2009 Annual Aquifer Monitoring Report
Evergreen Spring
Fryeburg, Maine

Prepared for

Nestle Waters North America Inc.
(Poland Spring)
123 Preservation Way
Poland Spring, Maine 04274

by

Ed Luetje, CG
Luetje Geological Services, LLC
46 Whittier St.
Portland, ME 04103

and

McDonald Morrissey Associates, Inc.
280 Pleasant Street
Concord, New Hampshire 03301

2009 ANNUAL AQUIFER MONITORING REPORT
EVERGREEN SPRING
FRYEBURG, MAINE

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1.0 INTRODUCTION

Luetje Geological Services (LGS) of Portland, Maine and McDonald Morrissey Associates, Inc. (MMA) of Concord, New Hampshire, independent hydrogeologic consulting firms, have been contracted on behalf of Poland Spring 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 with the December 2008 monthly report. Annual reports are compiled after the end of each year summarizing final data and drawing conclusions about hydrologic conditions in the Wards Brook Aquifer. This report represents the second annual report.

Hydrogeologic data collection from locations in and around the Wards Brook Aquifer began in 2003 by Woodard & Curran for Pure Mountain Springs Company. LGS assumed responsibility for the monthly monitoring program in July, 2008 and will continue 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 reports and an annual report. MMA was contracted to perform groundwater modeling verification, data analysis, senior 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:

- Pure Mountain Springs (PMS) and Woodard & Curran (W&C);
- Poland Spring Bottling Company;
- Fryeburg Water Company (FWC);
- WE Corporation (WE);
- SF Corporation, LLC (SF); and
- U.S. Geological Survey (USGS).

As part of its effort, Emery & Garrett created an extensive 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 Pure Mountain Springs 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 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). Poland Spring, on average, purchases well below the 'discretionary expense' value. In 2009, water pumped from Borehole-1 totaled approximately 86 million gallons, or 39% of discretionary water available. Poland Spring is unaware of any other significant use of discretionary water.

2.0 AQUIFER MONITORING PROGRAM

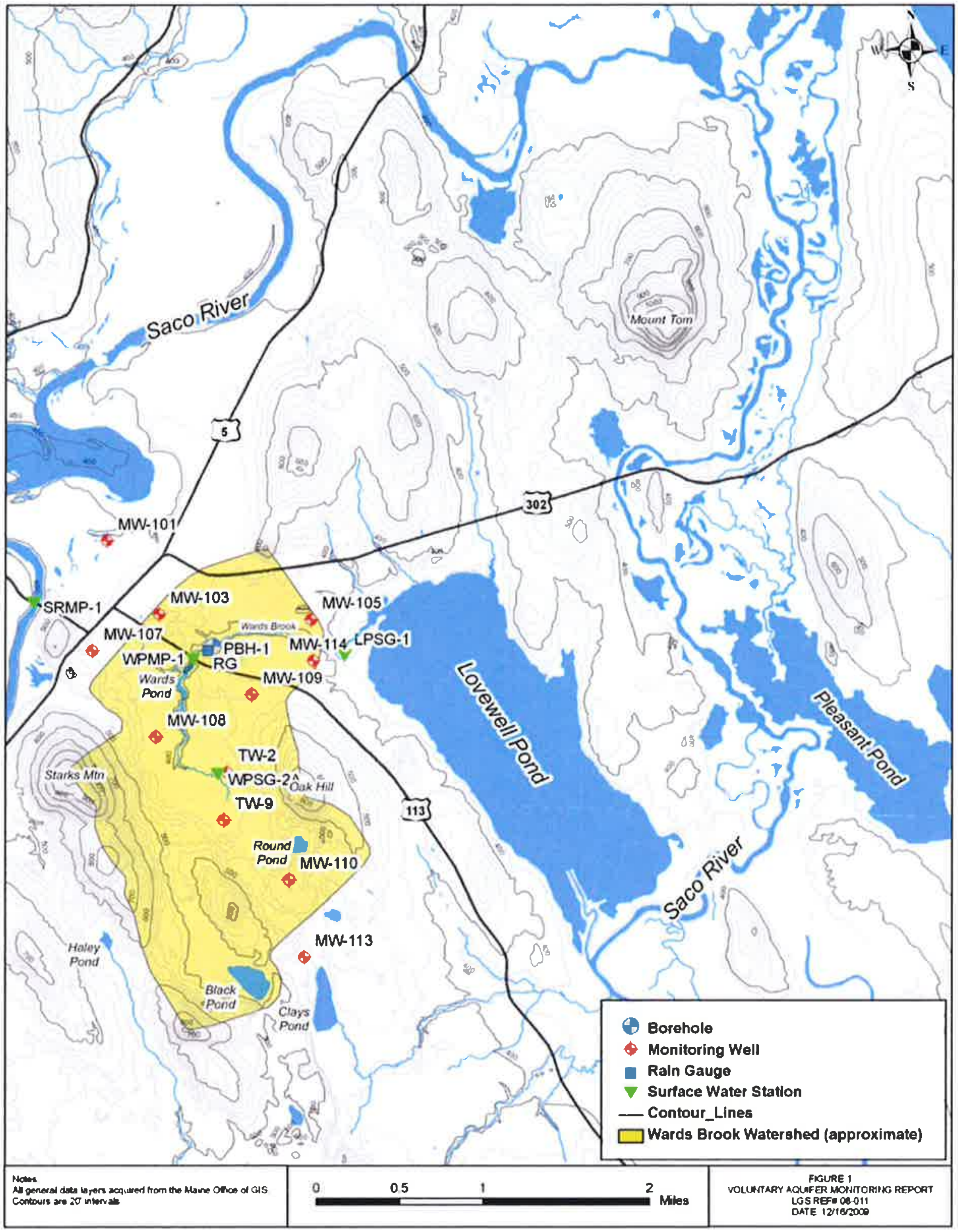
This annual report is a compilation of data for the period from January 2009 through December 2009. The entire record of water elevations measured at MW-108 is also included showing recent groundwater trends in the Wards Brook Aquifer and is discussed further in Section 4.0

Data are presented for eleven monitoring wells, four surface water stations, from rain gauges at the Borehole-1 load-out facility and the Fryeburg Eastern Slopes Airport (ICAO Station KIZG, Northeast Regional Climate Center), and withdrawal data from Borehole-1 (PBH-01). Locations of all data collection stations are shown in Figure 1. Table 1 summarizes data collection stations and monitoring frequency.

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'. WPSG-2A has superseded WPSG-2 (see Section 5.0 for more detail).
5. SRMP refers to 'Saco River Monitoring Point'.
6. LPSG refers to 'Lovewell Pond Staff Gauge'.



Saco River
Mount Tom
5
302
113
MW-101
SRMP-1
MW-103
MW-105
MW-107
Wards Brook
PBH-1
MW-114
LPSG-1
WPMP-1
RG
Wards Pond
MW-109
MW-108
Lovewell Pond
Pleasant Pond
Starks Mtn
TW-2
WPSG-2
Oak Hill
TW-9
Round Pond
MW-110
Saco River
MW-113
Haley Pond
Black Pond
Clays Pond
N
W
E
S
Borehole
Monitoring Well
Rain Gauge
Surface Water Station
Contour_Lines
Wards Brook Watershed (approximate)
Notes
All general data layers acquired from the Maine Office of GIS
Contours are 20' intervals
0
0.5
1
2
Miles
FIGURE 1
VOLUNTARY AQUIFER MONITORING REPORT
LGS REF# 08-011
DATE 12/16/2009

3.0 MONITORING NETWORK RESURVEY

A resurvey of the monitoring network was conducted in late summer/early fall of 2009 by Bliss Associates of Lovell, Maine, licensed surveyors in the State of Maine. Previous survey data was collected in 2003 and 2004 as additional wells were installed in 2004 (MW-101+ series). A site-wide resurvey is recommended periodically. Surface water stations will be resurveyed every spring to correct for any movement of the stations by ice in the winter.

This survey was completed to establish more precise and consistent water elevation data across the site and to establish new benchmarks near surface water stations for efficient resurveying in the spring. The survey was based on a Maine Department of Transportation benchmark at the Fryeburg Eastern Slopes Airport (AIR OC2770 CBN), elevation 442.043 feet NAVD88. New monitoring station reference elevations are shown below in Table 2.

Expected slight differences in reference elevations from the 2003-2004 survey work were calculated at all monitoring stations. Differences ranged from 0.01 feet to 0.46 feet with an average variance of 0.18 feet. These differences result from the change in elevation datum used for the survey (from NGVD29 to NAVD88). In addition, slight measuring point elevation differences may be realized caused by freeze/thaw around the casing, settling of the casing and/or similar sorts of movements. New reference elevations were first applied in the October 2009 monitoring report.

Table 2: Monitoring Network Resurvey Summary

Station ID	Old Reference Elevation (feet NGVD29)[1]	New Reference Elevation (feet NAVD88)[2]
MW-101	408.12	408.35
MW-103	421.29	421.58
MW-105	404.52	404.98
MW-107	431.67	431.95
MW-108	419.64	419.89
MW-109	420.00	420.11
MW-110	461.73	461.86
MW-113	441.14	441.13
MW-114	404.96	405.20
TW-2	404.01	404.18
TW-9	409.07	409.24
LPSG-1	364.68	364.83
WPMP-1	401.20	401.27
SRMP-1	418.64	418.79
WPSG-2A[3]		405.27

Notes: 1. NGVD29 is the National Geodetic Vertical Datum 1929, formerly mean sea level. The Reference Elevation is the measuring point (usually the top of casing for monitoring wells) elevation in feet NGVD.

2. NAVD88 is the North American Vertical Datum 1988. The Reference Elevation is the measuring point (usually the top of the casing for monitoring wells) elevation in feet NAVD.
3. WPSG-2A was installed on August 27th, 2009 to replace WPSG-2. See Section 5.0 for more detail.

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.

Figure 2 shows groundwater elevations measured from the monitoring well network for the 2009 calendar year. Groundwater elevations range from approximately 380 to 430 feet NAVD88 (North American Vertical Datum 1988). Figure 3 shows the entire record of groundwater elevations for MW-108. The presentation of this record was included because it is representative of recent groundwater trends in the Wards Brook Aquifer and is centrally located within the aquifer. Data tables showing all groundwater and surface water elevation data appear in Appendix B.

Examination of Figure 2 shows the typical seasonal variations in groundwater levels at all of the monitoring wells around the site. Figure 3 shows a recent rise in groundwater levels measured at MW-108 (record Nov 2003 – present). This rise in groundwater elevation has been observed throughout the Wards Brook Aquifer at nearly all monitoring wells at the site for this period of record and is likely due to above average precipitation during the period 2006-2009.

Seasonal variations in groundwater levels can also be seen in Figure 3. 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. The summer low groundwater levels observed in 2009 were similar to summer low groundwater levels in 2008 due to the above average precipitation observed in June and July 2009.

Figure 2: Hydrograph for 2009 Groundwater Elevations

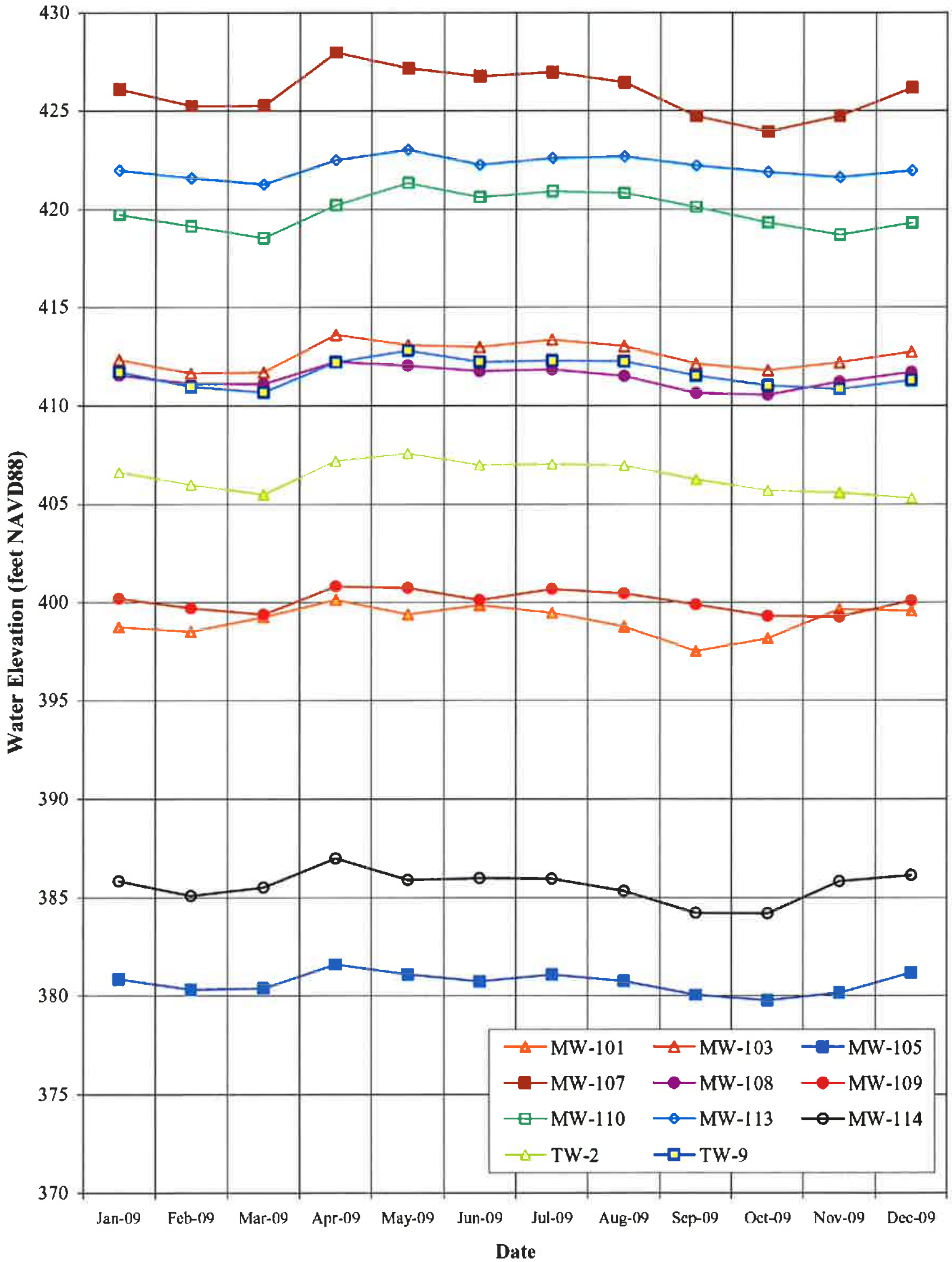
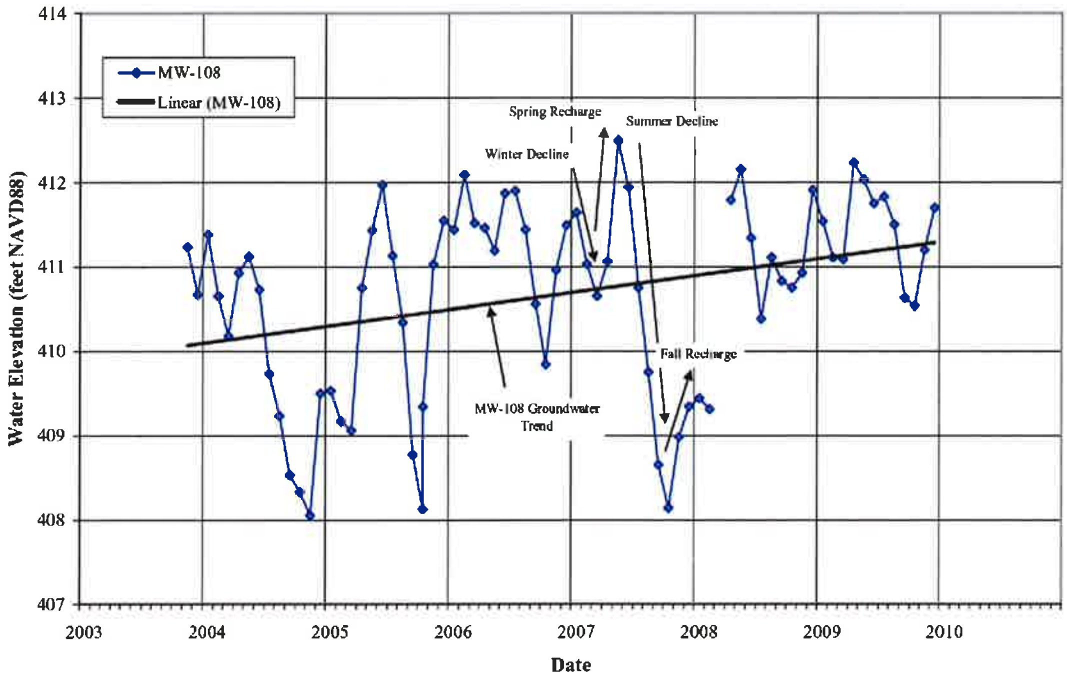


Figure 3: Hydrograph for MW-108 Complete Record



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 will be taken every month during regular monitoring. 2009 surface water stage from surface water stations appears in Figure 4. A data table summarizing surface water elevation data appears in Appendix B.

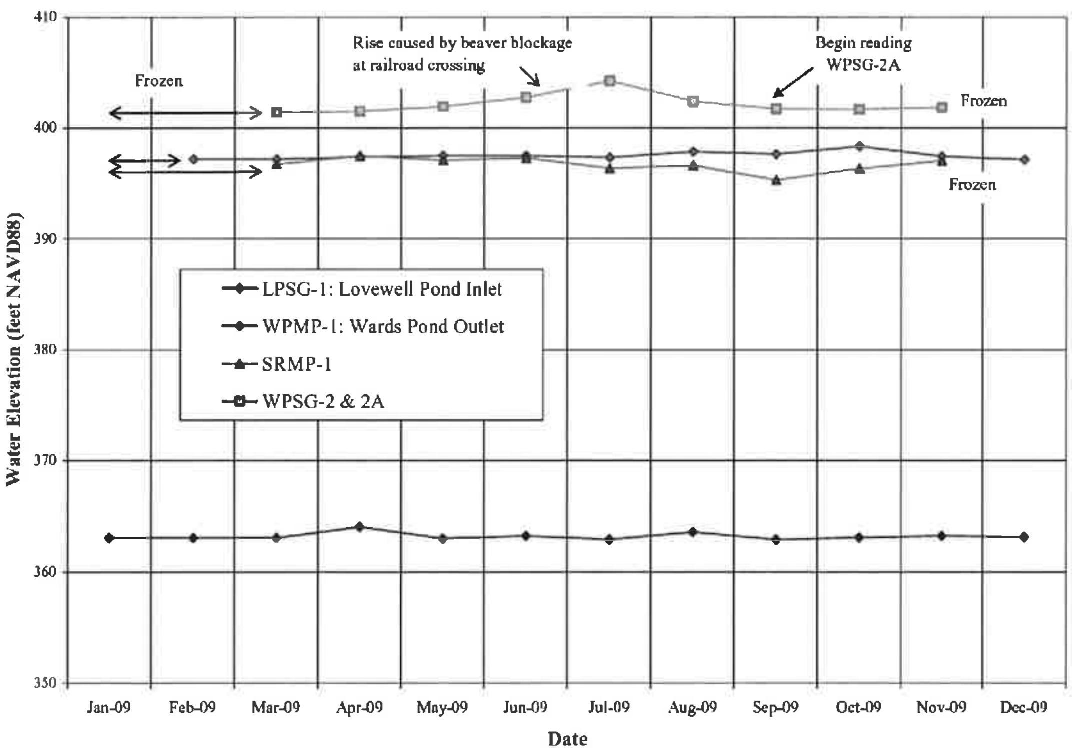
Examination of Figure 4 shows normal seasonal surface water fluctuations near the site with the exception of WPSG-2A (Wards Pond upper reaches) caused by beaver activity as described in the following paragraph. In general, there is typically a rise in surface water levels during spring melt, a decline through the summer months, another rise in the fall and early winter typically followed by frozen conditions during winter months. Frozen conditions were observed at WPSG-

2A, WPMP-1 and SRMP-1 during winter months. Only LPSG-1 remained unfrozen due to moving water at this station. An unusual slight rise in surface water elevations is also seen at WPMP-1, SRMP-1 and LPSG-1 in August caused by the large amount of precipitation received during June and July.

Surface water levels in Wards Pond upstream of the railroad crossing were heavily influenced by beaver activity throughout the 2009 summer months. Beginning in the spring, water levels in the upper reaches of Wards Pond above the railroad crossing rose unnaturally. This can be seen by examining the water elevation data as measured at WPSG-2A (formerly WPSG-2) from May – July 2009 and observing the beaver activity. This rise resulted from the clogging of surface water flow through the railroad crossing culvert (an old granite block structure) by beaver activity and the unusually wet months of June and July. Sometime during the week of August 17th, the railroad crossing experienced some settling and the water that was backed up into the upper reaches of Wards Pond was released. As a result, there is a surface water elevation decline for WPSG-2A between the months of July to August 2009 not seen at other surface water stations as observed in Figure 4.

On July 20th 2009, WPSG-2 was under more than two feet of water. To better record large surface water fluctuations in the upper reaches of Wards Pond, a new staff gauge with a larger graduation (6.66 feet) was installed adjacent to WPSG-2 on August 27th, 2009. Labeled WPSG-2A, this staff gauge has replaced WPSG-2 at this location starting with the September monitoring event.

Figure 4: Hydrograph for 2009 Surface Water

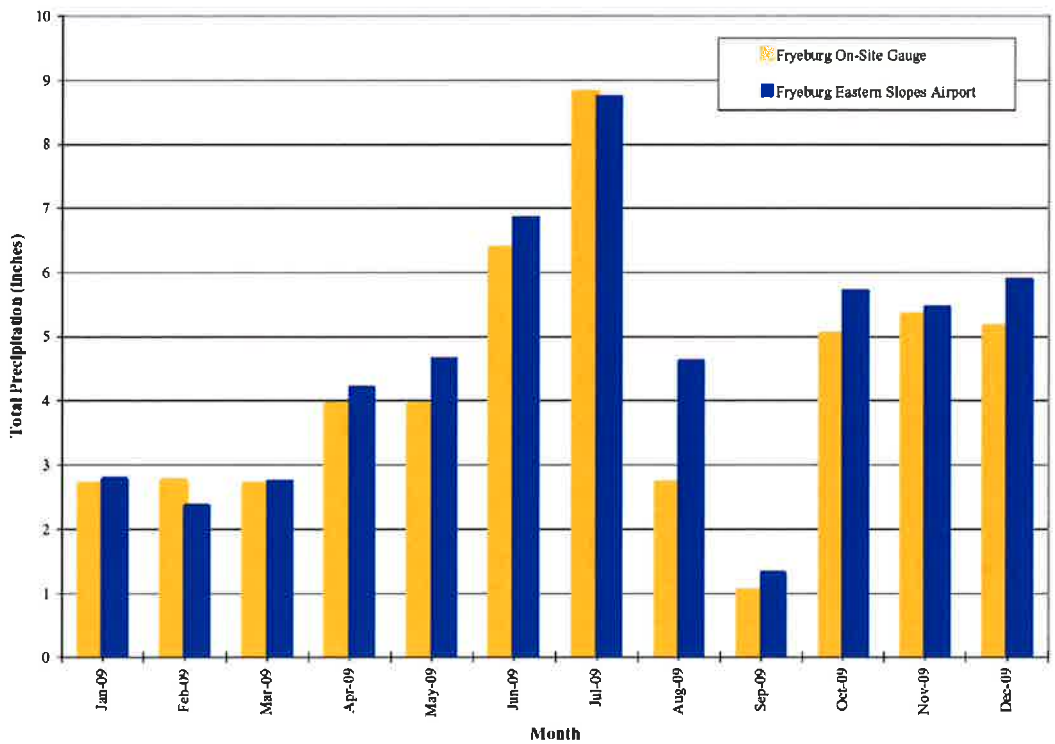


6.0 PRECIPITATION

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 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) to verify 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. Figure 5 shows monthly precipitation data collected at both rain gauge locations during 2009. A data table summarizing 2009 precipitation appears in Appendix C.

Figure 5: 2009 Monthly Precipitation - Fryeburg On-Site Gauge and Fryeburg Eastern Slopes Airport



Examination of Figure 5 shows that there is a reasonably close correlation between precipitation data collected at both locations. The Fryeburg area receives an average of approximately 48 inches of precipitation per year. This average was calculated from data collected at two long term National Weather Service Cooperative stations:

- East Hiram NWS Coop Station 173794 (1965 – 7/31/2009)
- North Conway NWS Coop Station 275995 (1974 – present)

For the 2009 calendar year, the on-site rain gauge recorded a total of 50.46 inches of precipitation, which is 4.50 inches less than was recorded in 2008. The Fryeburg Eastern Slopes Airport gauging station recorded 55.28 inches of precipitation, 4.82 inches more than was recorded by the on-site rain gauge.

7.0 WITHDRAWALS

Spring water volume withdrawn from Borehole-1 is measured by two Endress & Hauser Promag 50 electromagnetic in-line flow meters at the load station. At the load station, water is diverted to two fill locations called Hose Station-1 (HS-1) and Hose Station-2 (HS-2). Both hose stations have an in-line flow meter that records flow rate when the pump is running and records a running total of gallons pumped. Photographs showing both of the Endress & Hauser flow meters located in the load station building (Photograph D), and the hose stations at the load station facility (Photograph DD) appear in Appendix A. Table 3 summarizes the 2009 monthly withdrawal volumes below.

Table 3: 2009 Withdrawal Summary

Month	Monthly Total (gal)
Jan-09	7,170,830
Feb-09	5,389,990
Mar-09	8,252,420
Apr-09[1]	7,129,346
May-09	13,389,515
Jun-09	12,230,555
Jul-09[1]	7,768,651
Aug-09	11,003,590
Sep-09[1]	3,552,564
Oct-09	5,917,735
Nov-09	2,291,995
Dec-09	1,824,750
2009 Total	85,921,941

Notes: 1. Monthly total value is gallons offloaded at bottling facilities

Total gallons for the months of April, July, and September are total gallons recorded as offloaded at bottling facilities. These values are included because of recording errors at the load station recognized during reconciliation of monthly withdrawal numbers.

8.0 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 was conducted by Stantec and results from this study appear in Appendix D.

9.0 CONCLUSIONS

This report represents the second annual report for Fryeburg, Maine prepared voluntarily on behalf of Poland Spring and is a summary of hydrologic data collected from the Wards Brook Aquifer through the 2009 calendar year. In addition, Poland Spring provides these data 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 2009 include the following:

- Spring water withdrawal from Borehole-1 for 2009 totaled 85,921,941 gallons;
- 85,921,941 gallons represents approximately 39% of the discretionary water available as determined by Emery & Garrett Groundwater, Inc.;
- Normal seasonal variations of groundwater levels were observed at all monitoring well locations. Summer low groundwater levels observed in 2009 were similar to the summer groundwater lows observed in 2008 due to above average precipitation recorded for June and July 2009;
- Although no long term trends can be determined, groundwater levels in the Wards Brook Aquifer have generally been rising since 2003 as observed at MW-108;
- Surface water levels showed normal seasonal variation with the exception of a slight rise in water levels observed in August due to above average precipitation in June and July 2009;
- Abnormally high water levels were observed in the upper reaches of Wards Pond at WPSG-2A due to beaver activity and above average precipitation during June and July 2009. A new staff gauge was installed (WPSG-2A) to help capture large surface water fluctuations at this location;
- Total precipitation for the 2009 calendar year was 50.46 inches as recorded by the on-site rain gauge, 4.50 inches less than 2008; and,
- Based upon all the hydrologic data collected in 2009, there are no observable adverse impacts to the Wards Brook Aquifer from pumping activities.

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

Sincerely,

Luetje Geological Services, LLC

Ed Luetje C.G.

McDonald Morrissey Associates, Inc.

Daniel J. Morrissey

cc: Fryeburg Water District (Mr. Richard Krasker)
Fryeburg Water Company (Mr. Hugh Hastings)
Emery & Garrett Groundwater, Inc. (Mr. Peter Garrett)
Poland Spring (Mr. Mark Dubois)

APPENDIX A

Photographs

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

Photograph A

Photograph AA

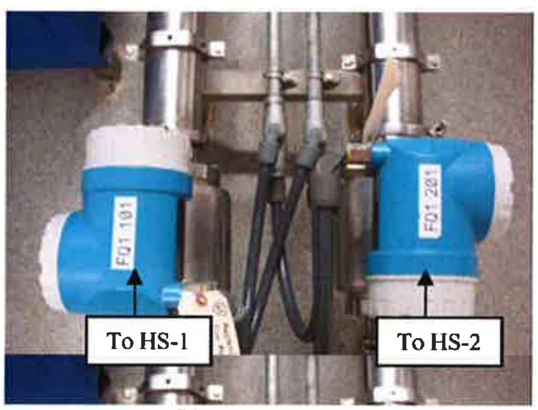
Photograph B: WBSG-2 – Typical staff gage used for measuring surface water elevation.
Photograph BB: Lovewell Pond from boat ramp off Rt. 113 facing north (6/22/2009)

Photograph B

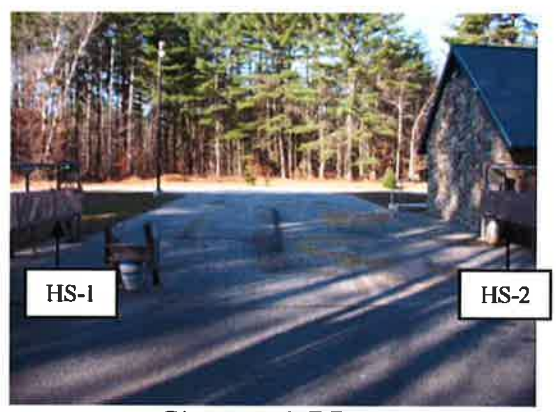
Photograph BB

Photograph C: On-site Rain Gage

Photograph D: Endress & Hauser Promag-50 Flow Meters
Photograph DD: Fryeburg Load Station showing Hose Stations 1 and 2



Photograph D



Photograph DD

APPENDIX B

2009 Groundwater and Surface Water Elevation Data
Fryeburg, Maine

APPENDIX B
2009 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 NAVD) [1]	408.35	421.58	404.98	431.95	419.89	420.11	461.86	441.13	405.20	404.18	409.24
1/19/2009	398.75	412.32	380.85	426.10	411.54	400.19	419.74	421.99	385.83	406.62	411.72
2/16/2009	398.51	411.62	380.31	425.25	411.11	399.70	419.14	421.61	385.08	405.98	410.96
3/17/2009	399.25	411.69	380.37	425.27	411.09	399.38	418.56	421.29	385.51	405.48	410.68
4/16/2009	400.12	413.58	381.59	427.95	412.23	400.80	420.21	422.50	386.99	407.18	412.21
5/18/2009	399.38	413.07	381.09	427.16	412.03	400.73	421.35	423.03	385.89	407.56	412.80
6/22/2009	399.85	412.98	380.73	426.74	411.75	400.10	420.61	422.27	385.98	406.98	412.22
7/20/2009	399.46	413.34	381.07	426.96	411.83	400.67	420.91	422.60	385.96	407.02	412.29
8/24/2009	398.76	413.00	380.74	426.43	411.50	400.45	420.83	422.69	385.33	406.95	412.25
9/21/2009	397.52	412.11	380.04	424.73	410.63	399.88	420.12	422.23	384.21	406.24	411.52
10/22/2009	398.17	411.78	379.77	423.95	410.54	399.29	419.32	421.89	384.19	405.68	411.02
11/20/2009	399.64	412.17	380.14	424.74	411.20	399.27	418.72	421.63	385.82	405.57	410.84
12/18/2009	399.58	412.70	381.18	426.16	411.70	400.08	419.32	421.97	386.13	405.30	411.29

Surface Water Stations	LPSG-1 [3]	WPMP-1 [4]	SRMP-1 [5]	WPSG-2 [6]	WPSG-2A [6]
Reference Elevation (feet NAVD) [1]	364.83	401.27	418.79	402.01	405.27
1/19/2009	363.06	frozen	frozen	frozen	
2/16/2009	363.03	397.18	frozen	frozen	
3/17/2009	363.04	397.17	396.74	401.38	
4/16/2009	364.03	397.4	397.49	401.49	
5/18/2009	362.99	397.5	397.09	401.91	
6/22/2009	363.21	397.49	397.29	402.74	
7/20/2009	362.91	397.34	396.36	404.21	
8/24/2009	363.56	397.86	396.62	402.4	
9/21/2009	362.89	397.63	395.3		401.68
10/22/2009	363.07	398.33	396.34		401.65
11/20/2009	363.22	397.42	397.04		401.83
12/18/2009	363.12	397.14	frozen		frozen

Notes:

1. NAVD is the North American Vertical Datum. Elevations are in feet NAVD. Measuring points were re-surveyed in the summer/fall 2009 by Bliss Associates and new reference elevations are reflected in this chart.
2. MW refers to monitoring well
3. LPSG refers to Lovewell Pond Staff Gauge
4. WPMP refers to Wards Pond Monitoring Point
5. SRMP refers to Saco River Monitoring Point
6. WPSG refers to Wards Pond Staff Gauge. WPSG-2A has superseded WPSG-2 due to periodic flooding of Wards Pond upper reaches

APPENDIX C

PRECIPITATION DATA
ON-SITE RAIN GAUGE &
FRYEBURG EASTERN SLOPES AIRPORT (ICAO STATION KIZG)

2009 Monthly Precipitation	*ON-SITE RAIN GAUGE DATA*	*FRYEBURG EASTERN SLOPES AIRPORT (ICAO STATION KIZG)*
Jan 2009	2.70	2.87
Feb 2009	2.75	2.36
Mar 2009	2.69	2.74
Apr 2009	3.95	4.20
May 2009	3.94	4.65
Jun 2009	6.37	6.85
Jul 2009	8.80	8.73
Aug 2009	2.72	4.61
Sep 2009	1.03	1.31
Oct 2009	5.03	5.71
Nov 2009	5.33	5.45
Dec 2009	5.15	5.89
2009 TOTAL	**50.46**	**55.28**

Nestle Waters North America Inc.
Evergreen Spring
Fryeburg, Maine

2009 Biological Monitoring Report
March 2010

PREPARED FOR:
Nestle Waters North America Inc. (Poland Spring)
123 Preservation Way
Poland Spring, ME 04274

PREPARED BY:
Stantec Consulting
30 Park Drive
Topsham, ME 04086

1.0 INTRODUCTION

Nestle Waters North America Inc. (Poland Spring), through its subsidiary Pure Mountain Springs, 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). Poland Spring continues to conduct voluntary monthly monitoring of groundwater levels of the underlying aquifer and the surface water levels of Wards Brook in order to assess potential impacts of the groundwater withdrawal operations on the overall hydrology of the spring site. In 2007, Normandeau Associates, Inc. (Normandeau) conducted a biological characterization of aquatic and wetland resources within Wards Brook and Lovewell Pond in order to provide a preliminary assessment of potential impacts to wetland and aquatic resources as a result of groundwater withdrawal operations.[1]

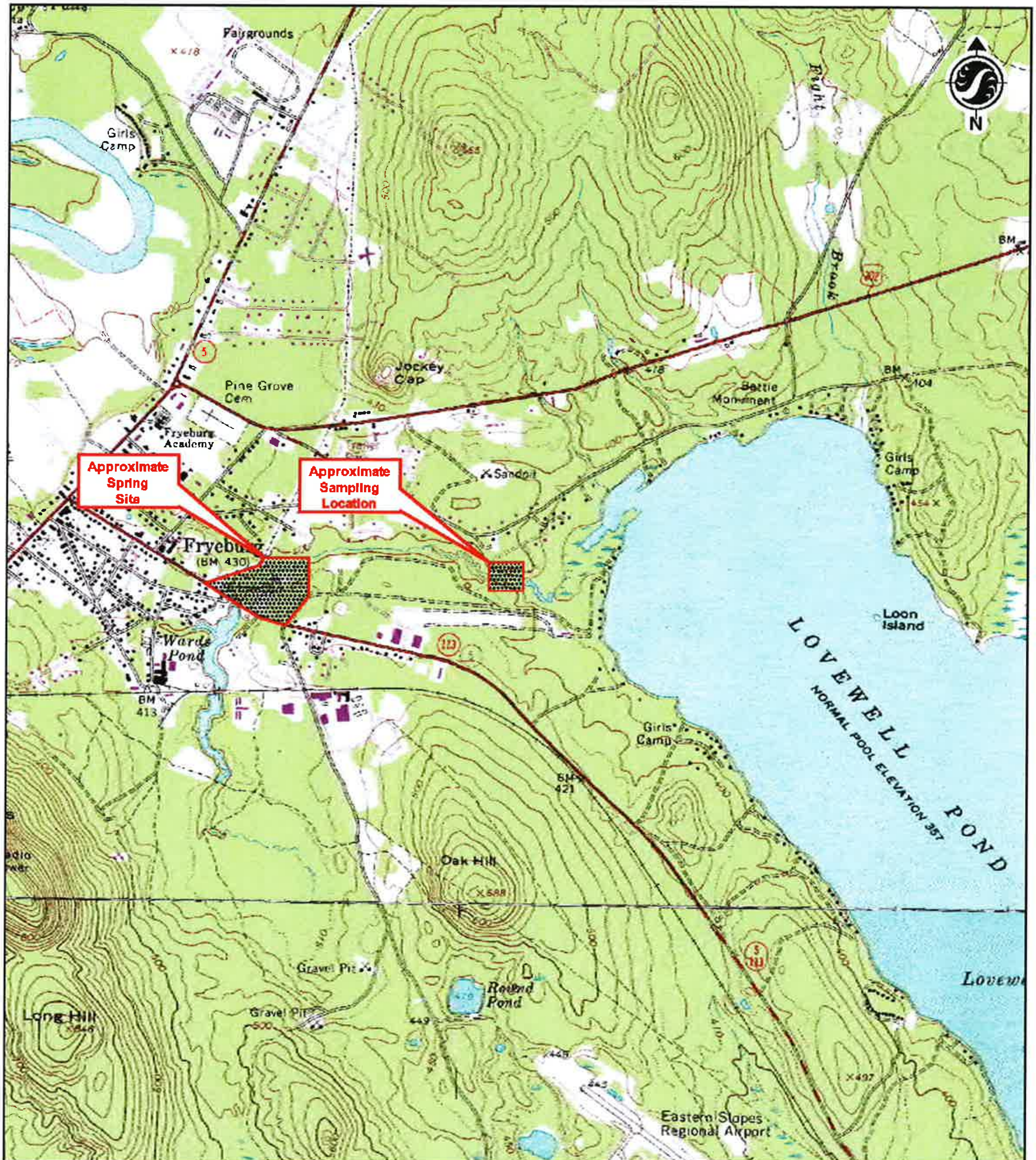
To further supplement the ongoing hydrological monitoring of the spring site and to augment the previous biological sampling completed by Normandeau, Stantec Consulting (Stantec) was asked by Poland Spring to initiate an on-site biological monitoring (biomonitoring) program in 2009 to monitor and assess potential impacts to stream habitats as a result of continued groundwater withdrawal operations through benthic macroinvertebrate monitoring. This biomonitoring program was voluntarily initiated as part of Poland Spring's commitment to maintaining sustainable yields of groundwater withdrawal and avoiding adverse impacts to the associated natural resources. This biomonitoring program is not part of any required conditional compliance associated with permits issued by the Maine Department of Environmental Protection (MDEP) or any other state or federal regulatory agency.

2.0 2009 STREAM BIOMONITORING METHODOLOGY

To monitor the aquatic habitats within Wards Brook relative to the potential impacts of groundwater withdrawals at Evergreen Spring, Stantec deployed one set of rock bags (i.e., 3 bags) in suitable sampling habitat (e.g., run-riffle habitat) upstream of a snowmobile at the Grist Mill site (RB-1; Figure 2) to sample the macroinvertebrate community within Wards Brook. 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 can be made. Long-term biological sampling of the macroinvertebrate communities can be conducted to document potential changes in the water quality over time. The RB-1 sampling site was similar in stream habitat to the Downstream Station as sampled by Normandeau in 2007. Deployment and retrieval of the rock bags was conducted in accordance with *Methods for Biological Sampling and Analysis of Maine's Rivers and Streams.*[2] Rock bags were deployed during the low flow season (i.e., July through September). This biomonitoring methodology is consistent with the approach implemented by Normandeau. Each rock bag was located using a Trimble® Pro-XR Global Positioning System receiver. 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 collection and included recording habitat and water quality parameters such as temperature, dissolved oxygen, specific conductivity, and pH.

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 M.R.S.A. 38, Chapter 465, four categories of water classification have been established. These standards describe the standards of aquatic life (e.g., macroinvertebrates) that shall be attained within Maine streams.

[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.
[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.



Stantec

Stantec Consulting Services Inc.
30 Park Drive
Topsham ME U.S.A.
04086
Tel. 207.729.1199
Fax. 207.729.2715
www.stantec.com

00489–F001–Locus.dwg

0 2,000
Feet

Client/Project 195600489

Nestle Waters North America Inc.

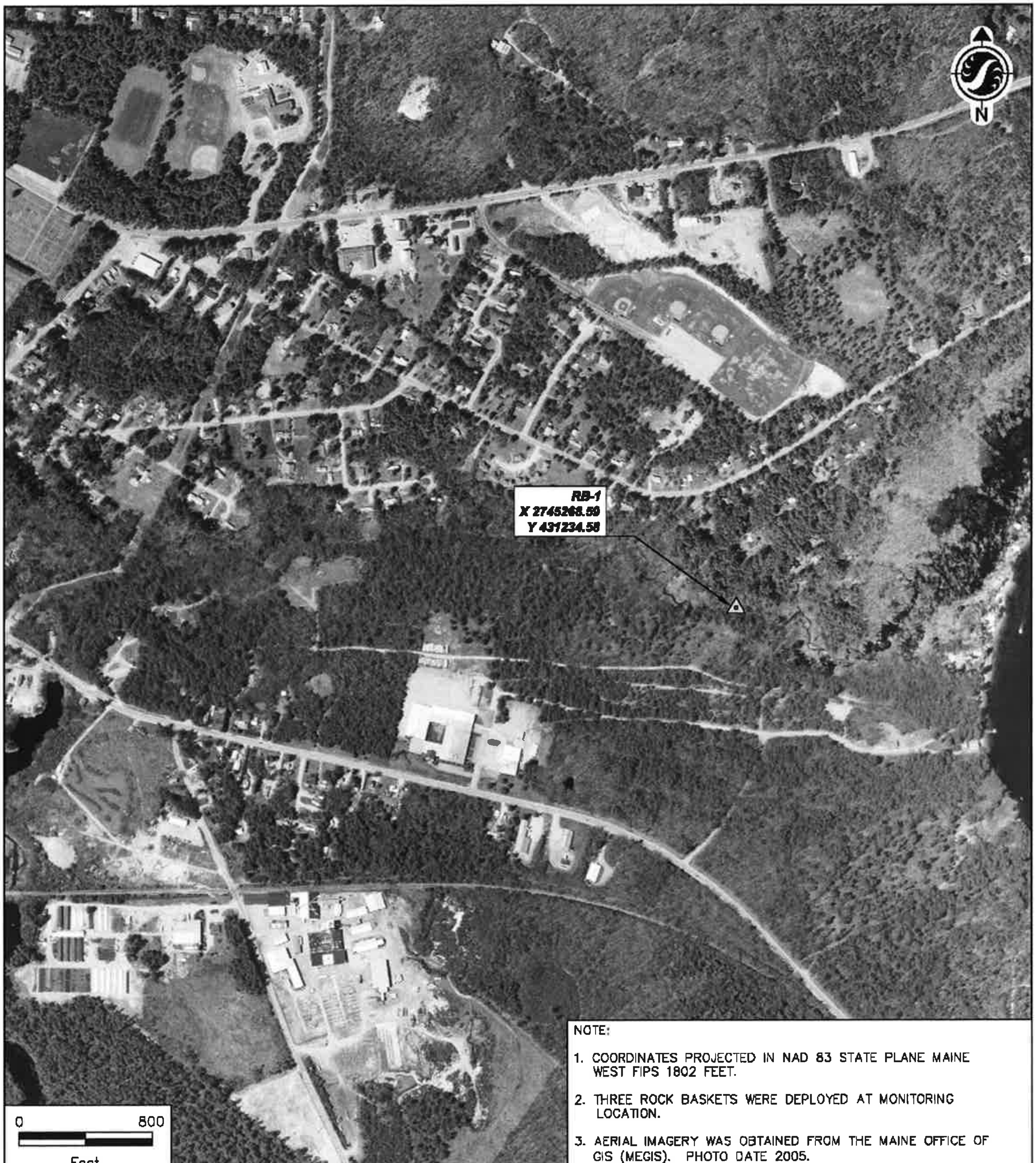
Evergreen Spring
Fryeburg, Maine

Figure No.
1

Title
Site Location Map

February 3, 2010

Figure 2
Biomonitoring Location Map



NOTE:

1. COORDINATES PROJECTED IN NAD 83 STATE PLANE MAINE WEST FIPS 1802 FEET.
2. THREE ROCK BASKETS WERE DEPLOYED AT MONITORING LOCATION.
3. AERIAL IMAGERY WAS OBTAINED FROM THE MAINE OFFICE OF GIS (MEGIS). PHOTO DATE 2005.

Stantec

Stantec Consulting Services Inc.
30 Park Drive
Topsham ME U.S.A.
04086
Tel. 207.729.1199
Fax. 207.729.2715
www.stantec.com

Legend

△ ROCK BASKET MONITORING LOCATION

● APPROXIMATE BOREHOLE LOCATION

Client/Project 195600489
Nestle Waters North America Inc.
Evergreen Spring
Fryeburg, Maine

Figure No.
2

Title
2009 Biomonitoring Locations

00489-F002-BioMon.dwg

February 3, 2010

Appendix 1
Macroinvertebrate Data

Report to Stantec, Inc. on the Benthic Macroinvertebrate Community Collected from Wards Brook in Fryeburg, Maine 2009

Prepared by: Lotic, Inc. PO Box 279 Unity ME 04988
January 27, 2010

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 10, 2009 and were recovered on September 8, 2009.

Lotic, Inc. was retained by Stantec, Inc. to provide sample processing and organism identification, and to provide a water quality estimation using Lotic's 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 Lotic's water quality estimation model.

The results of the water quality determinations are as follows:

Wards Brook	Class B

Methods

Three rock bags were deployed in Wards Brook on August 10, 2009 and retrieved on September 8, 2009 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 B waters. The comparative template category scores were almost evenly split between Class A (6) and Class B (5) but due to the dominance of Black Flies (42%) and the low Ephemeroptera diversity a Class A estimation cannot be justified.

Wards Brook, Fryeburg, Maine 2009
Comparative values for the community parameter
template for each water class

Site value	Community Parameter	WATER CLASS A	B	C	NA
	Plecoptera Richness				
	mean	2.5	1.9	0.3	0
3	mode	3	1	0	0
	range	1-4	1-4	0-1	0
		X	X		
	Taxa Ratio (E/T) (P)				
	mean	2.7	1.7	0.3	0
1.1	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
3, 21.0	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
14	range	13-24	11-27	7-13	0-11
		X	X		
	Total Richness				
	mean	36.8	47.3	26.8	17.6
41	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%
D, 42.0	Diptera taxa	5%	20%	50%	40%
	Non-insect taxa	0%	10%	0%	50%
	Dominant organism greater than 45%	5%	20%	40%	90%
				X	X

		A	B	C	NA
	Site Index				
	mean	3.70	4.34	5.24	7.73
3.53	range	2.22-4.96	3.76-5.41	4.55-6.08	6.12-8.73
		X			
	Trichoptera Richness				
	mean	8.3	10.0	6.8	1.7
8	mode	7	8	7	0
	range	5-13	6-17	3-10	0-7
		X	X	X	
	Ephemeroptera Richness				
	mean	7.8	7.6	3.3	1.3
3	mode	10	7	3	0
	range	5-10	4-11	3-4	0-5
				X	X
	Functional feeding groups				
	% of sites with full complement	100%	100%	100%	20%
	TOTAL	**A**	**B**	**C**	**NA**
		6	**5**	**3**	**2**

Water Quality Estimation

Evidence suggests that Class A and Class B are most probable due to the number of evaluation characters that suggest good water quality. However, the low number of Mayfly taxa and the dominance of the Black Flies shifts the evaluation to a Class B estimation.

REGULATORY GUIDANCE

Maine statute M.R.S.A. 38, Chapter 465 establishes a four category water classification system. Within each water class, an aquatic life standard is described in narrative form. The narrative aquatic life standards for the four water classes 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 in 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.

The communities referred to in the statutes are the benthic macroinvertebrate communities residing within the designated stream or river reach of unimpeded free-flowing waters.

The intended use of the aquatic life standard in the water classification system is to perform community analysis evaluations of benthic samples collected in a standardized fashion by comparing each community to baseline communities in each water quality class. The results of the comparison demonstrate which community type the collected sample most resembles, and thereby determine a water class. If the collected benthic community does not resemble any of the biological standard communities, the water class determination, by default, is classified "non-attainment."

In preparation for the aquatic life standards, MEDEP biological personnel reviewed eight years of macroinvertebrate data from collections made throughout the state. From these data, MEDEP established a baseline data set of 145 samples collected by standardized rock basket samplers (introduced substrates) throughout the months of July, August and September during the eight year period.

The MEDEP's data base is comprised of a wide range of water qualities. Many of the collections were made from pristine sites, or sites with little anthropogenic influence. A number of collections in the MEDEP's data base were made from streams or rivers in which the resident biological communities were severely altered from their original state. These sites were used as worst-case scenarios, and were therefore determined to be in "non-attainment" of the aquatic life standards.

MEDEP personnel then rated these sites a priori according to the biological narratives for Class A, B and C, as well as for the category of non-attainment (NA). A minimum of 25 sites were evaluated in each determination category.

Prior to conducting this study, Lotic requested and received from MEDEP a 60 sample subset of these 145 sites, including 20 A sites, 20 B sites, 10 C sites and 10 NA sites. These sites are considered by MEDEP personnel to be unambiguous and characteristic of the classic life standards. Lotic also requested and received a taxonomic abundance summary of all 145 sites which is included in this report.

Lotic biologists reviewed these data and independently identified community parameters which address the narrative aquatic life standards. This review has allowed Lotic to evaluate data sets and provide clients with an informed best professional judgment of whether the aquatic life standard is being met in the subject river or stream.

EVALUATION PROCEDURES

A basic understanding of the biological communities of different water classifications is needed to understand the evaluation procedures for these sites.

Rivers and streams which attain the classification of AA or A are typically pristine or have only a minimal amount of anthropogenic influence. The resident biological communities are essentially undisturbed, and should be considered "as naturally occurs." As a rule, Class A waters are nutrient-poor. In a Class A community, the dominant organism is often a mayfly or stonefly, organisms which are typically intolerant of pollutants. The structure of the community is balanced, that is, not one organism is hyperdominant (> 45% of the total organisms). The number of mayfly and caddisfly taxa is relatively equal, and stonefly taxa should be present. Stoneflies are extremely sensitive to high organic loadings and are therefore excellent indicators of good water quality.

In a Class B community, there are subtle shifts in community composition. These shifts may be represented by a slight reduction in stonefly and mayfly taxa, a slight increase in caddisfly taxa and an overall increase in the total number of taxa, or diversity. The dominant organism is likely to be a caddisfly, but, as in a Class A situation, hyperdominance is unlikely. In association with the increase in diversity, there is also a general reduction in indicator taxa which may be in response to a slight increase in nutrients or toxins.

A Class C community deviates even further from the A community. There is an overall decrease in diversity as the more intolerant taxa are lost. Because the organisms that remain can exploit the available resources without heavy competition, there is an increased chance that the dominant taxon with become hyperdominant.

Increased organic or toxic loadings will eventually reduce the diversity to the point that a "community" no longer exists. Organisms which predominate in such non-attainment situations include several species or tolerant chironomids (midges), tubificid worms, and other non-insects. While the diversity of the organisms present is extremely low, populations of the few taxa that remain to exploit the environment can explode.

In order to perform a water class evaluation, certain community parameters must be identified which remain relatively constant within a water class, but change predictably along a scale between the different water classes. These parameters must address the narrative biological standards in relation to community structure and function.

The following identification of community parameters using MEDEP's 60 sample subset and taxonomic abundance summary provides a template to which collected samples are compared to establish the likelihood of water class. While no one parameter is capable of making a determination, the overriding importance of a parameter can be inferred by the strength of the trend of the numeric value throughout the water classes.

The water class evaluation is based on the compilation of a number of parameters. The parameters used were developed from the MEDEP data set and fall into three general categories reflecting structure: quantitative (richness), relative (proportions of richness, dominance) and qualitative (indicator organisms, tolerance values). Additionally, a community function parameter is also included. Each parameter will be given an introduction and an explanation as to its inclusion and appropriateness to the narrative biological standards.

QUANTITATIVE PARAMETERS

Contemporary community analysis techniques measure structure using taxonomic units. For the purpose of the following evaluation, the taxonomic unit is genus. The number of genera in a larger grouping such as family or order is referred to as "taxonomic richness." The taxonomic units tabulated are Ephemeroptera richness (mayflies), Plecoptera richness (stoneflies) and Trichoptera richness (caddisflies), which are collectively referred to as "EPT taxa." The EPT taxa are considered important as they have a wide range of tolerances to both biotic and abiotic influences. Total taxonomic richness values for the data sets are also calculated.

RELATIVE PARAMETERS

The relationship between taxonomic units can also be an important community structural parameter as well as the number or the presence/absence of taxa. Using the analysis of historical data sets, it was found that the following ratio of (E richness/T richness) (P richness) is a good discriminator of water quality class.

Dominance has two essential components. They are 1) the type of organism that is dominant and 2) the relative abundance of the dominant taxon in comparison to other taxa. When these two characters are used together they can provide an additional discriminator of community structure.

QUALITATIVE PARAMETERS

Qualitative parameters refer to the numerical quality of the community as measured by a biotic index and the number of indicator taxa. These are derived by using the data reported on the "Taxonomic Abundance Summary by Bio Rank" supplied by MEDEP. This summary lists each taxa and the number of organisms recovered in each of the 145 MEDEP evaluation sites. It is read in the following manner using *Cheumatopsyche* as an example.

Cheumatopsyche were collected in 84% of all the sites with a sum total of each site's average abundance of 11064.47 organisms. Of this abundance 7%, 51%, 39% and 4% of the organisms were collected in the a priori A, B, C and NA sites, respectively. It is evident that most of the *Chuematophyche* were collected from the B and C sites.

From this type of information a "tolerance" or "biotic" value can be calculated for most taxa. A 0-9 scale (ten categories) can be assigned in the following manner:

Biotic Value	Criteria
0	>75% in A, but no more than 3% in C or NA
1	<75% but >50% in A, same C and NA criteria
2	A dominant, but not meeting C and NA criteria
3	>75% in B, but no more than 2% in NA
4	<75% but >50% in B and <5% in NA
5	B dominant but not meeting NA criteria
6	>75% in C
7	<75% but >50% in C
8	C dominant but <50%
9	NA dominant

As a result of these criteria, *Cheumatophyche* is assigned a biotic value of 4.

Not all taxa were assigned a biotic value. Taxa in which no trend was demonstrated or taxa with greater than 10% abundance in each type of site were not rated. Because of their rarity, organisms collected in 1% or less of the total sites were omitted irrespective of any trends which might have been demonstrated.

A site index can be calculated using the above data. Assigned biotic values are multiplied by the number of organisms in the taxa. The products are then summed and divided by the total number of organisms with assigned values. The resultant site index reflects the overall quality of the community and is based on Maine data and not generalized national data. The lower the site index value, the higher the community quality. Site index appears to be a fairly good discriminator of community structure.

Assignment of biotic values also identifies taxa that indicate excellent water quality (taxa with a value or 0 or 1). While the number of organisms in these taxa may not be so abundant as to significantly shift the site index, their presence adds important community structure information.

We have found the number and abundance of indicator taxa to be a very good discriminator of community structure. A list of the indicator taxa is included.

FUNCTION PARAMETER

Function in benthic community analysis generally refers to functional feeding groups. The five major functional feeding groups are: shredder, collector-filterer, collector-gatherer, scraper, and predator. Functional maintenance is demonstrated when all five feeding groups are represented within the benthic community. MEDEP has assigned many taxa to certain feeding groups, and these assignments are used to determine maintenance of function. However, the presence of all functional feeding groups is a poor discriminator of water quality class. Therefore, when all groups are present, the parameter is omitted in the water quality evaluation process.

COMPARATIVE TEMPLATE CONSTRUCTION

Each of the above community parameters was calculated for each of the 60 historical data sets received from MEDEP. The community parameter results of each water class group were pooled.

It was found that the average values were in most cases meaningful in describing the differences between the water classes. However, in some situations the range of values and the modal value of the group helped refine the analysis technique. Of the nine community parameters used in the water quality evaluation, three are strong Class A indicators (Plecoptera Richness, Taxa Ratio, Indicator Taxa), two are Class B indicators (Total Richness, Ephemeroptera Richness) and one is a Class C indicator (dominance) and three overlap both Class A and B criteria (EPT Richness, Site Index, Trichoptera Richness).

The template is used as an information matrix to aid in making a best professional judgment about the likelihood that a macroinvertebrate data set conforms with one of the narrative biological standards in Maine's water classification system.

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

Taxonomist: Lotic, Inc.

Sample Log No.:	Fryeburg (NEW)
Station No.:	
Waterbody Name:	Wards Brook
Town Name:	Fryeburg
Date of Collection:	9/8/2009
Time of Collection:	10:30 AM
Collected By:	Stantec
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
09020206025	Tallaperla			12	26	6
09021113069	Promoresia			38	13	1
09021113069	Promoresia	A				3
09020601001	Dolophilodes			125	101	
06010101001	Gordius			1	1	
09020605019	Rhyacophila			32	35	11
09020605019060	Rhyacophila fuscula			17	25	1
09020605019057	Rhyacophila carolina			32	8	
09020604014	Diplectrona			7	5	
09020604016	Hydropsyche			3	6	3
09020604	Hydropsychidae			2	11	1
09021012	Simuliidae			68	139	2
09021001005	Dicranota			4	2	
09021113070	Stenelmis			3		1
09020611064	Lepidostoma			9	6	
09020606020	Glossosoma			1		
09020204020	Leuctra			21	15	
09021001002	Tipula			2	2	
09021016	Empididae			5	4	
09021012047	Simulium			212	395	11
03010101	Planariidae			4	1	1
10020201	Sphaeriidae			2	1	1
09020207	Perlodidae			7	16	2
09020207026	Isoperla			1		
09021113	Elmidae			3		
09020601003	Chimarra			1	1	
09020601	Philopotamidae			6	7	
09020604013	Parapsyche			1	2	
08020202	Naididae			7	1	
09020301004012	Boyeria vinosa				2	
090202	Plecoptera				5	
09020406026	Paraleptophlebia			99	57	2
09020410035	Ephemerella			40	27	1
09020402015	Maccaffertium			2	1	

	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3
09020401	Baetidae			3	9	
09021001008	Hexatoma			2	4	1
09030105001	Lebertia				1	
09021011053	Parametriocnemus			11	20	3
09021011102181	Polypedilum aviceps			2	4	
09021011070	Micropsectra			2	2	
09021010043	Bezzia/Palpomyia			2	4	2
09021011065114	Tvetenia paucunca			44	59	2
09021011034	Cardiocladius			3	4	
09021011057105	Rheocricotopus robacki			9	13	
09021011041	Eukiefferiella			17	14	
09021011036	Corynoneura			5	2	1
09021011072	Rheotanytarsus			1		
#N/A	Tanypodinae				2	3
09021011062	Thienemanniella				9	
09021011049	Nanocladius				1	
09021011102185	Polypedilum illinoense group					1
09021011015	Procladius					1
09021011105	Stenochironomus					1

	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3

Total Benthos	868	1063	62
Total OTUs	43	44	24
Total spp.			

Tribes and Genus Groups included in Chironomidae 09021011 basket counts

Photo 1. Wards Brook: Looking upstream from RB-1 location. Stantec Consulting, August 10, 2009.

Photo 2. Wards Brook: RB-1 sampling location. Stantec Consulting, August 10, 2009.

Photo 3. Wards Brook: Looking downstream from RB-1 sampling location.
Stantec Consulting, August 10, 2009.

Appendix 3
Macroinvertebrate Community Comparison

Wards Brook Macroinvertebrate Comparison*

Order	Taxon	Tolerance Value**	2007			2009		
			Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Amphipoda	Gammarus sp.		2	0	0	0	0	0
Coleoptera	Elmidae	4	0	0	0	3	0	0
Coleoptera	Promoresia	2	0	4	16	38	12	1
Coleoptera	Promoresia (adult)		0	0	0	0	0	3
Coleoptera	Stenelmis	5	0	4	0	3	0	1
Diptera	Antocha	3	0	4	0	0	0	0
Diptera	Bezzia / Palpomyia	6	0	0	0	2	4	2
Diptera	Dicranota	3	0	0	0	4	2	0
Diptera	Empididae	6	0	0	0	5	4	0
Diptera	Hemerodromia		2	0	4	0	0	0
Diptera	Hexatoma		0	0	0	2	4	1
Diptera	Oreogeton		0	4	0	0	0	0
Diptera	Simuliidae	6	0	0	0	68	139	2
Diptera	Simulium	5	14	40	64	212	395	11
Diptera	Tipula	6	0	0	0	2	2	0
Diptera (Chironomidae)	Brillia	5	4	0	0	0	0	0
Diptera (Chironomidae)	Cardiocladius	5	0	0	0	3	4	0
Diptera (Chironomidae)	Corynoneura	4	0	0	0	5	2	1
Diptera (Chironomidae)	Eukiefferiella	8	0	20	0	17	14	0
Diptera (Chironomidae)	Micropsectra	7	0	0	0	2	2	0
Diptera (Chironomidae)	Nanocladius	7	0	0	0	0	1	0
Diptera (Chironomidae)	Parametriocnemus	5	6	8	24	11	20	3
Diptera (Chironomidae)	Polypedilum aviceps	4	0	0	0	2	4	0
Diptera (Chironomidae)	Polypedilum fallax	6	0	4	16	0	0	0
Diptera (Chironomidae)	Polypedilum flavum		1	20	0	0	0	0
Diptera (Chironomidae)	Polypedilum illinoense group		0	0	0	0	0	1
Diptera (Chironomidae)	Polypedilum sp.	6	0	0	12	0	0	0
Diptera (Chironomidae)	Procladius	9	0	0	0	0	0	1
Diptera (Chironomidae)	Rheocricotopus robacki	5	4	0	0	9	13	0
Diptera (Chironomidae)	Rheotanytarsus	6	0	0	0	1	0	0
Diptera (Chironomidae)	Stenochironomus	5	0	0	0	0	0	1
Diptera (Chironomidae)	Tanypodinae		0	0	0	0	2	3
Diptera (Chironomidae)	Tanytarsus	6	8	16	28	0	0	0
Diptera (Chironomidae)	Thienemanniella	6	6	0	4	0	9	0
Diptera (Chironomidae)	Trissopelopia		0	4	0	0	0	0
Diptera (Chironomidae)	Tvetenia bavarica	4	4	0	8	0	0	0
Diptera (Chironomidae)	Tvetenia paucunca		0	0	0	44	59	2
Ephemeroptera	Baetidae	4	0	0	0	3	9	0
Ephemeroptera	Baetis	6	6	0	4	0	0	0
Ephemeroptera	Ephemerella	1	0	0	0	40	27	1
Ephemeroptera	Maccaffertium	4	0	0	0	2	1	0
Ephemeroptera	Paraleptophlebia	1	8	44	24	99	57	2
Ephemeroptera	Serratella	2	6	32	12	0	0	0
Gordiodea	Gordius		0	0	0	1	1	0
Haplotaxida (Oligochaeta)	Lumbricidae	5	0	4	4	0	0	0
Haplotaxida (Oligochaeta)	Naididae		0	0	4	7	1	0
Haplotaxida (Oligochaeta)	Nais sp.	8	2	20	24	0	0	0
Haplotaxida (Oligochaeta)	Tubificidae (Naididae)	10	2	4	16	0	0	0
Megaloptera	Sialis sp.	4	0	4	4	0	0	0
Odonata	Boyeria vinosa	2	0	0	0	0	2	0
Plecoptera	Isoperla	2	4	28	8	1	0	0
Plecoptera	Leuctra	0	6	4	0	21	15	0
Plecoptera	Peltoperla		0	0	12	0	0	0
Plecoptera	Perlodidae	2	0	0	0	7	16	2
Plecoptera	Plecoptera		0	0	0	0	5	0
Plecoptera	Tallaperla	0	2	8	0	12	26	6
Trichoptera	Cheumatopsyche	5	4	0	0	0	0	0
Trichoptera	Chimarra	4	0	0	0	1	1	0
Trichoptera	Diplectrona	5	6	12	20	7	5	0
Trichoptera	Dolophilodes	0	80	104	184	125	101	0
Trichoptera	Glossosoma	0	0	0	0	1	0	0
Trichoptera	Hydropsyche	4	0	0	0	3	6	3
Trichoptera	Hydropsyche betteni	6	2	0	0	0	0	0
Trichoptera	Hydropsyche sparna	6	0	4	0	0	0	0
Trichoptera	Hydropsychidae	4	0	0	0	2	11	1
Trichoptera	Lepidostoma	1	0	0	0	9	6	0
Trichoptera	Limnephilidae	4	0	4	0	0	0	0
Trichoptera	Parapsyche	0	0	0	0	1	2	0
Trichoptera	Philopotamidae	3	0	0	0	6	7	0
Trichoptera	Ptilostomis	5	0	0	4	0	0	0
Trichoptera	Rhyacophila	1	2	16	0	0	0	0
Trichoptera	Rhyacophila carolina	1	0	0	0	32	8	0
Trichoptera	Rhyacophila fuscula	0	0	0	0	17	25	1
Trombidiformes	Lebertia		0	0	0	0	1	0
Turbellaria	Planariidae	6	0	0	0	4	1	1
Veneroida	Sphaeriidae	8	0	0	0	2	1	1

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

** 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