemented by Normandeau in 2007 and continued by Stantec in 2009 through 2017. Each rock bag was located using a Trimble® Pro-XR Global Positioning System receiver. Consistent with previous biomonitoring, samples were preserved in the field and submitted to Lotic, Inc. (Lotic) for taxonomic identification and habitat quality analysis using their macroinvertebrate water quality estimation model. MDEP Biological Monitoring Unit Stream Macroinvertebrate Field Data Sheets were completed at the time of rock bag deployment and retrieval and included habitat information and water quality parameters such as temperature, dissolved oxygen, specific conductivity, and pH. Representative photographs were taken of habitat conditions.

Lotic's water quality model uses several parameters from the stream macroinvertebrate community, including species diversity and abundance of certain species, to determine the water quality of the stream. Under Maine Revised Statutes Title 38, Chapter 3, Section 465, four categories of water classification have been established. These standards describe the standards of aquatic life (e.g., macroinvertebrates) to be attained within Maine streams.

The aquatic life standards are as follows:

Class	Biological Standard
AA	Aquatic life as naturally occurs
A	Aquatic life as naturally occurs
B	Water quality sufficient to support all indigenous aquatic species. Only non-detrimental changes to the resident biological community are allowed.
C	Water quality sufficient to support all indigenous fish species. Changes to aquatic life may occur but structure and function of the resident biological community must be maintained.

Through systematic sampling of various stream habitats throughout Maine, the MDEP compiled a baseline database of representative macroinvertebrate communities from unimpaired streams to highly altered streams. These data provided the basis of the stream classification above. Samples can be compared to this baseline database to determine stream classification and water quality. Lotic's report provided in Appendix A further elaborates on the baseline data compilation and the relevant macroinvertebrate community parameters used in evaluating water quality.

3.0 2019 STREAM BIOMONITORING RESULTS

Stantec deployed rock bags on August 19, 2019 and retrieved the rock bags on September 13, 2019. Rock bags were deployed in a shallow run-riffle habitat with a sand-gravel substrate. Physical

[2] Davies, S. and L. Tsomides. 2002. *Methods for Biological Sampling and Analysis of Maine's Rivers and Streams*. Maine Department of Environmental Protection. Bureau of Land and Water Quality. Augusta, ME.

measurements (e.g., wetted width, dissolved oxygen, pH, and specific conductivity) and qualitative observations of habitat characteristics were similar to previous monitoring years. Stantec collected the macroinvertebrate species from each rock bag and provided the samples to Lotic. Lotic identified and enumerated each macroinvertebrate species from the rock bag samples. Lotic then analyzed the data using their water quality model to estimate the water quality of the stream. Based on the macroinvertebrate water quality estimation model, Lotic determined that the benthic community at the RB-1 station in Wards Brook best represents a Class A stream. Lotic noted the high richness of mayflies, stoneflies, and caddisflies (i.e., EPT species) to support the Class A determination. The state statutory designation of Wards Brook is Class C[3]. The Class A water quality designation based on Lotic's water quality model is better than the statutory classification as indicated by the macroinvertebrate communities. Appendix A contains the results of Lotic's analyses. Appendix B contains representative stream habitat photographs taken during the 2019 biomonitoring.

4.0 DISCUSSION

No water quality classification was determined by Normandeau for their 2007 baseline sampling and 2009 sampling determined a Class B water quality. Similar to previous sampling results in 2011, 2013, 2015. and 2017, the macroinvertebrate community sampled in 2019 continues to indicate Class A water quality. Class A results attained during these years resulted from a high proportion of EPT species, which generally do not tolerate poor water quality. Both mayflies (Ephemeroptera) and stoneflies (Plecoptera) are species that are characteristic of higher quality waters with minimal disturbances. Lotic noted that the overall abundance of stoneflies and EPT richness supported the Class A estimation.

A comparison of the macroinvertebrate communities sampled between 2007 and 2019 is presented in Appendix C. Table 1 below compares various metrics relative to the macroinvertebrate communities sampled between 2007 and 2019. Most metrics in 2019 are comparable to and within the range of values from previous monitoring years. Mayflies continued to increase in mean abundance in 2019. As noted above, mayflies are characteristic of higher quality waters with minimal disturbances. A comparison of the data table in Appendix C show minor shifts in species diversity and abundance, but dominant macroinvertebrate species have been relatively consistent since the initiation of Stantec's biomonitoring efforts. Dominant and common taxa continue to include black flies (*Simulium* sp.), bloodworm midges (Chironomidae), and several species of mayflies and caddisflies. There was a continued increase abundance of a net-spinning caddisfly species (i.e., *Hydropsyche sparna*) in 2019 compared with previous years. This is a common species that is frequently found in a variety of clear sandy streams and rivers within forested areas of its range.[4] It is a filtering collector organism that obtains its food by filtering fine particulate matter (e.g., detritus or algae) from the water column. It has a tolerance value of 6 (out of 10) and is reportedly sensitive to nutrient enrichment in its habitat (Schmude and Hilsenhoff 1986). An increase in abundance may correspond to an increase of available food sources, which are expected to

[3] Wards Brook is classified as Class C surface water. Title 38, Section 467-12(B)(2).
[4] Schmude, K. L. and W. L. Hilsenhoff. 1986. Biology, ecology, larval taxonomy, and distribution of Hydropsychidae (Trichoptera) in Wisconsin. The Great Lakes Entomologist. Vol 19: No. 3, 123–145

vary annually and seasonally due to runoff and high-velocity flow events, inputs of detritus, or water temperature.

Table 1. Comparison of Rock Bag Data

Category	2007	2009	2011	2013	2015	2017	2019
Plecoptera mean abundance	24	37	48.7	8.7	8.3	14.3	14.7
Relative Plecoptera abundance	0.07	0.06	0.12	0.04	0.03	0.04	0.04
Ephemeroptera mean abundance	45.3	80.3	95	44.7	57.3	102.7	110
Relative Ephemeroptera abundance	0.12	0.13	0.24	0.18	0.22	0.30	0.28
Tricoptera mean abundance	147.3	99.3	105.3	52.7	58.3	90	125.3
Relative Trichoptera abundance	0.40	0.16	0.27	0.21	0.22	0.26	0.32
Chironomid mean abundance	65.7	78.7	39.7	59.3	85.3	81	75
Relative Chironomid abundance	0.18	0.12	0.1	0.24	0.33	0.24	0.19
Number of taxa with tolerance values between 0 and 2*	8	16	18	17	15	16	15
Number of taxa with tolerance values between 3 and 5*	13	16	15	12	13	12	16
Number of taxa with tolerance values between 6 and 8*	12	15	16	9	8	7	9
Number of taxa with tolerance values above 8*	1	1	0	1	0	0	1
Stream Classification	NR**	B	A	A	A	A	A

**Tolerance values obtained from Bode et al. 1996. Quality Assurance Work Plan for Biological Stream Monitoring in New York State. NYS Department of Environmental Conservation, Albany, NY. 89p.; Mandaville, S.M. 2002. Benthic Macroinvertebrates in Freshwaters- Taxa Tolerance Values, Metrics, and Protocols. Soil and Water Conservation Society of Metro Halifax, Nova Scotia, Canada. Tolerance values range from 0–10 with lower tolerance values attributed to good to excellent water quality and high tolerance values attributed to fair to very poor water quality.*

*** 2007 studies were completed by Normandeau and stream classification was not reported in the December 2007 report*

Wards Brook is located in a suburban landscape and is surrounded by residential developments and major roadways such as Route 113 and Route 302. Development in the watershed has and will continue to affect Wards Brook water quality through surface water runoff from impervious surfaces, including roadways and parking lots. Negative effects such as sedimentation, nutrient inputs such as phosphorus, and stream temperature increases from surface water runoff are expected to influence the macroinvertebrate community to shift toward species that are more tolerant of anthropogenic

disturbances such as black flies, bloodworm midges, other true flies (Diptera), or net-spinning caddisflies (e.g., *Hydropsyche* spp. and *Cheumatopsyche* spp.).

The continued abundance of EPT taxa, as well as species with low to moderate tolerance values, is characteristic of streams in wooded suburban environments. Based on the 2019 results, the macroinvertebrate data indicate that water withdrawals have not adversely affected the water quality of Wards Brook.

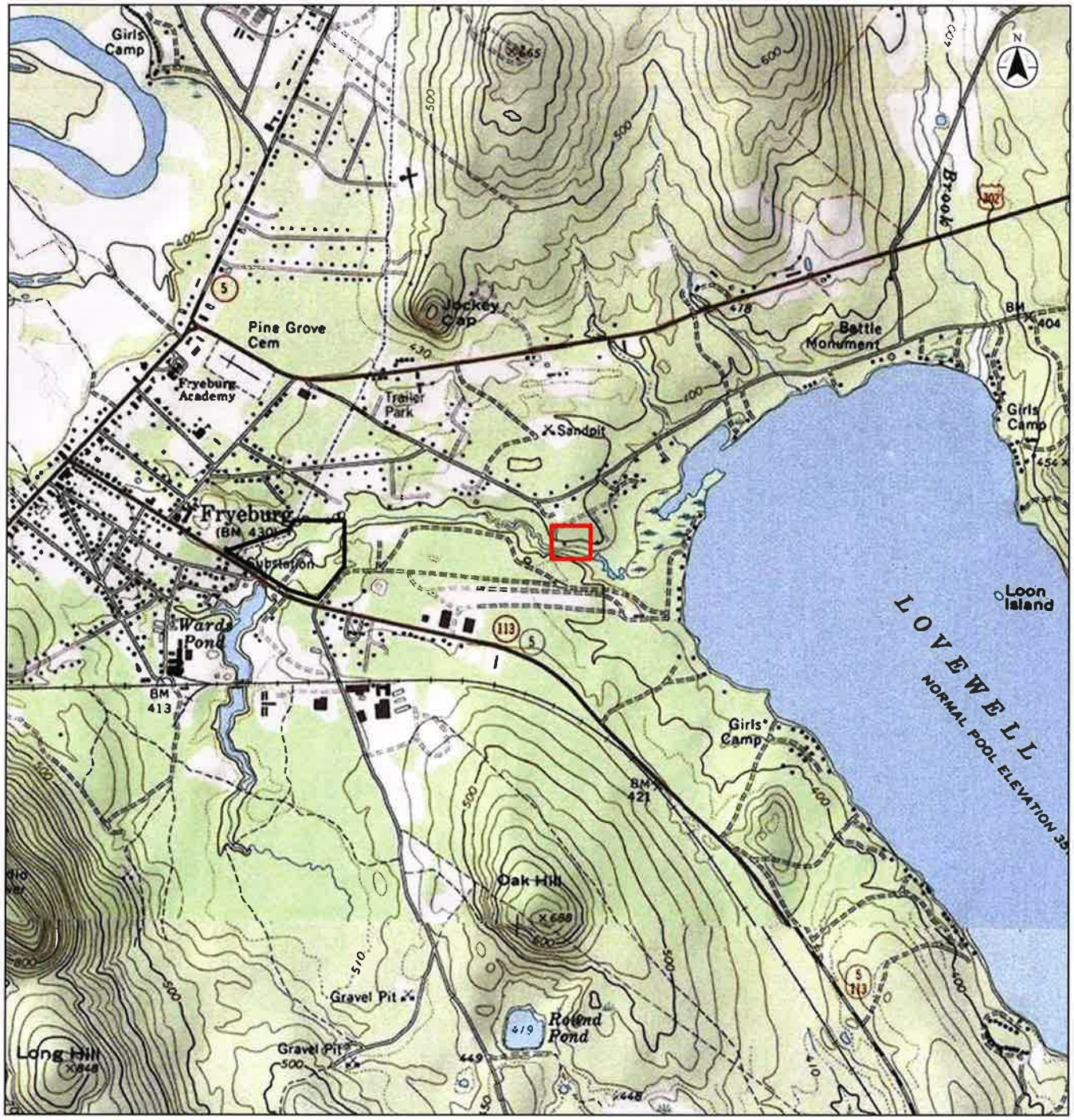
5.0 CONCLUSIONS AND RECOMMENDATIONS

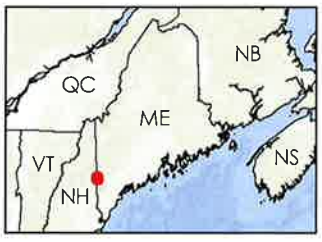
The biomonitoring program in Wards Brook that was initiated by Normandeau in 2007 and continued by Stantec allows for assessments to be made relative to the potential adverse impacts Evergreen Spring water withdrawal may have on the benthic stream communities and habitats.

The data collected in 2007 through 2019 indicate that Wards Brook maintains a community of macroinvertebrates that are consistent for small woodland stream communities in a suburban watershed. The water quality of Wards Brook is attributed to natural variation of macroinvertebrate species as a result of environmental factors. Data collected in 2019 continue to indicate that Wards Brook attains Class A water quality standards, which is above the statutory Class C designation. Based on the results of macroinvertebrate sampling, the water withdrawal operations at Evergreen Spring have not had an adverse effect on the water quality of Wards Brook.

Due to the consistency of past biomonitoring results and if there is no significant development in the immediate watershed, Stantec recommends continued stream biomonitoring on an every-three-year schedule (i.e., 2022, 2025, and beyond, if necessary) to monitor Wards Brook for potential effects of groundwater withdrawal operations.

Figures





Legend

- Approximate Spring Site
- Approximate Biomonitoring Project Area

0 2,000 Feet

1:24,000 (at original document size of 8.5x11)

Stantec

Project Location
Fryeburg, Maine

195600717

Prepared by EMK on 2016-02-09
Technical Review by KH on 2018-02-13
Independent Review by MPA on 2018-02-16

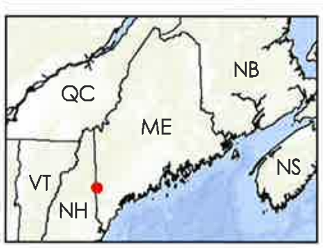
Client/Project
Nestle Waters North America Inc.
Evergreen Spring

Figure No.
1

Title
Project Location Map

Notes
1. Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet
2. Topographic basemap provided by ArcGIS online USA Topographic Map (http://gala.arcgisonline.com/maps/USA_Topo_Maps/MapServer).

V:\1956\active\195600717\03_data\gis_cad\GIS\mxd\2017\00717_02_Biomonitoring.mxd Revised: 2018-02-13 By: bkramer



Legend

- Stream Biomonitoring Location
- Approximate Borehole Location

0 800 Feet

1:9,600 (at original document size of 8.5x11)

Stantec

Project Location
Fryeburg, Maine

195600717

Prepared by EMK on 2018-02-09
Technical Review by KH on 2018-02-13
Independent Review by MPA on 2020-02-11

Client/Project
Nestle Waters North America Inc.
Evergreen Spring

Figure No.
2

Title
2019 Stream Biomonitoring Location

Notes
1. Three rock bags were deployed at monitoring location.
2. 2015 National Agriculture Imagery Program (NAIP) aerial orthoimagery provided by USDA's Farm Service Agency.

Appendix A MACROINVERTEBRATE DATA

Report on the Benthic Macroinvertebrate Community Collected from Ward Brook in Fryeburg, Maine 2019.

Prepared for: Stantec Consulting Services Inc.
30 Park Drive,Topsham, ME 04086

Prepared by: Lotic Inc.
101 Main St.
Belfast, ME 04915

January 21, 2020

Introduction

Stantec, Inc. sampled the benthic macroinvertebrate community in Wards Brook in Fryeburg following Maine Department on Environmental Protection procedures. Three rock-bags were deployed on August 19, 2019 and were recovered on September 13, 2019.

Lotic, Inc. was retained by Stantec, Inc. to provide sample processing and organism identification, and to provide a water quality estimation using the Lotic macroinvertebrate model. The following report details the procedures that Lotic used for sample sorting, macroinvertebrate identification and water quality estimation.

Executive Summary

The sampling of benthic macroinvertebrates in all locations followed established MEDEP protocols. The collected organisms from the samples were enumerated, identified, and then evaluated using the Lotic water quality estimation model.

The results of the water quality determinations are as follows:

Wards Brook	Class A

Methods

Three rock bags were deployed in Wards Brook on August 19, 2019 and retrieved on September 13, 2019 by Stantec personnel. All three rock bags were collected and preserved with 70% ethyl alcohol (ETOH) in the field. Preserved samples were shipped to Lotic for sample sorting, organism identification and enumeration.

Each sample was poured into a standard 40-mesh sieve and rinsed. Large debris was removed after inspection for clinging organisms. If found they were removed and the debris discarded. Benthic organisms were sorted from fine sample debris and placed in a labeled vial containing 70% ETOH. Sample debris was discarded.

Organisms were then identified to the lowest practical taxonomic level with the aid of a stereo microscope. While every attempt was made to identify the organisms to species level, identifications could be impeded by the age of the organism (early instars may not have developed the characteristics used in the identification process), condition of organism (some organisms are damaged i.e. missing gills, cerci, or legs in the collecting/sorting process), or categorical (in many groups species are known from adults only, larval keys are either non-existent or incomplete). Organisms in the groups Chironomidae (midges) and Oligochaeta (worms) were slide mounted and identified using a compound microscope.

These data were then evaluated using Lotic's water quality estimation model.

Background

Lotic's macroinvertebrate model estimates water quality by comparing the resident biological community at a collection site to macroinvertebrate communities collected from a range of previously established water qualities (Class A, B, C, and NA). Identified community metrics are tabulated and compared to the baseline information. Estimations of water quality are made using weight of evidence from the comparative template. Based on years of evaluations, the agreement between Lotic's model and the MEDEP water quality evaluation model is greater than 90%. The comparative template and a detailed explanation of metrics are included in this report along with the macroinvertebrate data sheet.

Results

The results of the comparative evaluation suggest that the resident macroinvertebrate community at Wards Brook best represents a community residing in Class A waters. The comparative template category scores were Class A (9), Class B (6) and Class C (1). The high EPT richness and high Plecoptera richness lend weight to the Class A estimation.

Wards Brook, Fryeburg, Maine 2019

Site value	Community Parameter		WATER CLASS A	B	C	NA
	Plecoptera Richness					
		mean	2.5	1.9	0.3	0
5		mode	3	1	0	0
		range	1-4	1-4	0-1	0
			X			
	Taxa Ratio (E/T) · (P)					
		mean	2.7	1.7	0.3	0
3.3		range	0.5-8.0	0.4-3.7	0.0-1.0	0
			X			
	Indicator Taxa					
		mean	3.7	2.0	0.5	0
2,4		range	1-7	0-4	0-1	0
		mean abundance when present	24.0	2.0	0.5	0
			X			
	EPT Richness					
		mean	16.8	19.5	10.3	3.2
25		range	13-24	11-27	7-13	0-11
			X	X		
	Total Richness					
		mean	36.8	47.3	26.8	17.6
48		range	20-48	25-63	20-33	4-27
			X	X		
	Dominance (% of sites)					
		Ephemeroptera, Plecoptera taxa	60%	0%	0%	0%
		Trichoptera taxa	35%	70%	50%	10%
Hydropsyche, 14.8%						
		Diptera taxa	5%	20%	50%	40%
		Non-insect taxa	0%	10%	0%	50%
	Dominant organism greater than 45%		5%	20%	40%	90%
			X	X	X	

	Site Index				
	mean	3.70	4.34	5.24	7.73
4.12	range	2.22-4.96	3.76-5.41	4.55-6.08	6.12-8.73
		X	X		
	Trichoptera Richness				
	mean	8.3	10.0	6.8	1.7
12	mode	7	8	7	0
	range	5-13	6-17	3-10	0-7
		X	X		
	Ephemeroptera Richness				
	mean	7.8	7.6	3.3	1.3
8	mode	10	7	3	0
	range	5-10	4-11	3-4	0-5
		X	X		

TOTAL	**A**	**B**	**C**	**NA**
	9	**6**	**1**	**0**

Water Quality Estimation

Evidence suggests that Class A is most probable due to the number of evaluation characters that suggest good water quality, primarily high EPT richness. Overall abundance and richness was slightly higher than in previous years.

Maine Department of Environmental Protection
Logsheet for Benthic Macroinvertebrates Identified
Please see the Read Me worksheet

Taxonomist: Lotic Inc.

Sample Log No.:	
Station No.:	
Waterbody Name:	Wards Brook
Town:	Fryeburg
Date of Collection:	9/27/2018
Time of Collection:	7:40am
Sampled By:	
Subsample Factor:	1
Sampler Type:	RBG-Rock Bag

Chironomidae Subsample (SS) Effort			
Level of SS Effort	none	none	none
No. Chir SSed			
No. Chir in SS			
Misc. Chir not SSed			
TChir	0	0	0

			Retrieval Depth Unit	Depth 1	Depth 2	Depth 3
	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3
09020604016032	Hydropsyche sparna			10	48	30
09020604016030	Hydropsyche morosa			13	12	14
09020604016031	Hydropsyche slossonae			1		
09020604016	Hydropsyche			8	15	22
09020604015	Cheumatopsyche			1	2	1
09020604014	Diplectrona			12	18	11
09020604	Hydropsychidae				2	1
09020601003002	Chimarra aterrima			12	8	7
09020601003003	Chimarra obscura					1
09020601001	Dolophilodes			3	7	16
09020611064	Lepidostoma			8	7	8
09020606020	Glossosoma			1	1	8
09020618078	Oecetis			12		8
09020609043096	Brachycentrus appalachia			16	22	7
09020609044	Micrasema				1	
09020619061	Apatania			1	1	
09020605019060	Rhyacophila fuscula			8	5	4
09021113069	Promoresia			12	12	5
09021113067	Optioservus			2	1	1
09021113069	Promoresia	ADULTS			1	
09021113070	Stenelmis			1		
09020205023063	Pteronarcys dorsata			4	1	
#N/A	Agnetina capitata			2	1	
09020209042121	Acroneuria abnormis			1	1	5
09020204020	Leuctra			10	7	10
09020209049151	Paragnetina media			1		1
09020402009	Epeorus			14	17	16

09020402015051	Maccaffertium modestum			35	38	42
09020402015055	Maccaffertium vicarium			1	1	3
09020406026	Paraleptophlebia			12	22	25
09020410035	Ephemerella			8	21	17
09020410036	Eurylophella			2	2	1
09020401001004	Baetis flavistriga			8	7	8
09020401001008	Baetis intercalaris			10	8	9
09020401001003	Baetis brunneicolor				2	1
09021012047	Simulium			27	44	48
09021012047	Simulium	PUPAE			4	1
09021011102181	Polypedilum aviceps			16	8	8
09021010043	Bezzia/Palpomyia			5	4	4
09021011102185	Polypedilum illinoense group			15	18	10
09021011036	Corynoneura			5	1	7
09021011037057	Cricotopus bicinctus			1		
09021011037070	Cricotopus trifascia				1	
09021011050092	Orthocladius annectens				1	
09021011065114	Tvetenia paucunca			12	14	18
09021011041075	Eukiefferiella claripennis group			1	1	2
09021011071	Paratanytarsus			1	4	1
09021011072	Rheotanytarsus			12	18	35
09021011076	Tanytarsus			2	2	
09021011062	Thienemanniella			2	8	1
08020202022	Limnodrilus			1		
09030107001	Sperchon				1	
09030105001	Lebertia					1

Total Benthos	**329**	**420**	**418**
Total OTUs	**43**	**45**	**40**
Total spp.			

Tribes and Genus Groups included in Chironomidae 09021011 basket counts

EDD for Rivers/Streams Macroinvertebrate Field Data

Waterbody Name	Wards Brook	
Town	Fryeburg	
Station Number		*Number only (omit 'S-')*
Log Number		
Sampled By		*List*
Sample Method	RBG-Rock Bag	*List*
Deployment Date	8/9/2019	
Deployment Time	12:45pm	
Number Deployed	3	
Deployed Depth Rep 1	50	cm-required
Deployed Depth Rep 2	50	cm-required
Deployed Depth Rep 3	50	cm-required

Retrieval Date	9/13/2019
Retrieval Time	7:40am
Number Retrieved	3

Physical Characteristics

Land Use 1	Upland hardwood	*List*
Land Use 2	Urban	*List*
Land Use 3		*List*
Land Use 4		*List*
Terrain	Rolling	*List*
Canopy Cover	Dense	*List*
Location 1		*List*
Location 2		*List*
Location 3		*List*

Potential Stressor(s)

Stressor 1		*List*
Stressor 2		*List*
Stressor 3		*List*
Stressor 4		*List*

Physical Characteristics of Bottom

Bedrock	0	%
Boulders (>10")	20	%
Rubble/Cobble (2.5" – 10")	20	%
Gravel (1/8" – 2.5")		%
Sand (<1/8")	60	%
Silt	0	%
Clay	0	%
Muck	0	%
Detritus	0	%
Sum	100	

Habitat Characteristics	Deployment Value	Unit
Wetted Width	4	m
Bankfull Width	5	m

Habitat Characteristics	Retrieval Value	Unit
Wetted Width	3.5	m
Bankfull Width	5	m

Depth	50	cm
Velocity	60	cm/sec
DO	8.55	mg/L
Temperature	18.3	Deg C
SPC	96	uS/cm
pH	6.9	STU
DO Meter #		
DO Meter calibrated?		*List*
Temp/SPC/pH Meter #		
Temp/SPC/pH Meter calibrated?		*List*
HETL Folder #		
HETL Folder # - DUP		

Depth	30	cm
Velocity	60	cm/sec
DO	10.6	mg/L
Temperature	10.9	Deg C
SPC	151	uS/cm
pH	6.7	STU
DO Meter #		
DO Meter calibrated?		*List*
Temp/SPC/pH Meter #		
Temp/SPC/pH Meter calibrated?		*List*

Appendix B PHOTOGRAPHS

Photo 1. RB-1 Stream Sampling Station looking upstream. Stantec. August 19, 2019.

Photo 2. RB-1 Stream Sampling Station looking downstream. Stantec. August 19, 2019.

Photo 3. RB-1 Stream Sampling Station looking upstream. Stantec. September 13, 2019.

Photo 4. RB-1 Stream Sampling Station looking downstream. Stantec. September 13, 2019.

Appendix C MACROINVERTEBRATE COMMUNITY COMPARISON

Wards Brook Macroinvertebrate Community Comparison*

Order	Taxon	Tolerance Value**	2007			2009			2011			2013			2015			2017			2019		
			Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Amphipoda	Gammarus sp.	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Dubiraphia	6	0	0	0	0	0	0	3	0	1	1	0	1	0	0	0	0	0	0	0	0	0
Coleoptera	Elmidae	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Optioservus	4	0	0	0	0	0	0	0	0	0	0	0	0	2	5	2	5	7	5	2	1	1
Coleoptera	Promoresia	2	0	4	16	38	12	1	20	1	7	6	11	12	6	12	8	5	9	10	12	12	5
Coleoptera	Promoresia (adult)	2	0	0	0	0	0	3	0	0	0	2	0	4	0	0	1	0	0	0	0	1	0
Coleoptera	Stenelmis	5	0	4	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Diptera	Antocha	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Bezzia / Palpomyia	6	0	0	0	2	4	2	0	2	3	0	0	0	2	5	4	1	0	0	5	4	4
Diptera	Culicoides	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Dicranota	3	0	0	0	4	2	0	2	1	5	0	0	0	2	0	0	0	0	0	0	0	0
Diptera	Empididae	6	0	0	0	5	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Hemerodromia	6	2	0	4	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
Diptera	Hexatoma	2	0	0	0	2	4	1	0	3	2	0	1	0	2	1	0	0	0	0	0	0	0
Diptera	Neoplasta	--	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Oreogeton	--	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Simuliidae	6	0	0	0	68	139	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Simulium	5	14	40	64	212	395	11	96	91	28	56	75	47	26	38	39	41	28	52	27	44	48
Diptera	Simulium (pupae)	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1
Diptera	Tipula	6	0	0	0	2	2	0	0	2	2	1	0	3	0	0	0	0	0	0	0	0	0
Diptera	Tipulidae	6	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Brillia	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Cardiocladius	5	0	0	0	3	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Corynoneura	4	0	0	0	5	2	1	5	1	1	1	3	1	4	5	1	2	8	1	5	1	7
Diptera (Chironomidae)	Cricotopus bicinctus	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Diptera (Chironomidae)	Cricotopus trifascia	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0
Diptera (Chironomidae)	Eukiefferiella	8	0	20	0	17	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Diptera (Chironomidae)	Eukiefferiella brehmi group	8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Eukiefferiella claripennis group	8	0	0	0	0	0	0	22	29	11	21	22	12	21	24	24	0	0	0	1	1	2
Diptera (Chironomidae)	Eukiefferiella devonica group	8	0	0	0	0	0	0	5	0	0	3	0	1	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Larsia	7	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Micropsectra	7	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Nanocladius	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Orthocladius annectens	6	0	0	0	0	0	0	0	0	0	0	0	0	3	5	3	0	0	0	0	1	0
Diptera (Chironomidae)	Parametriocnemus	5	6	8	24	11	20	3	1	1	1	12	10	9	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Paratanytarsus	--	0	0	0	0	0	0	0	0	0	0	0	0	16	4	11	12	27	11	1	4	1
Diptera (Chironomidae)	Polypedilum aviceps	4	0	0	0	2	4	0	0	1	0	12	10	4	15	21	10	14	18	11	16	8	8
Diptera (Chironomidae)	Polypedilum bergi	--	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Polypedilum fallax	6	0	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Polypedilum flavum	6	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Polypedilum illinoense group	6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	11	2	17	15	18	10
Diptera (Chironomidae)	Polypedilum sp.	6	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Procladius	9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Pseudochironomus	6	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Rheocricotopus robacki	5	4	0	0	9	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Rheotanytarsus	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	15	15	20	12	18	35
Diptera (Chironomidae)	Stenochironomus	5	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Tanypodinae	7	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Tanytarsus	6	8	16	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
Diptera (Chironomidae)	Thienemanniella	6	6	0	4	0	9	0	2	1	2	1	0	4	13	6	11	0	0	0	2	8	1
Diptera (Chironomidae)	Trissopelopia	--	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Tvetenia bavarica	4	4	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera (Chironomidae)	Tvetenia paucunca	--	0	0	0	44	59	2	13	6	9	14	21	16	27	13	16	21	16	16	12	14	18
Ephemeroptera	Acerpenna macdunnoughi	5	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae	4	0	0	0	3	9	0	6	1	4	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetis	6	6	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetis flavistriga	4	0	0	0	0	0	0	0	0	0	8	2	5	8	4	4	10	7	7	8	7	8
Ephemeroptera	Baetis intercalaris	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4	5	10	10	8	9
Ephemeroptera	Baetis brunneicolor	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Ephemeroptera	Epeorus	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	6	7	12	4	14	17	16
Ephemeroptera	Ephemerella	1	0	0	0	40	27	1	49	19	63	9	4	6	6	6	9	7	15	12	8	21	17
Ephemeroptera	Ephemerella dorothea	1	0	0	0	0	0	0	6	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Eurylophella	2	0	0	0	0	0	0	0	0	0	3	7	6	9	2	5	7	8	14	2	2	1
Ephemeroptera	Habrophlebia	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Maccaffertium	4	0	0	0	2	1	0	3	0	6	0	0	0	18	21	12	0	0	0	0	0	0
Ephemeroptera	Maccaffertium modestum	4	0	0	0	0	0	0	2	4	6	12	22	18	0	0	0	35	38	40	35	38	42
Ephemeroptera	Maccaffertium vicarium	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
Ephemeroptera	Paraleptophlebia	1	8	44	24	99	57	2	27	21	63	4	11	16	16	21	17	22	28	9	12	22	25
Ephemeroptera	Plauditus	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	0	0	0
Ephemeroptera	Serratella	2	6	32	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Wards Brook Macroinvertebrate Community Comparison*

Order	Taxon	Tolerance Value**	2007			2009			2011			2013			2015			2017			2019		
			Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Gordiodea	Gordius	--	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haplotaxida	Limnodrilus	10	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	1	0	0
Haplotaxida (Oligochaeta)	Lumbricidae	5	0	4	4	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0
Haplotaxida (Oligochaeta)	Naididae	8	0	0	4	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haplotaxida (Oligochaeta)	Nais sp.	8	2	20	24	0	0	0	1	0	4	2	0	1	0	2	1	0	0	0	0	0	0
Haplotaxida (Oligochaeta)	Tubificidae (Naididae)	10	2	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoplonemertea	Prostoma	--	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Megaloptera	Sialis sp.	4	0	4	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odonata	Aeshna	5	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Odonata	Boyeria vinosa	2	0	0	0	0	2	0	0	0	1	3	0	3	0	0	0	0	0	0	0	0	0
Planorboidea	Helisoma	6	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Plecoptera	Acroneuria abnormis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5
Plecoptera	Agnetina capitata	2	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	5	2	2	2	1	0
Plecoptera	Allocapnia	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Plecoptera	Capniidae	2	0	0	0	0	0	0	3	1	2	0	0	0	0	0	0	0	0	1	0	0	0
Plecoptera	Isoperla	2	4	28	8	1	0	0	6	1	9	3	4	1	4	3	6	7	8	5	0	0	0
Plecoptera	Leuctra	0	6	4	0	21	15	0	7	3	26	2	6	5	3	1	5	3	3	5	10	7	10
Plecoptera	Paragnetina media	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Plecoptera	Peltoperla	--	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plecoptera	Perlodidae	2	0	0	0	7	16	2	21	4	11	0	0	0	0	0	0	0	0	0	0	0	0
Plecoptera	Plecoptera	--	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plecoptera	Pteronarcys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Plecoptera	Pteronarcys dorsata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0
Plecoptera	Sweltsa	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Plecoptera	Taeniopteryx	2	0	0	0	0	0	0	14	7	6	1	2	2	0	0	0	0	0	0	0	0	0
Plecoptera	Tallaperla	0	2	8	0	12	26	6	3	20	2	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Apatania	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0
Trichoptera	Brachycentrus	2	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0
Trichoptera	Brachycentrus appalachia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	16	22	7
Trichoptera	Brachycentrus numerosus	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Trichoptera	Cheumatopsyche	5	4	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	1
Trichoptera	Chimarra	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Chimarra aterrima	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	5	7	5	12	8	7
Trichoptera	Chimarra obscura	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Trichoptera	Diplectrona	5	6	12	20	7	5	0	9	9	31	12	15	9	25	18	12	14	22	28	12	18	11
Trichoptera	Dolophilodes	0	80	104	184	125	101	0	12	1	6	12	21	22	15	16	14	12	17	13	3	7	16
Trichoptera	Glossosoma	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	8
Trichoptera	Hydropsyche	4	0	0	0	3	6	3	5	4	12	6	8	10	0	0	0	2	1	4	8	15	22
Trichoptera	Hydropsyche betteni	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Hydropsyche morosa	6	0	0	0	0	0	0	0	0	0	0	0	0	5	5	2	14	12	18	13	12	14
Trichoptera	Hydropsyche slossonae	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Trichoptera	Hydropsyche sparna	6	0	4	0	0	0	0	0	0	0	0	0	0	18	7	15	35	22	18	10	48	30
Trichoptera	Hydropsychidae	4	0	0	0	2	11	1	11	7	12	0	0	0	0	0	0	0	0	0	0	2	1
Trichoptera	Lepidostoma	1	0	0	0	9	6	0	12	29	38	3	5	5	2	2	8	2	4	4	8	7	8
Trichoptera	Limnephilidae	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Micrasema	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Trichoptera	Neophylax	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Oecetis	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	12	0	8
Trichoptera	Oligostomis	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Palaeagapetus	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Parapsyche	0	0	0	0	1	2	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
Trichoptera	Philopotamidae	3	0	0	0	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Ptilostomis	5	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Rhyacophila	1	2	16	0	0	0	0	21	15	78	0	0	0	1	0	0	0	0	0	0	0	0
Trichoptera	Rhyacophila carolina	1	0	0	0	32	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Rhyacophila fuscula	0	0	0	0	17	25	1	0	0	0	3	12	6	0	0	0	0	2	1	8	5	4
Trombidiformes	Lebertia	6	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1
Trombidiformes	Sperchon	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Turbellaria	Planariidae	6	0	0	0	4	1	1	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0
Veneroida	Sphaeriidae	8	0	0	0	2	1	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneroida	Sphaerium	6	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0

* 2007 data sampled by Normaneau Associates, Inc.; 2009 – 2019 data sampled by Stantec.

** Tolerance values obtained from Bode *et al.* 1996. Quality Assurance Work Plan for Biological Stream Monitoring in New York State. NYS Department of Environmental Conservation, Albany, NY. 89p.; Mandaville, S.M. 2002. Benthic Macroinvertebrates in Freshwaters- Taxa Tolerance Values, Metrics, and Protocols. Soil and Water Conservation Society of Metro Halifax, Nova Scotia, Canada