New Hampshire Volunteer River Assessment Program
2008 Cold River Watershed Water Quality Report

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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New Hampshire Volunteer River Assessment Program
2008 Cold River Watershed Water Quality Report

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Cover Photo: Great Brook, Langdon

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ACKNOWLEDGEMENTS

The New Hampshire Department of Environmental Services Volunteer River Assessment Program extends sincere thanks to the volunteers of the Cold River Local Advisory Committee for their efforts during 2008. This report was created solely from the data collected by the volunteers listed below. Their time and dedication is an expression of their genuine concern for local water resources and has significantly contributed to our knowledge of river and stream water quality in New Hampshire.

2008 Cold River Volunteers

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1.0 INTRODUCTION

1.1. Purpose of Report

Each year the New Hampshire Volunteer River Assessment Program prepares and distributes a water quality report for each volunteer river monitoring group that is based solely on the water quality data collected by that group during a specific year. The reports summarize and interpret the data, particularly as they relate to New Hampshire's surface water quality standards, and serve as a teaching tool and guidance document for future monitoring activities by the individual volunteer groups.

1.2. Report Format

Each report includes the following:

- **Volunteer River Assessment Program Overview**

  This section includes a description of the history of VRAP, the technical support, training and guidance provided by NHDES, and how data is transmitted to the volunteers and used in surface water quality assessments.

- **Monitoring Program Description**

  This section provides a description of the volunteer group's monitoring program including monitoring objectives as well as a table and map showing sample station locations.

- **Results and Recommendations**

  Water quality data collected during the year are summarized on a parameter-by-parameter basis using: (1) a data summary table, which includes the number of samples collected, data ranges, the number of samples meeting New Hampshire water quality standards, and the number of samples adequate for water quality assessments at each station; (2) a discussion of the data; (3) a river graph showing the range of measured values at each station; and (4) a list of applicable recommendations.

  Sample results reported as less than the detection limit were assumed equal to one-half the detection limit on the river graphs. This approach simplifies the understanding of the parameter of interest, and specifically helps one to visualize how the river or watershed is functioning from upstream to downstream. In addition, this format allows the reader to better understand potential pollution areas and target those areas for additional sampling or environmental enhancements. Where applicable, the river graph also shows New Hampshire surface water quality standards or levels of concern for comparison purposes.

- **Appendix A – Water Quality Data**

  This appendix includes a spreadsheet detailing the data results and additional information such as data results which do not meet New Hampshire surface water quality standards, and data that are unusable for assessment purposes due to quality control requirements.

- **Appendix B – Interpreting VRAP Water Quality Parameters**

  This appendix provides a brief description of water quality parameters typically sampled by VRAP volunteers and their importance, as well as applicable state water quality criteria or levels of concern.

- **Appendix C – VRAP Volunteer Monitor Field Sampling Procedures Assessment *(Field Audits)***

  This appendix provides an overview of the VRAP Volunteer Monitor Field Sampling Procedures Assessment (field audit) process with respect to programmatic quality assurance/quality control (QA/QC) guidelines.

- **Appendix D – New Hampshire Watershed Report Cards**

  This appendix provides an overview of the New Hampshire Watershed Report Cards built from the 2008 305(b)/303(d) Surface Water Quality Reports.

2.0 PROGRAM OVERVIEW

2.1 What is VRAP?

In 1998, the New Hampshire Volunteer River Assessment Program was established to promote awareness and education of the importance of maintaining water quality in New Hampshire's rivers and streams. VRAP aims to educate people about river and stream water quality and ecology and to improve water quality monitoring coverage for the protection of water resources.

Today, VRAP loans water quality monitoring equipment, provides technical support, and facilitates educational programs to volunteer groups on numerous rivers and watersheds throughout the state. VRAP volunteers conduct water quality monitoring on an ongoing basis and increase the amount of river water quality information available to local, state and federal governments, which allows for better watershed planning.

2.2 Why is VRAP Important?

VRAP establishes a regular volunteer-driven water sampling program to assist NHDES in evaluating water quality throughout the state. VRAP empowers volunteers with information about the health of New Hampshire's rivers and streams. Regular collection of water quality data allows for early detection of water quality changes allowing NHDES to trace potential problems to their source. Data collected by VRAP volunteers are directly contributing to New Hampshire's obligations under the Clean Water Act. Measurements taken by volunteers are used in assessing the water quality of New Hampshire's river and streams, and are included in reporting to the US Environmental Protection Agency.

2.3 How Does VRAP Work?

VRAP is a cooperative program between NHDES, river groups, local advisory committees, watershed associations, and individuals working to protect New Hampshire's rivers and streams. Volunteers are trained by VRAP staff in the use of water quality monitoring equipment at an annual training workshop. VRAP works with each group to establish monitoring stations and develop a sampling plan.

During the summer months, VRAP receives water quality data from trained volunteers. The data are reviewed for quality assurance, and are entered into the environmental monitoring database at NHDES. During the off-season, VRAP interprets the data and compiles the results into an annual report for each river. VRAP volunteers can use the data as a means of understanding the details of water quality, as well as guide future sampling efforts. NHDES can use the data for making surface water quality assessments, provided that the data met certain quality assurance/quality control guidelines.

2.4 Equipment and Sampling Schedule

VRAP frequently lends and maintains water quality monitoring equipment kits to VRAP groups throughout the state. The kits contain meters and supplies for routine water quality parameter measurements of turbidity, pH, dissolved oxygen, water temperature and specific conductance (conductivity). Other parameters such as nutrients, metals, and *E. coli* can also be studied, although VRAP does not always provide funds to cover laboratory analysis costs. Thus, VRAP encourages groups to pursue other fundraising activities such as association membership fees, special events, in-kind services (non-monetary contributions from individuals and organizations), and grant writing.

Each year, volunteers design and arrange a sampling schedule in cooperation with VRAP staff. Project designs are created through a review and discussion of existing water quality information, such as known and perceived problem areas or locations of exceptional water quality. The interests, priorities, and resources of the partnership determine monitoring locations, parameters, and frequency. VRAP typically recommends sampling every other week from May through September, and VRAP groups are encouraged to organize a long-term sampling program in order to begin to determine trends in river conditions.

2.5 Training and Technical Support

Each VRAP volunteer attends an annual training workshop to receive a demonstration of monitoring protocols and sampling techniques and the calibration and use of water quality monitoring equipment. During the training, volunteers have an opportunity for hands-on use of the equipment and receive instruction in the collection of samples for laboratory analysis.

VRAP groups conduct sampling according to a prearranged monitoring schedule and VRAP protocols. VRAP staff aim to visit each group annually during a scheduled sampling event to verify that volunteers successfully follow the VRAP protocols (see Appendix C). If necessary, volunteers are re-trained during the visit, and the group’s monitoring coordinator is notified of the result of the verification visit. VRAP groups forward water quality results to NHDES for incorporation into an annual report and state water quality assessment activities.

2.6 Data Usage

Annual Water Quality Reports

Water quality measurements repeated over time create a picture of the fluctuating conditions in rivers and streams and help to determine where improvements, restoration or preservation may benefit the river and the communities it supports. All data collected by volunteers are summarized in water quality reports that are prepared and distributed after the conclusion of the sampling period. VRAP groups can use the reports and data as a means of understanding the details of water quality, guiding future sampling efforts, or determining restoration activities.

New Hampshire Surface Water Quality Assessments

Along with data collected from other water quality programs, specifically the State Ambient River Monitoring Program, applicable volunteer data are used to support periodic NHDES surface water quality assessments. VRAP data are entered into NHDES's environmental monitoring database and are ultimately uploaded to the EPA database. Assessment results and the methodology used to assess surface waters are published by NHDES every two years (i.e., Section 305(b) Water Quality Reports) as required by the federal Clean Water Act. The reader is encouraged to log on to the NHDES web page to review the assessment methodology and list of impaired waters http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm/.

2.7 Quality Assurance/Quality Control

In order for VRAP data to be used in the assessment of New Hampshire's surface waters, the data must meet quality control guidelines as outlined in the VRAP Quality Assurance Project Plan (QAPP). The VRAP QAPP was approved by NHDES and reviewed by EPA in the summer of 2003. The QAPP is reviewed annually and is officially updated and approved every five years. The VRAP quality assurance/quality control measures include a six-step approach to ensuring the accuracy of the equipment and consistency in sampling efforts.

- **Calibration:** Prior to each measurement, the pH and DO meters must be calibrated. Conductivity and turbidity meters are checked against a known standard before the first measurement and after the last one.
- **Replicate Analysis:** A second measurement by each meter is taken from the original sample at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the replicate analysis should be conducted at different stations. Replicates should be measured within 15 minutes of the original measurements.
- **6.0 pH Standard:** A reading of the pH 6.0 buffer is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the 6.0 pH standard check should be conducted at different stations.
- **Zero Oxygen Solution:** A reading of a zero oxygen solution is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the zero oxygen standard check should be conducted at different stations.
- **DI (De-Ionized) Turbidity Blank**: A reading of the DI blank is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the blank check should be conducted at different stations.
- **End of the Day Conductivity and Turbidity Meter Check:** At the conclusion of each sampling day, the conductivity and turbidity meters are re-checked against a known standard.

2.7.1 Measurement Performance Criteria

Precision is calculated for field and laboratory measurements through measurement replicates (instrumental variability) and is calculated for each sampling day. The use of VRAP data for assessment purposes is contingent on compliance with a parameter-specific relative percent difference (RPD) as derived from equation 1, below. Any data exceeding the limits of the individual measures are disqualified from surface water quality assessments. All data that exceeds the limits defined by the VRAP QAPP are acknowledged in the data tables with an explanation of why the data was unusable. Table 1 shows typical parameters studied under VRAP and the associated quality control procedures.

(Equation 1. Relative Percent Difference)

$$RPD = \frac{|x_1 - x_2|}{\frac{x_1 + x_2}{2}} \times 100 \ \%$$

where x_1 is the original sample and x_2 is the replicate sample

Table 1. Field Analytical Quality Controls

Water Quality Parameter	QC Check	QC Acceptance Limit	Corrective Action	Person Responsible for Corrective Action	Data Quality Indicator
Temperature	Measurement Replicate	RPD < 10% or Absolute Difference <0.8 C.	Repeat Measurement	Volunteer Monitors	Precision
Dissolved Oxygen	Measurement Replicate	RPD < 10%	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Known Buffer (Zero O_2 Sol.)	RPD < 10% or Absolute Difference <0.4 mg/L	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Relative Accuracy
pH	Measurement Replicate	Absolute Difference <0.3 pH units	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Known Buffer (pH = 6.0)	± 0.1 std units	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Specific Conductance	Measurement Replicate	RPD < 10% or Absolute Difference <5µS/cm	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Method Blank (Zero Air Reading)	± 5.0 µS/cm	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Turbidity	Measurement Replicate	RPD < 10% or Absolute Difference <1.0 NTU	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Method Blank (DI Water)	± 0.1 NTU	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Laboratory Parameters	Measurement Replicate	RPD < 20% or Absolute Difference less than ½ the mean value of the parameter in NHDES's Environmental Monitoring Database	Repeat Measurement	Volunteer Monitors	Precision

3.0 METHODS

In 2002, volunteers from the Cold River Local Advisory Committee (CRLAC) began a water quality monitoring program on the Cold River and its tributaries. The goal of this effort was to provide water quality data from the Cold River watershed relative to surface water quality standards and to allow for the assessment of the river for support of aquatic life and primary contact recreation (swimming). The establishment of a long-term monitoring program will allow for an understanding of the river's dynamics, or variations on a station-by-station and year-to-year basis. The data can also serve as a baseline from which to determine any water pollution problems in the river and/or watershed. The Volunteer River Assessment Program has provided field training, financial assistance for laboratory costs, and technical assistance.

In 2005 the Cold River watershed experienced one of the worst floods in New Hampshire history. The watershed was severely damaged both in terms of property/infrastructure impacts and alteration of the physical structure of the lower Cold River and Warren Brook. The value of the CRLAC monitoring program became extremely evident as they and NHDES sought to study the impact of the flood on water quality and what short and long term problems resulted. The monitoring conducted in 2008 continues to document the long-term impacts of the 2005 flood and the impacts of natural and anthropogenic restoration.

During 2008, trained volunteers from the CRLAC monitored water quality at 55 stations along the mainstem of the Cold River and its tributaries (Table 2). Stations IDs are designated using a three-letter code to identify the waterbody name plus a number indicating the relative position of the station. The higher the station number the more upstream the station is in the watershed. All surface waters in the Cold River Watershed are designated as Class B waters. This classification is used to apply the appropriate water quality standards.

Water quality monitoring was conducted from July to October. In-situ measurements of water temperature, air temperature, dissolved oxygen, pH, turbidity and specific conductance were taken using a multiparameter In-Situ Troll. Samples for *E.coli*, total phosphorus, total kjeldahl nitrogen, nitrate, nitrate/nitrite, ammonia, and aluminum were taken using bottles supplied by the NHDES laboratory and were stored on ice during transport from the field to the lab. Table 3 summarizes the parameters measured, laboratory standard methods, and equipment used.

Table 2. Sampling Stations for the Cold River Watershed, NHDES VRAP, 2008

Station ID & AUID	Class	Waterbody Name	Location	Town	Elevation (Rounded to the Nearest 100 Feet)
CREACWO NHRIV801070201-06	**B**	**Crescent Lake**	Crescent Lake Dam Outlet	Acworth	1200
09-CLD NHRIV801070201-06	**B**	**Cold River**	Crescent Lake Road Bridge	Lempster	1200
08-CLD NHRIV801070201-08	**B**	**Cold River**	Allen Road Bridge	Acworth	1000
07-XDB NHRIV801070201-11	**B**	**Unnamed Tributary to Dodge Pond**	Route 10 Bridge	Lempster	1100
06-XDB NHRIV801070201-11	**B**	**Unnamed Tributary to Dodge Pond**	Route 10 Bridge	Lempster	1100
05-XDB NHRIV801070201-11	**B**	**Unnamed Tributary to Dodge Pond**	West Inlet to Dodge Pond Route 10 Bridge	Lempster	1100
04-XDB NHRIV801070201-09	**B**	**Unnamed Tributary to Dodge Pond**	South Inlet to Dodge Pond Boy Scout Camp Footbridge	Lempster	1100
03-XDB NHRIV801070201-09	**B**	**Unnamed Tributary to Dodge Pond**	East Inlet to Dodge Pond	Lempster	1200
01-XDB NHLAK801070201-02	**B**	**Unnamed Tributary to Dodge Pond**	Dodge Pond Beach	Lempster	1200
07-DOB NHRIV801070201-11	**B**	**Dodge Brook**	Old Road Bridge	Lempster	1110
02-CRT NHRIV801070201-12	**B**	**Unnamed Tributary to Dodge Brook**	Cutler Road	Lempter	1110
05-DOB NHRIV801070201-13	**B**	**Dodge Brook**	Route 10 Bridge	Lempster	1110
01-XJR NHRIV801070201-14	**B**	**Unnamed Tributary to Dodge Brook**	Downstream of Jolly Roger Racetrack	Lempster	1100
01-DOB NHRIV801070201-16	**B**	**Dodge Brook**	East Acworth Road Bridge	Acworth	900
07-HNY NHRIV801070202-01	**B**	**Honey Brook**	Route 123A 500 Yards D/S of Route 10 on Upstream Side of Culvert	Marlow	1000
01-HNY NHRIV801070202-01	**B**	**Honey Brook**	Route 123A Bridge	Acworth	900

07-CLD NHRIV801070202-02	**B**	**Cold River**	Grout Hill Rd Bridge	Acworth	900
01-BOB NHRIV801070202-04	**B**	**Bowers Brook**	Route 123A Bridge	Acworth	700
06D-CLD NHRIV801070202-04	**B**	**Cold River**	Deep Hole	Acworth	700
06-CLD NHRIV801070202-04	**B**	**Cold River**	Route 123A Pulloff	Acworth	700
01-MIB NHRIV801070202-05	**B**	**Milliken Brook**	Route 123A Bridge	Acworth	700
NEWALSD NHLAK801070202-01	**B**	**Newell Pond**	Deep Spot	Alstead	700
09-THB NHRIV801070202-06	**B**	**Thayer Brook**	Newell Pond Road Bridge	Alstead	1400
02-THB NHRIV801070202-07	**B**	**Thayer Brook**	Forrest Road Bridge	Acworth	800
05A-CLD NHRIV801070202-08	**B**	**Cold River**	Forrest Road Bridge	Acworth	700
06-CRB NHRIV801070202-09	**B**	**Crane Brook**	Crane Brook Road	Acworth	1300
01-XCB NHRIV801070202-09	**B**	**Unknown Tributary to Crane Brook**	Boscomb Hill Road	Acworth	1100
05-CRB NHRIV801070202-09	**B**	**Crane Brook**	100 Feet Downstream of Unnamed Tributary at Holden Hill Road	Acworth	1100
01-CRB NHRIV801070202-09	**B**	**Crane Brook**	Upstream of Confluence with Cold River	Acworth	600
12-WAB NHRIV801070203-02	**B**	**Warren Brook**	Prentice Hill Road Bridge	Alstead	1200
09-WAB NHRIV801070203-03	**B**	**Warren Brook**	Second Crossing of Route 123 Downstream of Warren Lake Dam	Alstead	1000
07-WAB NHRIV801070203-03	**B**	**Warren Brook**	Route 123 Bridge at Town Barn	Alstead	900
03-CAB NHRIV801070203-03	**B**	**Camp Brook**	Camp Brook Road Bridge	Alstead	800
05-WAB NHRIV801070203-03	**B**	**Warren Brook**	Site of Former Cooper Hill Road Culvert	Alstead	800
03-WAB NHRIV801070203-03	**B**	**Warren Brook**	Route 123 Bridge Just Upstream of Junction with Route 12A	Alstead	600
01-WAB NHRIV801070203-04	**B**	**Warren Brook**	Route 123A Bridge	Alstead	400
03T-CLD NHRIV801070203-04	**B**	**Cold River**	Wooden Dam Below Confluence w/Warren Bk	Alstead	700

03-CLD NHRIV801070203-04	**B**	**Cold River**	Route 123 Bridge	Alstead	400
03-CLD-PIPE-1 NHRIV801070203-04	**B**	**Cold River**	Route 123 Bridge	Alstead	400
03-CLD-PIPE-2 NHRIV801070203-04	**B**	**Cold River**	Route 123 Bridge	Alstead	400
01-DAB NHRIV801070203-05	**B**	**Darby Brook**	Comstock Road Bridge	Alstead	400
02-CLD NHRIV801070203-09	**B**	**Cold River**	Drewsville - Route 123 Bridge	Walpole	400
02-CLD-PIPE NHRIV801070203-09	**B**	**Cold River**	Drewsville - Route 123 Bridge	Walpole	400
01-LBK NHRIV801070203-07	**B**	**Unnamed Tributary to Little Brook**	Ball Hill Road	Langdon	700
01-XLB NHRIV801070203-07	**B**	**Great Brook**	Ball Hill Road	Langdon	500
03A-GRB NHRIV801070203-07	**B**	**Great Brook**	100 Feet Upstream from Little Brook	Acworth	500
03-GRB NHRIV801070203-07	**B**	**Great Brook**	Route 12A Bridge at Ball Hill Road	Langdon	500
02-GRB NHRIV801070203-08	**B**	**Great Brook**	Covered Bridge on Cheshire Turnpike	Langdon	400
03-RAB NHRIV801070203-08	**B**	**Ram Brook**	Jewett Road	Langdon	400
01-RAB NHRIV801070203-08	**B**	**Ram Brook**	100 Feet Upstream of Confluence with Great Brook	Langdon	400
03-BMB NHRIV801070203-08	**B**	**Brush Meadow Brook**	Jewett Road	Langdon	400
01-BMB NHRIV801070203-08	**B**	**Brush Meadow Brook**	100 Feet Upstream of Confluence with Great Brook	Langdon	400
01-JEB NHRIV801070203-08	**B**	**Jewett Brook**	50 Feet Upstream of Confluence with Great Brook	Langdon	400
01-GRB NHRIV801070203-08	**B**	**Great Brook**	Cold River Road Bridge	Langdon	400
01-MTB NHRIV801070203-10	**B**	**Mountain Brook**	Cold River Road Bridge	Walpole	300
01-CLD NHRIV801070203-12	**B**	**Cold River**	Arch Bridge	Walpole	200
00H-CLD NHRIV801070203-12	**B**	**Cold River**	Route 12 Bridge	Walpole	200

Table 3. Sampling and Analysis Methods

Parameter	Sample Type	Standard Method	Equipment Used	Laboratory
Temperature	Instantaneous	SM 2550	In-Situ Troll 9000	------
Dissolved Oxygen	Instantaneous	SM 4500 O G	In-Situ Troll 9000	------
pH	Instantaneous	SM 4500 H+	In-Situ Troll 9000	------
Specific Conductance	Instantaneous	SM 2510	In-Situ Troll 9000	------
Turbidity	Instantaneous	EPA 180.1	In-Situ Troll 9000	------
E.coli	Bottle (Sterile)	EPA 1103.1	------	NHDES
Total Phosphorous	Bottle (w/Preservative)	EPA 365.3	------	NHDES
Total Kjeldahl Nitrogen	Bottle (w/Preservative)	EPA 365.3	------	NHDES
Nitrate	Bottle	EPA 353.2	------	NHDES
Nitrate + Nitrite	Bottle	EPA 353.2	------	NHDES
Ammonia	Bottle	EPA 350.1	------	NHDES
Aluminum	Bottle (w/Preservative)	EPA 200	------	NHDES
Chloride	Bottle	SM D512C	------	NHDES Limnology Center

RESULTS AND RECOMMENDATIONS

Results and recommendations for each monitored parameter are presented in the following sections. For a description of the importance of each parameter and pertinent water quality criteria for these and other parameters, please see Appendix B, *"Interpreting VRAP Water Quality Parameters."*

4.1 Dissolved Oxygen

Between one and three measurements were taken in the field for dissolved oxygen concentration at 42 stations in the Cold River watershed (Table 4). Of the 56 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for dissolved oxygen includes a minimum concentration of 5.0 mg/L **and** a minimum daily average of 75 percent of saturation. In other words, there are criteria for both concentration and saturation that must be met before the river can be assessed as meeting dissolved oxygen standards. Table 4 reports only dissolved oxygen concentration as more detailed analysis is required to determine if instantaneous dissolved oxygen saturation measurements are above or below water quality standards.

All riverine measurements taken for dissolved oxygen met the New Hampshire Class B surface water quality standard minimum (Figure 1). The average concentration of dissovled oxygen was consistently above the Class B standard at all riverine stations ranging from 8.32 mg/L to 12.24 mg/L.

Figure 2 depicts the results of a dissolved oxygen/water temperature vertical profile measured in the deep spot of Newall Pond. Previous vertical profiles measured by CRLAC have indicated stratification in Newell Pond. The profile conducted in 2008 shows Newell Pond to be unstratified and was likely taken after lake turnover. During the spring and summer, surface water in lakes and ponds absorb the sun's thermal energy causing an increase in water temperature. Through wind and wave action this upper layer of water (epilimnion) is thoroughly mixed and generally uniform in water temperature. Beneath the epilimnion is a region of more dense and coldwater (hypolimnion). Theses two layers of water are separated by a thermocline and do not mix resulting in thermal stratification during the summer months. As air temperature begins to cool in the fall so does the water temperature until eventually the lake is more uniform in temperature. This allows for the waters in the epilimnion and hypolimnion to overturn and fully mix in a "fall turnover". The profile in Figure 2 was taken after the fall turnover.

Unstratified ponds such as Newell Pond must have dissolved oxygen levels above the Class B standard of at least 75% saturation based on a daily average and an instantaneous minimum of at least 5.0 mg/L throughout the upper 25% of depth.

Table 4. Dissolved Oxygen Concentration (mg/L) Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
09-CLD	2	7.72 - 9.96	0	2
08-CLD	2	7.50 - 10.93	0	2
07-XDB	1	9.36	0	1
06-XDB	1	12.65	0	1
04-XDB	2	11.68 - 12.27	0	2
03-XDB	2	10.71 - 11.87	0	2
01-XDB	3	7.21 - 9.42	0	3
07-DOB	1	10.44	0	1
02-CRT	1	11.7	0	1
05-DOB	2	7.80 - 11.94	0	2
01-XJR	1	10.87	0	1
01-DOB	1	12.24	0	1
07-HNY	1	10.84	0	1
01-HNY	1	13.41	0	1
07-CLD	1	12.04	0	1
01-BOB	1	12.13	0	1
06-CLD	1	11.63	0	1
01-MIB	1	11.93	0	1
NEWALSD	1 (profile)	4.97 - 8.94	0	1
09-THB	1	9.19	0	1
02-THB	1	11.69	0	1
05A-CLD	1	12.01	0	1
12-WAB	1	11.39	0	1
09-WAB	1	12.15	0	1
07-WAB	1	12.63	0	1
03-CAB	1	12.12	0	1
05-WAB	1	12.31	0	1
03-WAB	1	12.40	0	1
01-WAB	2	8.54 - 12.73	0	2
03-CLD	2	8.93 - 13.46	0	2

01-DAB	2	9.18 - 13.59	0	2
02-CLD	2	8.79 - 12.85	0	2
02-CLD-PIPE	1	12.81	0	1
01-LBK	1	7.58	0	1
03-GRB	1	13.22	0	1
02-GRB	1	12.83	0	1
03-RAB	1	11.60	0	1
03-BMB	1	12.43	0	1
01-BMB	1	10.01	0	1
01-GRB	2	9.50 - 13.53	0	2
01-MTB	2	9.43 - 13.09	0	2
01-CLD	2	9.05 - 13.70	0	2
Total	**56**	_____	**0**	**56**

Figure 1. Dissolved Oxygen Statistics for the Cold River Watershed
July 21 - November 25, 2008, NHDES VRAP

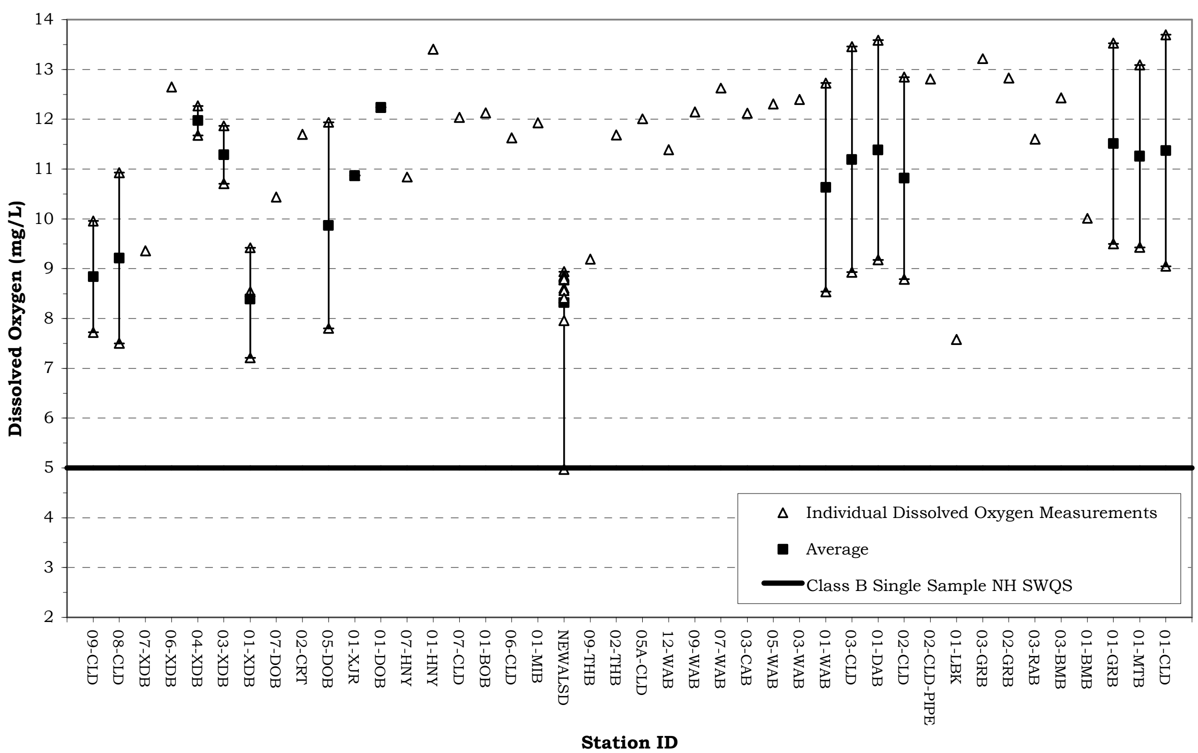
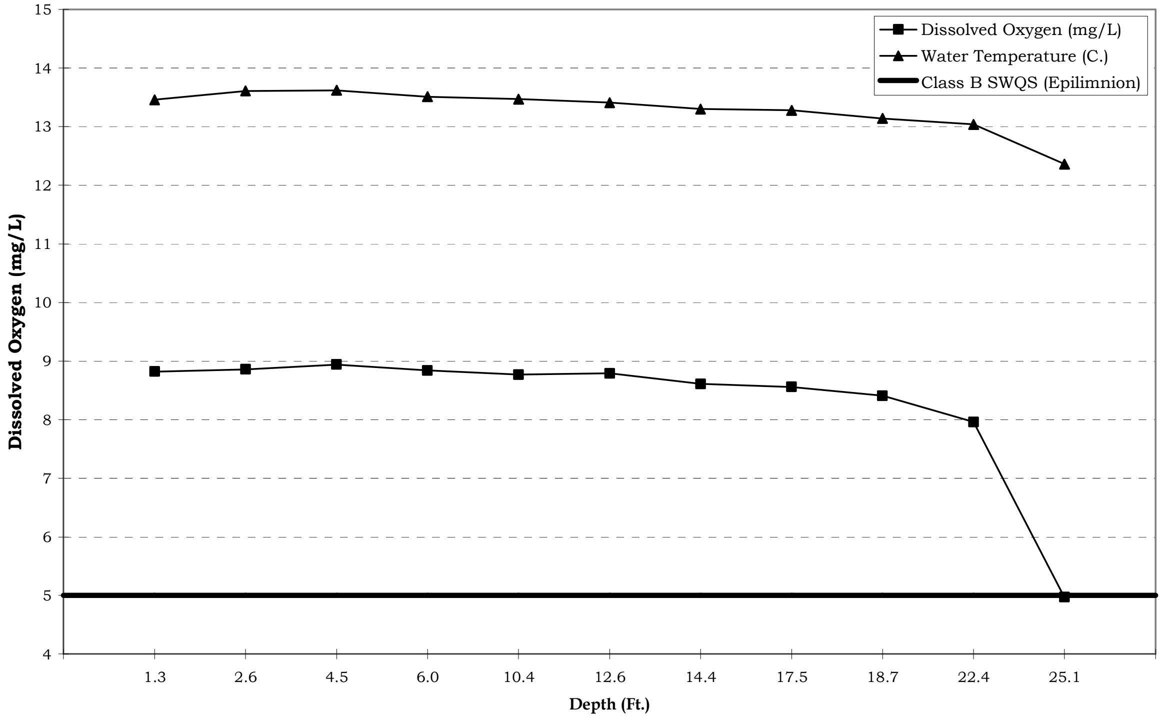


Figure 2. Newall Pond - Verticle Profile of Dissolved Oxygen (mg/L) and Water Temperature (C.) October 18, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

- If possible, take measurements between 5 a.m. and 10 a.m., which is when dissolved oxygen is usually the lowest, and between 2 p.m. and 7 p.m. when dissolved oxygen is usually the highest. In general, dissolved oxygen levels are lowest in the early morning when there is low photosynthetic activity and a peak in respiration from organisms throughout the water column. This is the time of least oxygen production and greatest carbon dioxide emission. Peak dissolved oxygen levels occur when photosynthetic activity is at its peak. The greater the amount of photosynthetic activity the greater the production of oxygen as a byproduct of photosynthesis.

- Consider incorporating the use of in-situ dataloggers to automatically record dissolved oxygen saturation levels during a period of several days. The use of these instruments is dependent upon availability, and requires coordination with NHDES.

4.2 pH

Between one and three measurements were taken in the field for pH at 41 stations in the Cold River watershed [Table 5]. Of the 56 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard is 6.5 - 8.0, unless naturally occurring.

Table 5. pH Data Summary – Cold River Watershed, 2008

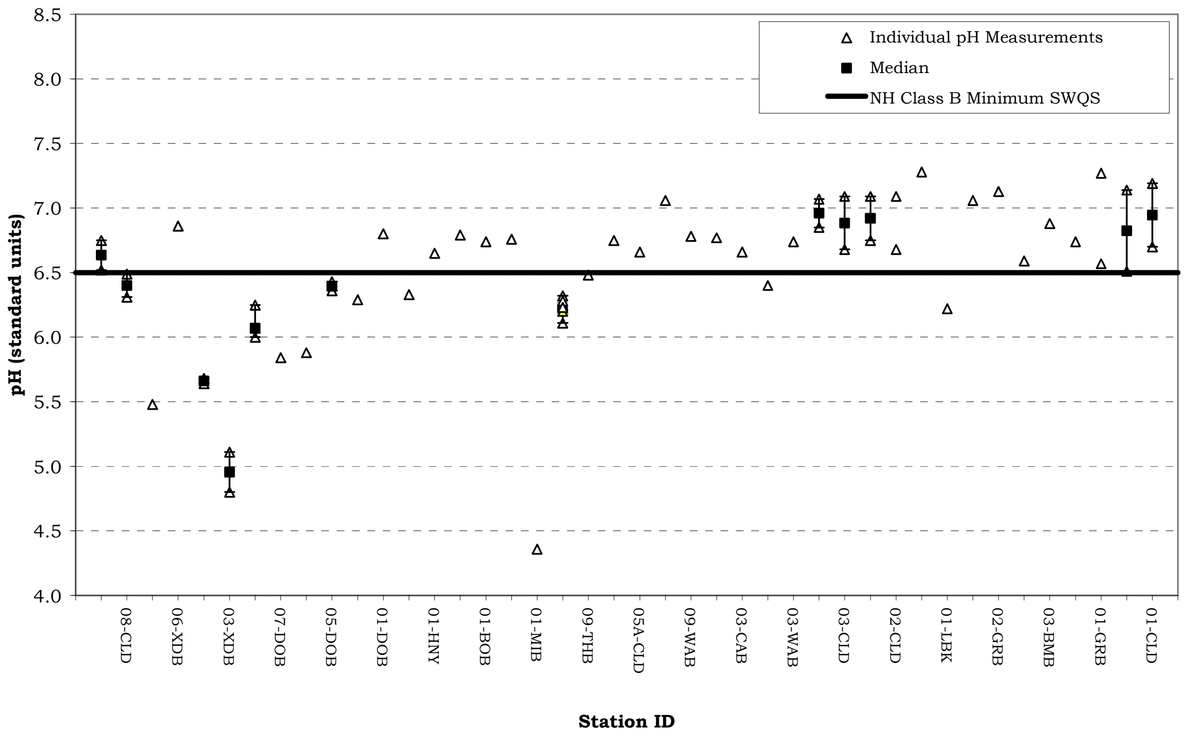
Station ID	Samples Collected	Data Range (standard units)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
09-CLD	2	6.52 - 6.75	0	2
08-CLD	2	6.31 - 6.49	2	2
07-XDB	1	5.48	1	1
06-XDB	1	6.86	0	1
04-XDB	2	5.64 - 5.68	2	2
03-XDB	2	4.80 - 5.11	2	2
01-XDB	3	6.00 - 6.25	3	3
07-DOB	1	5.84	1	1
02-CRT	1	5.88	1	1
05-DOB	2	6.36 - 6.43	2	2
01-XJR	1	6.29	1	1
01-DOB	1	6.80	0	1
07-HNY	1	6.33	1	1
01-HNY	1	6.65	0	1
07-CLD	1	6.79	0	1
01-BOB	1	6.74	0	1
06-CLD	1	6.76	0	1
01-MIB	1	4.36	1	1
NEWALSD	1 (profile)	6.11 - 6.32	1	1
09-THB	1	6.48	1	1
02-THB	1	6.75	0	1
05A-CLD	1	6.66	0	1
12-WAB	1	7.06	0	1
09-WAB	1	6.78	0	1

07-WAB	1	6.77	0	1
03-CAB	1	6.66	0	1
05-WAB	1	6.40	1	1
03-WAB	1	6.74	0	1
01-WAB	2	6.85 - 7.07	0	2
03-CLD	2	6.68 - 7.09	0	2
01-DAB	2	6.75 - 7.09	0	2
02-CLD	2	6.68 - 7.09	0	2
02-CLD-PIPE	1	7.28	0	1
01-LBK	1	6.22	1	1
03-GRB	1	7.06	0	1
02-GRB	1	7.13	0	1
03-RAB	1	6.59	0	1
03-BMB	1	6.88	0	1
01-BMB	1	6.74	0	1
01-GRB	2	6.57 - 7.27	0	2
01-MTB	2	6.51 - 7.14	0	2
01-CLD	2	6.70 - 7.19	0	2
Total	**56**	_____	**20**	**56**

pH measurements were variable with a majority of stations (particularly in the upper watershed) having at least one measurement below the New Hampshire Class B surface water quality standard minimum (Figure 3).

Lower pH measurements are likely the result of natural conditions such as the soils, geology, or the presence of wetlands in the area. Rain and snow falling in New Hampshire is relatively acidic, which can also affect pH levels; after the spring melt or significant rain events, surface waters will generally have a lower pH.

Figure 3. pH Statistics for the Cold River Watershed
July 21 - Novmber 25, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.
- Consider sampling for pH in some of the tributaries and wetland areas that are influencing the pH of stations with measurements below state standards. Site conditions are considered along with pH measurements because of the narrative portion of the pH standard. RSA 485-A:8 states that pH of Class B waters *shall be between 6.5 and 8.0, except when due to natural causes*. Wetlands can lower the pH of a river naturally by releasing tannic and humic acids from decaying plant material. If the sampling location is influenced by wetlands or other natural conditions, then the low pH measurements are not considered a violation of water quality standards. It is important to note that the New Hampshire water quality standard for pH is fairly conservative, thus pH levels slightly below the standard are not necessarily harmful to aquatic life. In this case, additional information about factors influencing pH levels is needed.

4.3 Turbidity

Between one and three measurements were taken in the field for turbidity at 42 stations in the Cold River watershed [Table 6]. Of the 77 measurements taken, 74 met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for turbidity is less than 10 NTU above background. Samples that exceeded the 2008 average for a given station by more than 10 NTU are designated as "potentially not meeting standards". Higher turbidity measurements may be naturally occurring as they are influenced by precipitation, soil type, the composition of the streambed and the geology of the streambed.

Table 6. Turbidity Data Summary – Cold River Watershed, 2008

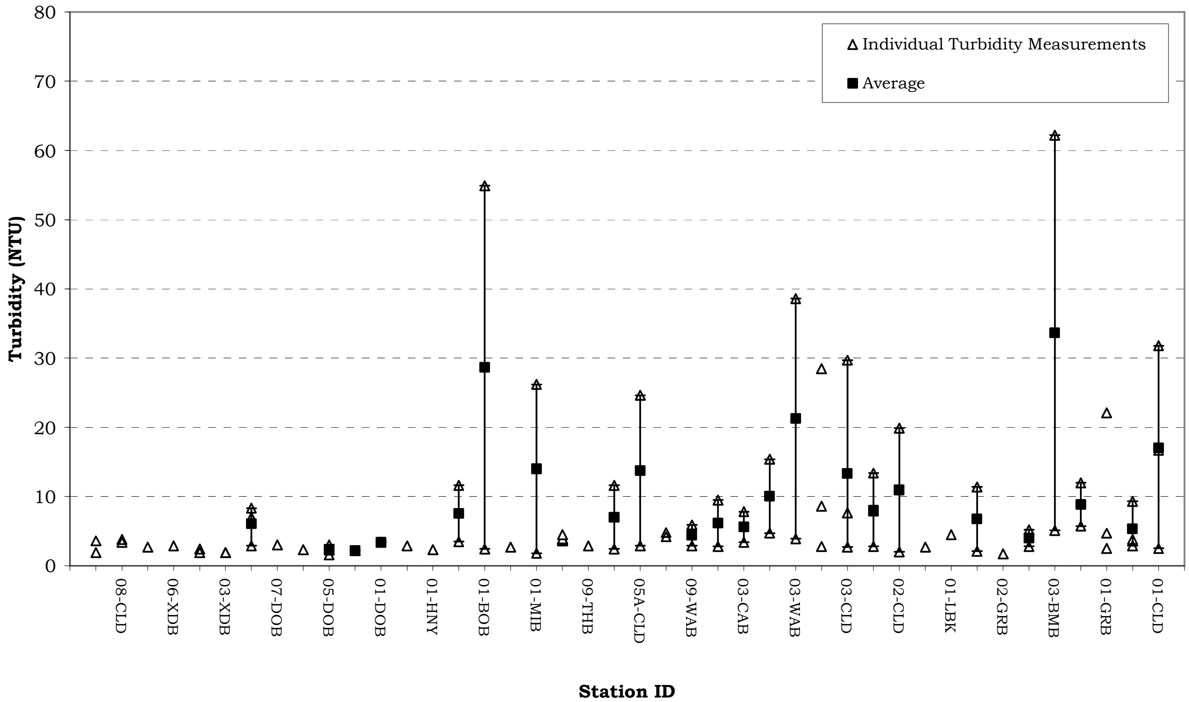
Station ID	Samples Collected	Data Range (standard units)	Acceptable Samples Potentially Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
09-CLD	2	1.9 - 3.6	0	1
08-CLD	2	3.4 - 3.8	0	1
07-XDB	1	2.7	0	1
06-XDB	1	2.9	0	1
04-XDB	2	1.9 - 2.4	0	2
03-XDB	2	1.9	0	2
01-XDB	3	2.9 - 8.3	0	2
07-DOB	1	3.0	0	1
02-CRT	1	2.3	0	1
05-DOB	2	1.6 - 3.0	0	2
01-XJR	1	2.2	0	1
01-DOB	1	3.4	0	1
07-HNY	1	2.9	0	1
01-HNY	1	2.3	0	1
07-CLD	2	3.5 - 11.6	0	2
01-BOB	2	2.4 - 54.9	1	2
06-CLD	1	2.7	0	1
01-MIB	2	1.8 - 26.2	1	2
NEWALSD	1 (profile)	3.6 - 4.5	0	1
09-THB	1	2.9	0	1

02-THB	2	2.4 - 11.6	0	2
05A-CLD	2	2.9 - 24.6	1	2
12-WAB	2	4.2 - 4.8	0	2
09-WAB	2	2.9 - 5.9	0	2
07-WAB	2	2.8 - 9.5	0	2
03-CAB	2	3.4 - 7.8	0	2
05-WAB	2	4.7 - 15.4	1	2
03-WAB	2	3.9 - 38.6	1	2
01-WAB	3	2.8 - 28.5	1	3
03-CLD	3	2.7 - 29.7	1	3
01-DAB	3	2.8 - 13.4	0	3
02-CLD	2	2.0 - 19.9	1	2
02-CLD-PIPE	1	2.7	0	1
01-LBK	1	4.5	0	1
03-GRB	2	2.1 - 11.4	0	2
02-GRB	1	1.7	0	1
03-RAB	2	2.8 - 5.2	0	2
03-BMB	2	5.1 - 62.2	1	2
01-BMB	2	5.7 - 12.0	0	2
01-GRB	3	2.5 - 22.1	1	3
01-MTB	3	2.9 - 9.3	0	3
01-CLD	3	2.5 - 31.8	1	3
Total	**77**	_____	**11**	**74**

Turbidity levels were variable with the average ranging from 1.90 NTU to 33.7 NTU (Figure 4). Eleven stations each had elevated measurements on 11/25/08. A "steady rain" during the evening prior to the sampling event, as well as during the sampling event, was noted on the VRAP Field Data Sheet. Thus, the rain may have contributed to the high turbidity levels.

Although clean waters are associated with low turbidity there is a high degree of natural variability involved. Precipitation often contributes to increased turbidity by flushing sediment, organic matter and other materials from the surrounding landscape into surface waters. However, human activities such as removal of vegetation near surface waters and disruption of nearby soils can lead to dramatic increases in turbidity levels. In general it is typical to see a rise in turbidity in more developed areas due to increased runoff.

Figure 4. Turbidity Statistics for the Cold River Watershed
July 21 - November 25, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.
- Collect samples during wet weather. This will help us to understand how the river responds to runoff and sedimentation. This is especially critical in those areas most impacted by the 2005 flood. Turbidity monitoring should be conducted within restored areas to see if bank stabilization projects succeed in lowering turbidity levels during precipitation events.
- If a higher than normal turbidity measurement occurs, volunteers can investigate further by moving upstream and taking additional measurements. This will facilitate isolating the location of the cause of the elevated turbidity levels. In addition, take good field notes and photographs. If human activity is suspected or verified as the source of elevated turbidity levels, volunteers should contact NHDES.

4.4 Specific Conductance

Between one and three measurements were taken in the field for specific conductance at 51 stations in the Cold River watershed [Table 7]. Of the 134 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

New Hampshire surface water quality standards do not contain numeric criteria for specific conductance although in many fresh surface waters, specific conductance can be used as a surrogate to predict compliance with numeric water quality criteria for chloride.

Table 7. Specific Conductance Data Summary – Cold River Watershed, 2008

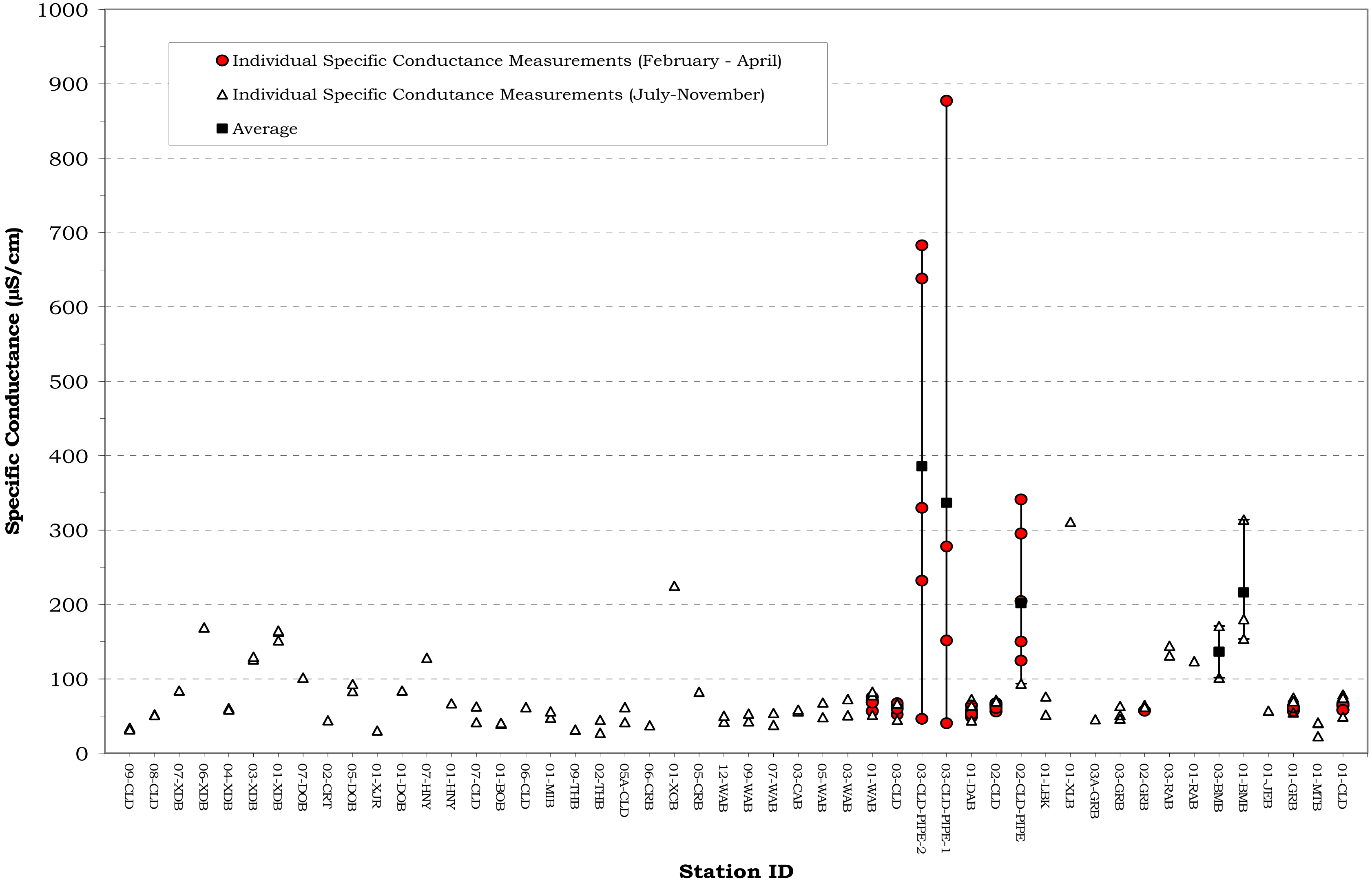
Station ID	Samples Collected	Data Range (µS/cm)	Acceptable Samples Not Meeting NH Class B Standards (µS/cm as chloride surrogate)	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
09-CLD	2	31.8 - 34.1	0	2
08-CLD	2	51.1 – 52.0	0	2
07-XDB	1	84.2	0	1
06-XDB	1	169.1	0	1
04-XDB	2	58.5 - 60.8	0	2
03-XDB	2	126.3 – 130.0	0	2
01-XDB	3	151.78 - 164.8	0	3
07-DOB	1	101.6	0	1
02-CRT	1	44.3	0	1
05-DOB	2	83.6 - 92.8	0	2
01-XJR	1	30.4	0	1
01-DOB	1	84.2	0	1
07-HNY	1	128.1	0	1
01-HNY	1	67.0	0	1
07-CLD	2	41.7 - 62.7	0	2
01-BOB	2	39.4 - 40.8	0	2
06-CLD	1	61.9	0	1
01-MIB	2	47.5 - 56.2	0	2
NEWALSD	1 (profile)	30.3 - 35.3	0	1 (profile)
09-THB	1	31.6	0	1

02-THB	2	27.5 - 44.7	0	2
05A-CLD	2	41.8 - 61.8	0	2
06-CRB	1	37.4	0	1
01-XCB	1	225.0	0	1
05-CRB	1	82.5	0	1
12-WAB	2	42.2 - 50.3	0	2
09-WAB	2	42.7 - 53.1	0	2
07-WAB	2	38.0 – 54.0	0	2
03-CAB	2	56.4 - 58.5	0	2
05-WAB	2	48.4 - 68.1	0	2
03-WAB	2	51.1 - 72.6	0	2
01-WAB	8	51.5 - 82.6	0	8
03-CLD	8	44.8 - 67.4	0	8
03-CLD-PIPE-2	5	46.2 - 683.0	0	5
03-CLD-PIPE-1	5	40.3 - 877.0	0	5
01-DAB	8	43.8 - 72.8	0	8
02-CLD	7	56.0 - 71.7	0	7
02-CLD-PIPE	6	93.5 - 341.2	0	6
01-LBK	2	51.7 - 76.2	0	2
01-XLB	1	311.0	0	1
03A-GRB	1	45.5	0	1
03-GRB	3	46.3 - 63.5	0	3
02-GRB	3	57.2 – 65.0	0	3
03-RAB	2	131.2 - 144.3	0	2
01-RAB	1	123.7	0	1
03-BMB	2	101.6 - 171.0	0	2
01-BMB	3	153.7 - 314.0	0	3
01-JEB	1	57.0	0	1
01-GRB	8	54.9 - 74.7	0	8
01-MTB	3	22.8 - 41.2	0	3
01-CLD	8	49.0 - 78.8	0	8
Total	**134**	_____	**0**	**134**

Specific conductance levels were variable, and relatively low throughout the entire watershed (Figure 5). In general, stations 03-CLD-PIPE-2, 03-CLD-PIPE-1, and 02-CLD-PIPE had the highest specific conductance measurements. It should be noted that these stations are associated with stormwater pipes and surface water quality standards do not apply unless they are causing an impairment in a surface water. Several stations also had measurements greater than 100 μS and more than one station had measurements greater than 200 μS. Higher specific conductance levels can be indicative of pollution from sources such as urban/agricultural runoff, road salt, failed septic systems, or groundwater pollution.

During 2008 the Cold River Local Advisory Committee began monitoring specific conductance during the winter and early spring months to more fully assess the watershed for both specific conductance and chloride. Chloride and specific conductance are very closely related to one another and the protocols NHDES uses to assess waterbodies allows specific conductance to be used as a formal surrogate for chloride. Monitoring for specific conductance and chloride in the winter and early spring months will help determine what the impact of road salt application is in the watershed and indicated what time of year chloride levels tend to be highest. Specific conductance measurements taken during the winter and snowmelt months are indicted with a separate color in Figure 5.

Figure 5. Specific Conductance Statistics for the Cold River Watershed February 6 - November 25, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

- Consider collecting chloride samples at the same time that specific conductance is measured. During the late winter/early spring snowmelt, higher specific conductance levels are often seen due to elevated concentrations of chloride in the runoff. Specific conductance levels are very closely correlated to chloride levels. Simultaneously measuring chloride and specific conductance will allow for a better understanding of their relationship.

- Consider incorporating the use of in-situ dataloggers to automatically determine specific conductance levels during rain events, snowmelt, and baseline dry weather conditions. The use of these instruments is dependent upon availability, and requires coordination with NHDES.

4.5 Water Temperature

Between one and eight measurements were taken in the field for water temperature at 49 stations in the Cold River watershed [Table 8]. Of the 131 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

Although there is currently no numerical water quality criteria for water temperature, NHDES is in the process of collecting biological and water temperature data that will contribute to the development of a procedure for assessing rivers and stream based on water temperature and its corresponding impact to the biological integrity of the waterbody.

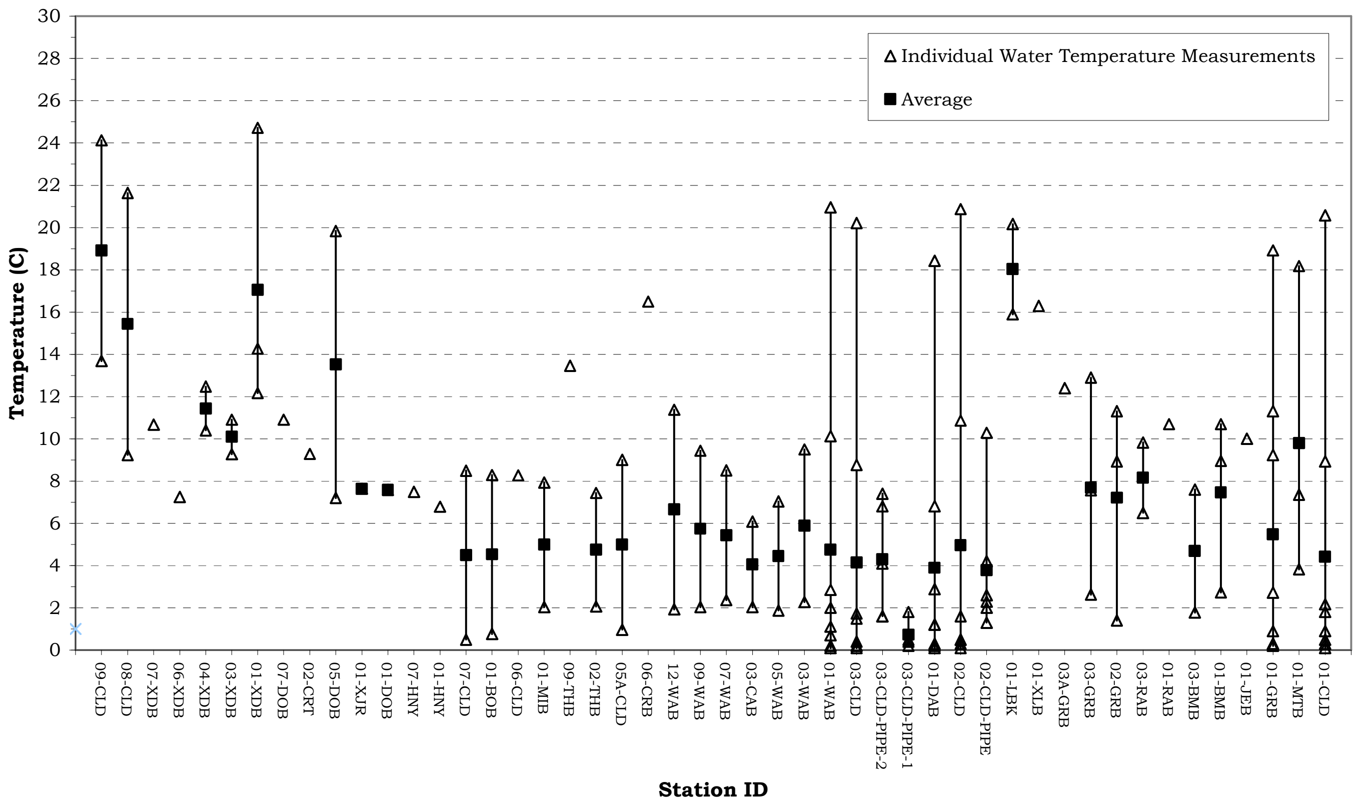
Table 8. Water Temperature Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (°C)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
09-CLD	2	13.7 - 24.1	Not Applicable	2
08-CLD	2	9.2 - 21.6	N/A	2
07-XDB	1	10.7	N/A	1
06-XDB	1	7.3	N/A	1
04-XDB	2	10.4 - 12.5	N/A	2
03-XDB	2	9.3 - 10.9	N/A	2
01-XDB	3	12.2 - 24.7	N/A	3
07-DOB	1	10.9	N/A	1
02-CRT	1	9.3	N/A	1
05-DOB	2	7.2 - 19.8	N/A	2
01-XJR	1	7.6	N/A	1
01-DOB	1	7.6	N/A	1
07-HNY	1	7.5	N/A	1
01-HNY	1	6.8	N/A	1
07-CLD	2	0.5 - 8.5	N/A	2
01-BOB	2	0.8 - 8.3	N/A	2
06-CLD	1	8.3	N/A	1
01-MIB	2	2.0 - 7.9	N/A	2
NEWALSD	1 (profile)	12.4 - 13.6	N/A	1
09-THB	1	13.5	N/A	1
02-THB	2	2.1 - 7.4	N/A	2
05A-CLD	2	1.0 - 9.0	N/A	2
06-CRB	1	16.5	N/A	1
12-WAB	2	1.9 - 11.4	N/A	2

09-WAB	2	2.0 - 9.4	N/A	2
07-WAB	2	2.4 - 8.5	N/A	2
03-CAB	2	2.0 - 6.1	N/A	2
05-WAB	2	1.9 - 7.0	N/A	2
03-WAB	2	2.3 - 9.5	N/A	2
01-WAB	8	0.1 – 21.0	N/A	8
03-CLD	8	0.1 - 20.2	N/A	8
03-CLD-PIPE-2	5	1.6 - 7.4	N/A	5
03-CLD-PIPE-1	4	0.2 - 1.8	N/A	4
01-DAB	8	0.1 - 18.4	N/A	8
02-CLD	7	0.1 - 20.9	N/A	7
02-CLD-PIPE	6	1.3 - 10.3	N/A	6
01-LBK	2	16.0 - 20.2	N/A	2
01-XLB	1	16.3	N/A	1
03A-GRB	1	12.4	N/A	1
03-GRB	3	2.6 – 13.0	N/A	3
02-GRB	3	1.4 - 11.3	N/A	3
03-RAB	2	6.5 - 9.8	N/A	2
01-RAB	1	10.7	N/A	1
03-BMB	2	1.8 - 7.6	N/A	2
01-BMB	3	2.7 - 10.7	N/A	3
01-JEB	1	10.0	N/A	1
01-GRB	8	0.2 - 18.9	N/A	8
01-MTB	3	3.8 - 18.2	N/A	3
01-CLD	8	0.1 - 20.6	N/A	8
Total	**131**	_____	**0**	**131**

Figure 6 shows the results of instantaneous water temperature measurements taken at 49 stations in the Cold River watershed. The average water temperature varied from 4.14 °C. to 18.91 °C.

Figure 6. Water Temperature Statistics for the Cold River Watershed
February 6 - November 25, 2008, NHDES VRAP



Water temperature is a critical parameter for aquatic life and has an impact on other water quality parameters such as dissolved oxygen concentrations, and the activity of bacteria in the water. Water temperature controls the metabolic and reproductive processes of aquatic species and can determine which fish and macroinvertabrate species can survive in a given river or stream.

A number of factors can have an impact on water temperature including the quantity and maturity of riparian vegetation along the shoreline, the rate of flow, the percent of impervious surfaces contributing stormwater, thermal discharges, impoundments and the influence of groundwater.

Recommendations

- Continue collecting water temperature data via both instantaneous readings and consider long-term deployment of NHDES water temperature dataloggers.

4.6 *Escherichia coli*/Bacteria

Between one and four samples were taken for *Escherichia coli* (*E. coli*) at 18 stations in the Cold River watershed (Table 6). Of the 34 samples taken, 30 met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

Class B New Hampshire surface water quality standards for *E.coli* are as follows:

$\leq$406 cts/100 ml, based on any single sample or
$\leq$126 cts/100 ml, based on a geometric mean calculated from three samples collected within a 60-day period.

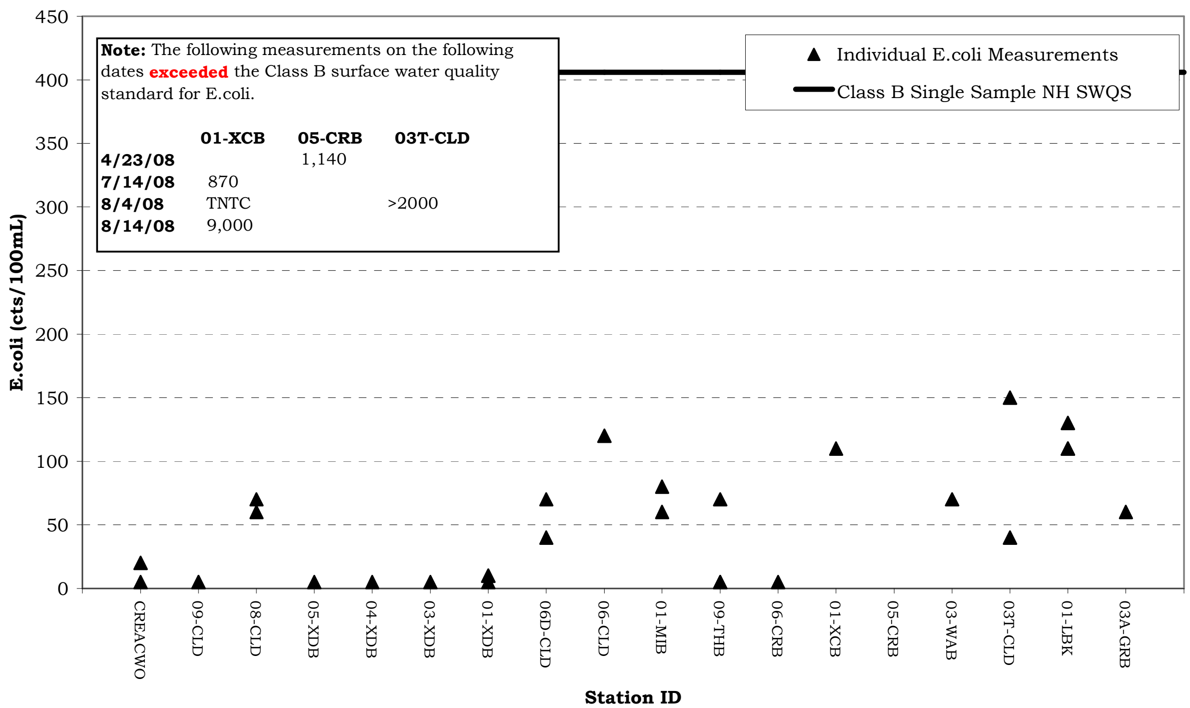
Table 5. *E.coli* Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (counts/100 mL)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
CREACWO	2	<10 - 20	0	2
09-CLD	2	5	0	2
08-CLD	2	60 - 70	0	2
05-XDB	1	5	0	1
04-XDB	1	5	0	1
03-XDB	1	5	0	1
01-XDB	3	5 - 10	0	3
06D-CLD	2	40 - 70	0	2
06-CLD	1	120	0	1
01-MIB	2	60 - 80	0	2
09-THB	3	5 - 70	0	3
06-CRB	1	5 - 5	0	1
01-XCB	4	110 - 9000	2	2
05-CRB	1	1140	1	0
03-WAB	1	70	0	1
03T-CLD	3	40 - 2001	1	2
01-LBK	3	110 - 130	0	3
03A-GRB	1	60	0	1
Total	**34**	____	**4**	**30**

Four measurements exceeded the New Hampshire Class B surface water quality standard (Figure 7). In order to fully determine whether a waterbody is meeting surface water standards for *E.coli* a geometric mean must be calculated. A geometric mean is calculated using three samples collected within a 60-day period. Of the five stations where three or more *E.coli* samples were taken, a geometric mean was not calculated since the samples were collected outside of the 60-day period.

Several factors can contribute to elevated *E. coli* levels, including, but not limited to rain storms, low river flows, the presence of wildlife (e.g., birds), and the presence of septic systems along the river

Figure 7. *E.coli* Statistics for the Cold River Watershed
April 23 - September 15, 2008, NHDES VRAP



Recommendations

- Continue collecting three samples within any 60-day period during the summer to allow for determination of geometric means. Samples need only be collected during the critical period of May 24 to September 15 for assessment purposes. This coincides with the peak contact recreation season.

- Continue to document river conditions and station characteristics (including the presence of wildlife in the area during sampling).

- Continue to document river conditions and station characteristics (including the presence of wildlife in the area during sampling).At stations with particularly high bacteria levels volunteers can investigate further by moving upstream and taking additional measurements. This will facilitate isolating the location of the cause of the elevated bacteria levels. Those sampling should also look for any potential sources of bacteria such as emission pipes, failed septic systems, farm animals, pet waste, wildlife and waterfowl.

4.7 Total Phosphorus

Between one and four samples were taken for total phosphorus at 19 stations in the Cold River watershed (Table 9). Of the 37 samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

There is no numeric standard for total phosphorus for Class B waters. The narrative standard states that "unless naturally occurring, shall contain no phosphorus in such concentrations that would impair any existing or designated uses." The NHDES "level of concern" for total phosphorous is 0.05 mg/L.

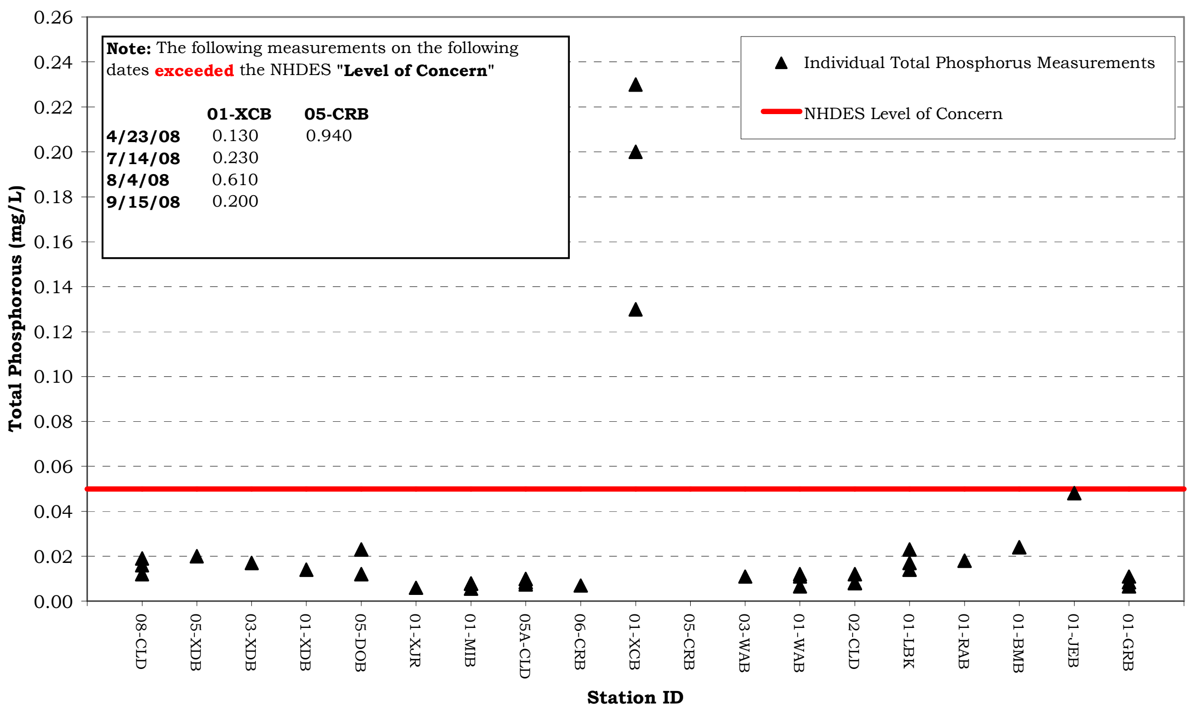
Table 9. Total Phosphorus Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Above NHDES Level of Concern	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
08-CLD	3	0.012 - 0.019	0	3
05-XDB	1	0.020	0	1
03-XDB	1	0.017	0	1
01-XDB	1	0.014	0	1
05-DOB	2	0.012 - 0.023	0	2
01-XJR	1	0.006	0	1
01-MIB	3	0.0056 - 0.0078	0	3
05A-CLD	3	0.0074 - 0.0099	0	3
06-CRB	1	0.0069	0	1
01-XCB	4	0.130 - 0.610	4	4
05-CRB	1	0.094	1	1
03-WAB	1	0.011	0	1
01-WAB	3	0.0066 - 0.012	0	3
02-CLD	3	0.008 - 0.012	0	3
01-LBK	3	0.014 - 0.023	0	3
01-RAB	1	0.018	0	1
01-BMB	1	0.024	0	1
01-JEB	1	0.048	0	1
01-GRB	3	0.0066 - 0.011	0	3
Total	**37**	____	**5**	**37**

Four measurements at station 01-XCB, and one measurement at station 05-CRB exceeded the NHDES “level of concern” (Figure 8). Under undisturbed natural conditions phosphorous is at very low levels in aquatic ecosystems. Of the three nutrients critical for aquatic plant growth; potassium, nitrogen, and phosphorous, it is usually phosphorous that is the limiting factor to plant growth. When the supply of phosphorous is increased due to human activity, algae respond with significant growth.

A major source of excessive phosphorous concentrations in aquatic ecosystems can be wastewater treatment facilities, as sewage typically contains relatively high levels of phosphorus detergents. However, fertilizers used on lawns and agricultural areas can also contribute significant amounts of phosphorus.

Figure 8. Total Phosphorus Statistics for the Cold River Watershed
April 23 - September 15, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.8 Total Kjeldahl Nitrogen

One sample was taken for total kjeldahl nitrogen at six stations in the Cold River watershed (Table 10). Of the six samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

There is no numeric standard for TKN for Class A or B waters. The narrative standard states that "unless naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses."

Table 10. Total Kjeldahl Nitrogen Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
01-MIB	1	ND	Not applicable	1
06-CRB	1	ND	N/A	1
01-XCB	1	1.6	N/A	1
05-CRB	1	12.0	N/A	1
03-WAB	1	ND	N/A	1
01-LBK	1	ND	N/A	1
Total	**6**	_____	**2**	**6**

[A] NHDES Laboratory detection limit for TKN is 0.25 mg/L

Although there is no numeric standard for TKN, the median TKN value for New Hampshire rivers and streams is 0.40 mg/L (based on VRAP and other NHDES data collected 1976 – 2005). Samples collected at stations 01-XCB and 05-CRB exceeded the state median of 0.40 mg/L. Samples collected at four other stations were below the laboratory detection limit.

TKN is unoxidized nitrogen and a measurement of the combined concentration of organic nitrogen and ammonia. Nitrogen is naturally occurring in soil in organic forms from decomposing plant and animal matter. Bacteria in the soil then convert nitrogen to nitrate, a nitrogen-oxygen chemical unit. Primary sources which can cause increased nitrate levels are human sewage, livestock manure, and agricultural fertilizers. Higher TKN values may also be indicative of high production rates, algal growth and decomposing organics.

Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.9 Nitrogen – Nitrate (NO_3)

Between one and three samples were taken for NO_3 at 20 stations in the Cold River watershed (Table 11). Of the 37 samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

There is no numeric standard for nitrate for Class A or B waters. The narrative standard states that "unless naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses."

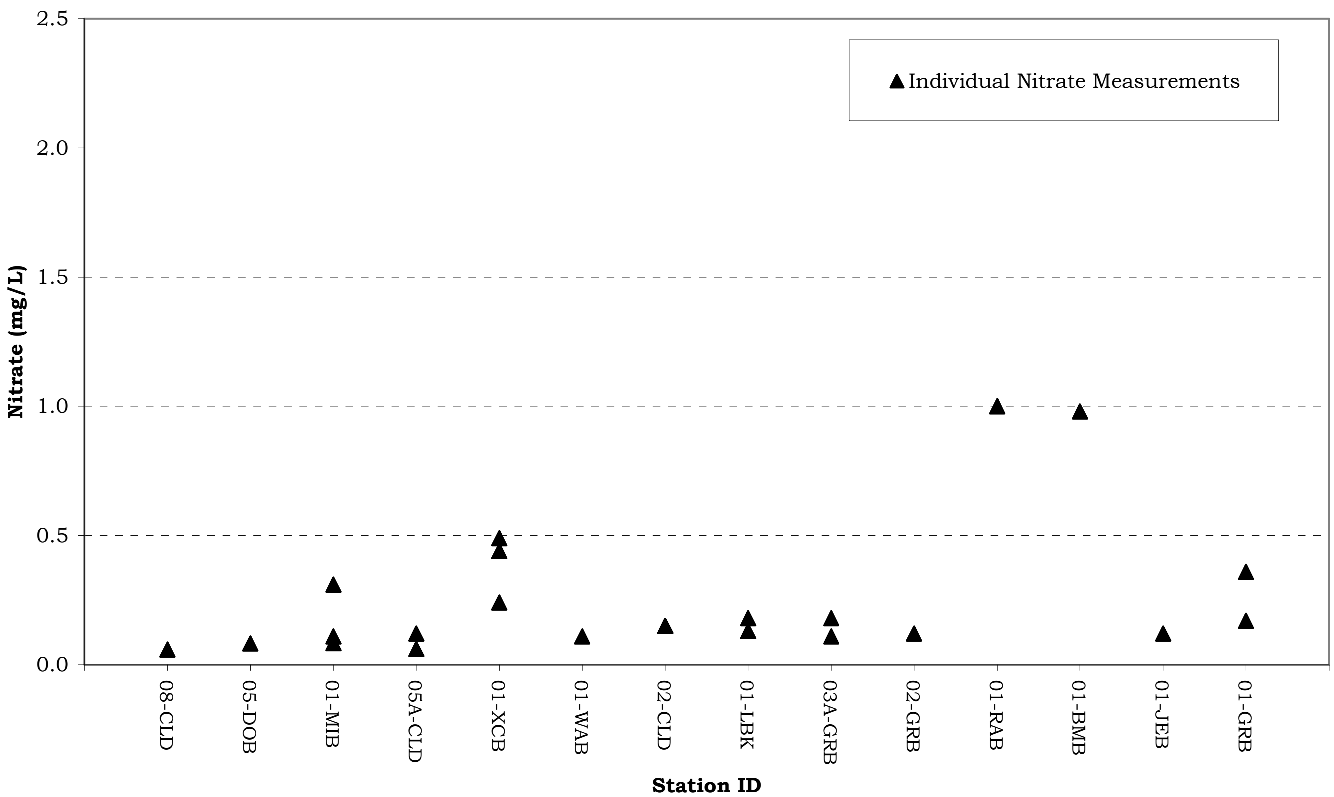
Table 11. Nitrate Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
08-CLD	3	ND - 0.059	Not Applicable	3
05-XDB	1	ND	N/A	1
04-XDB	1	ND	N/A	1
03-XDB	1	ND	N/A	1
01-XDB	1	ND	N/A	1
05-DOB	1	0.082	N/A	1
01-MIB	3	0.084 - 0.310	N/A	3
09-THB	1	ND	N/A	1
05A-CLD	3	ND - 0.120	N/A	3
01-XCB	3	0.24 - 0.49	N/A	3
03-WAB	1	ND	N/A	1
01-WAB	3	ND - 0.11	N/A	3
02-CLD	3	ND - 0.15	N/A	3
01-LBK	3	ND - 0.18	N/A	3
03A-GRB	2	0.11 - 0.18	N/A	2
02-GRB	1	0.12	N/A	1
01-RAB	1	1.00	N/A	1
01-BMB	1	0.98	N/A	1
01-JEB	1	0.12	N/A	1
01-GRB	3	0.17 - 0.36	N/A	3
Total	**37**	_____	**0**	**37**

[A] NHDES Laboratory detection limit for nitrate is 0.05 mg/L

Although there is no numeric standard for nitrate, the median nitrate value for New Hampshire rivers and streams is 0.18 mg/L (based on VRAP and other NHDES data collected 1976 – 2005). Five nitrate samples collected exceeded the nitrate state median. Station 01-CRB had nitrate/nitrite levels higher than elsewhere in the watershed and this could indicate potential nuisance levels of nitrogen.

Figure 9. Nitrate Statistics for the Cold River Watershed
July 14 - October 27, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.10 Nitrogen – Nitrate (NO_3) + Nitrite (NO_2)

One sample was taken for NO_2 + NO_3 at six stations in the Cold River watershed (Table 11). Of the six samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

There is no numeric standard for nitrate/nitrite for Class A or B waters. The narrative standard states that "unless naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses."

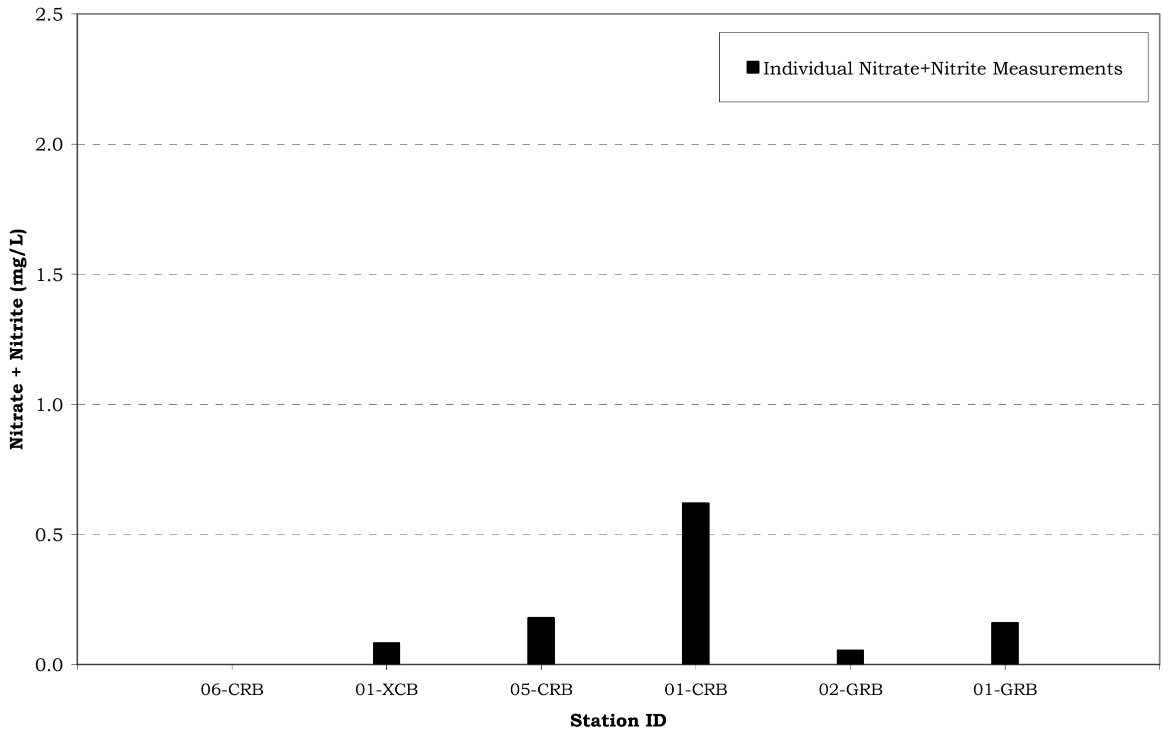
Table 11. Nitrate/Nitrite Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
06-CRB	1	ND	Not Applicable	1
01-XCB	1	0.083	N/A	1
05-CRB	1	0.180	N/A	1
01-CRB	1	0.620	N/A	1
02-GRB	1	0.054	N/A	1
01-GRB	1	0.160	N/A	1
Total	**6**	____	**0**	**5**

[A] NHDES Laboratory detection limit for nitrate + nitrite is 0.05 mg/L

Although there is no numeric standard for nitrate/nitrite, the median nitrate/nitrite value for New Hampshire rivers and streams is 0.17 mg/L (based on VRAP and other NHDES data collected 1976 – 2005). Five nitrate/nitrite samples collected exceeded the nitrate/nitrite state median. Station 01-CRB had nitrate/nitrite levels higher than elsewhere in the watershed and this could indicate potential nuisance levels of nitrogen (Figure 10).

Figure 10. Nitrate (NO_3)/Nitrite (NO_2) Statistics for the Cold River Watershed
August 29 - November 7, 2008, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.11 Ammonia

One sample was taken for ammonia at three stations in the Cold River watershed [Table 12]. Of the three samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for ammonia is dependent on the temperature and pH of the sample.

Table 12. Ammonia Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
06-CRB	1	ND	0	1
01-XCB	1	0.82	0	1
05-CRB	1	7.30	1[A]	1
Total	**3**	_____	**1**	**3**

[A] Water temperature and pH were not measured at the time samples was taken however the median water temperature and pH from previously collected data indicate a water quality exceedance.

Station 01-XCB had ammonia measurements that likely exceeded the chronic standard.

Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.12 Aluminum

Three samples were taken for aluminum at one station in the Cold River watershed [Table 12]. Of the three samples taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for Aluminum is as follows:

Freshwater chronic criterion 0.087 mg/l
Freshwater acute criterion 0.750 mg/l

Table 13. Aluminum Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
01-WAB	3	0.063 - 0.099	2	3
Total	**3**	_____	**2**	**3**

Two samples taken for aluminum at station 01-WAB was above the New Hampshire Class B chronic surface water quality standard.

Aluminum is the most common metal in the earth's crust and occurs in many rocks and ores. Due to its high chemical reactivity, aluminum does not occur in nature as its pure metal state but is instead combined with other elements. Aluminum will exist in higher concentrations in those surface waters with lower pH levels. The more acidic waters allow higher amounts of aluminum to precipitate out from surrounding soils and substrate.

Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.

4.13 Chloride

Between one and three samples were taken for chloride at 18 stations in the Cold River watershed [Table 12]. Of the 27 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for chloride is as follows:

Freshwater chronic criterion	230 mg/l
Freshwater acute criterion	860 mg/l

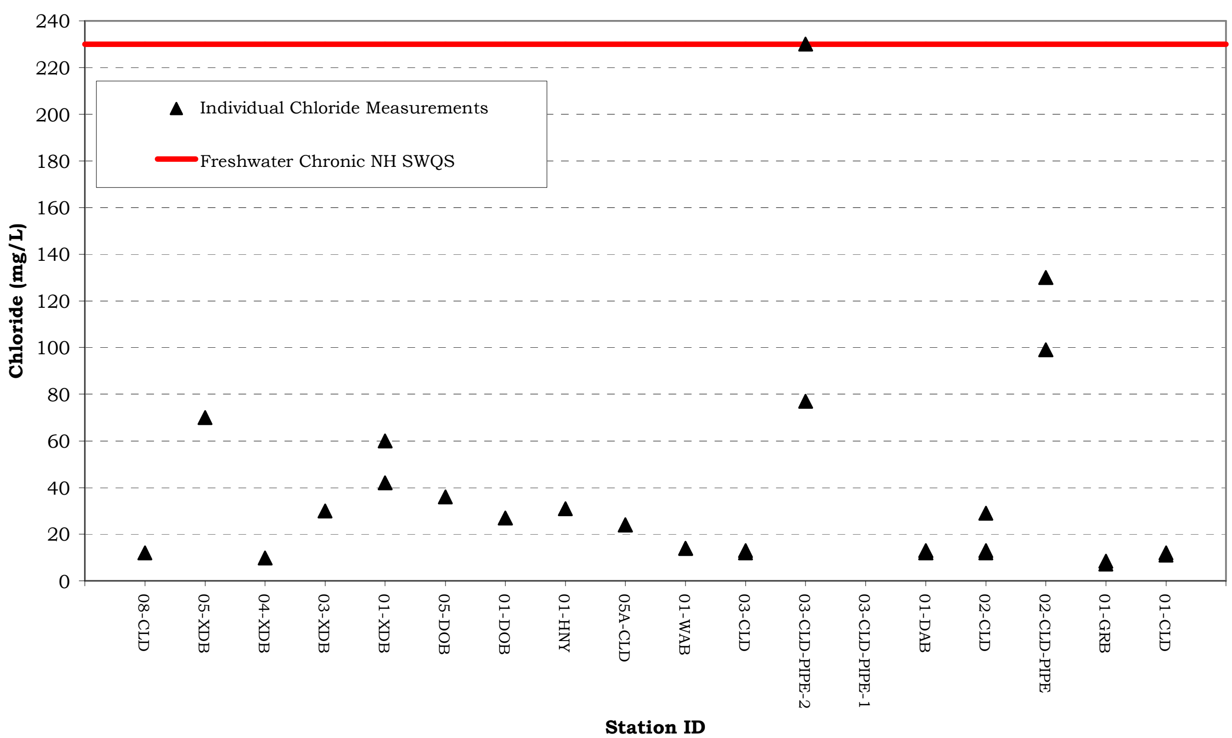
Table 12. Chloride Data Summary – Cold River Watershed, 2008

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
08-CLD	1	12	0	1
05-XDB	1	70	0	1
04-XDB	1	9.9	0	1
03-XDB	1	30	0	1
01-XDB	2	42 - 60	0	2
05-DOB	1	36	0	1
01-DOB	1	27	0	1
01-HNY	1	31	0	1
05A-CLD	1	24	0	1
01-WAB	1	14	0	1
03-CLD	2	12 - 13	0	2
03-CLD-PIPE-2	2	77 - 230	0	2
03-CLD-PIPE-1	1	340	0	1
01-DAB	2	12 - 13	0	2
02-CLD	3	12 - 29	0	3
02-CLD-PIPE	2	99 - 130	0	2
01-GRB	2	7.2 - 8.5	0	2
01-CLD	2	11 - 12	0	2
Total	**27**	_____	**0**	**27**

All surface water samples were below the state of New Hampshire Class B chronic surface water quality standard of 230 mg/L (Figure 11). Station 03-CLD-PIPE-1 did have a measurement above the chronic standard however this water is stormwater and not a surface water.

Although chloride can originate from natural sources, most of the chloride that enters the environment is associated with the storage and application of road salt. Road salt readily dissolves and enters aquatic environments in ionic forms. As such, chloride-containing compounds commonly enter surface water, soil, and groundwater during late-spring snowmelt (since the ground is frozen during much of the late winter and early spring). Chloride ions are conservative, which means they are not degraded in the environment and tend to remain in solution, once dissolved. Chloride ions that enter ground water can ultimately be expected to reach surface water and, therefore, influence aquatic environments and humans. Additional human sources of chloride can come from fertilizers, septic systems, and underground water softening systems.

Figure 11. Chloride Statistics for the Cold River Watershed
February 6, 2008 - July 14, 2008, NHDES VRAP



Recommendations

- Continue collecting chloride samples during both low-flow summer months and during snowmelt period in winter and early spring. It is critical that specific conductance be recorded when chloride samples are collected.

APPENDIX A: 2008 COLD RIVER WATERSHED VRAP DATA

Legend	
(blue)	Measurements not meeting New Hampshire surface water quality standards
(yellow)	Turbidity measuremets potentially not meeting New Hampshire surface water quality standards
(pink)	Total Phosphorous measurements exceeding NHDES level of concern
(diagonal line)	Measurements not meeting NHDES quality assurance/quality control standards

[A] Chronic water quality standard

[B] Hardness dependent metal. The water quality standard is caluculated based on the site specific hardness value.

CREACWO, Crescent Lake, Dam Outlet, Acworth

Date	Time of Sample	*E. coli* (CTS/100mL)
Standard	**NA**	**<406**
08/04/2008	9:30	<10
09/15/2008	12:05	20

09-CLD, Cold River, Crescent Lake Road Bridge, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**	**<406**
08/04/2008	09:25							5
08/05/2008	19:29	7.72	96.3	6.52	1.9	31.81	24.13	
09/15/2008	11:57							5
10/18/2008	16:15	9.96	99.76	6.75	3.6	34.13	13.68	

08-CLD, Cold River, Allen Road Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**	**<406**	**Narrative**	**230[A]**	**Narrative**
07/14/2008	07:30								0.019	12	ND
08/04/2008	09:10							70	0.016		0.059
08/05/2008	19:10	7.50	88.79	6.31	3.8	51.1	21.64				
09/15/2008	11:45							60	0.012		ND
10/18/2008	15:58	10.93	98.24	6.49	3.4	51.92	9.23				

07-XDB, Unnamed Tributary to Dodge Pond, Route 10 Bridge, Lempter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/17/2008	16:57	9.36	87.99	5.48	2.7	84.16	10.67

06-XDB, Unnamed Tributary to Dodge Pond, Route 10 Bridge, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/2008	16:38	12.65	109.07	6.86	2.9	169.09	7.25

05-XDB, Unnamed Tributary to Dodge Pond, West Inlet to Dodge Pond, Route 10 Bridge, Lempster

Date	Time of Sample	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	<406	Narrative	230[A]	Narrative
10/27/2008	11:30	5	0.020	70	ND

04-XDB, Unnamed Tributary to Dodge Pond, South Inlet to Dodge Pond, Boy Scout Camp Footbridge, Lempter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	230[A]	Narrative
10/10/2008	15:34	11.68	114.2	5.68	1.9	58.48	12.47				
10/17/2008	16:14	12.27	114.72	5.64	2.4	60.79	10.4				
10/27/2008	10:30							5	ND	9.9	ND

03-XDB, Unnamed Tributary to Dodge Pond, East Inlet to Dodge Pond, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	230[A]	Narrative
10/10/2008	16:41	10.71	112.8	4.80	1.9	129.5	10.91				
10/17/2008	16:25	11.87	108.04	5.11	1.9	126.31	9.27				
10/27/2008	10:35							5	0.017	30	ND

01-XDB, Unnamed Tributary to Dodge Pond, Dodge Pond Beach, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	230[A]	Narrative
07/14/2008	07:40							5	0.014	60	ND
08/04/2008	09:45							10			
08/05/2008	19:51	7.21	90.99	6.25	~~2.9~~	151.79	24.72				
09/15/2008	12:12							10			
10/10/2008	17:23	8.54	93.8	6.00	7.0	163.4	14.27				
10/17/2008	16:42	9.42	91.68	6.07	8.3	164.8	12.16				
10/27/2008	11:00									42	

07-DOB, Dodge Brook, Old Road Bridge, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/17/2008	16:13	10.44	98.62	5.84	3.0	101.61	10.91

02-CRT, Culter Road Tributary to Dodge Brook, Route 10 Bridge, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/17/2008	17:25	11.70	106.34	5.88	2.3	44.33	9.28

05-DOB, Dodge Brook, Route 10 Bridge, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	230[A]	Narrative
7/14/2008	7:50							0.023	36	0.082
08/05/2008	20:30	7.80	89.49	6.36	1.6	92.84	19.83			
09/15/2008	12:25							0.012		
10/18/2008	17:10	11.94	102.59	6.43	3.0	83.61	7.20			

01-XJR, Unnamed Tributary to Dodge Brook, Downstream of Jolly Roger Racetrack, Lempster

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphours (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative
09/15/2008	12:28							0.006
10/18/2008	17:16	10.87	94.4	6.29	2.2	30.44	7.64	

01-DOB, Dodge Brook, East Acworth Road Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
07/14/2008	00:00							27
10/18/2008	15:47	12.24	105.3	6.80	3.4	84.15	7.58	

07-HNY, Honey Brook, Route 123A 500 Yards Downstream of Route 10 on Upstream Side of Culvert, Marlow

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/08	17:25	10.84	99.4	6.33	2.9	128.07	7.5

01-HNY, Honey Brook, Route 123A Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
07/14/2008	00:00							31
10/18/2008	15:39	13.41	113.1	6.65	2.3	66.96	6.79	

07-CLD, Cold River, Grout Hill Road Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/2008	15:29	12.04	105.8	6.79	3.5	62.73	8.50
11/25/2008	17:12				11.6	41.73	0.50

01-BOB, Bowers Brook, Route 123A Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/2008	15:16	12.13	105.7	6.74	2.4	40.79	8.28
11/25/2008	17:02				54.9	39.42	0.77

06D-CLD, Cold River, Deep Hole, Acworth

Date	Time of Sample	*E. coli* (CTS/100mL)
Standard	NA	<406
07/14/2008	07:10	70
08/04/2008	08:50	40

06-CLD, Cold River, Route 123A Pulloff, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406
09/15/2008	11:30							120
10/18/2008	15:08	11.63	101.0	6.76	2.7	61.91	8.27	

01-MIB, Milliken Brook, Route 13A Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	Narrative	Narrative
07/14/2008	07:00								0.006		0.310
08/04/2008	08:45							80	0.008		0.110
09/15/2008	11:22							60	0.008	ND	0.084
10/18/2008	14:59	11.93	102.7	4.36	1.8	56.15	7.93				
11/25/2008	17:24				26.2	47.49	2.04				

NEWALSD, Newell Pond, Deep Spot, Alstead

Date	Depth	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	Feet	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/2008	1.3	18:09	8.82	88.39	6.32	3.6	31.53	13.46
	2.6	18:10	8.86	89.16	6.25	3.6	31.29	13.61
	4.53	18:11	8.94	89.97	6.25	3.9	31.09	13.62
	5.99	18:12	8.84	88.67	6.22	3.7	30.49	13.51
	10.35	18:13	8.77	87.96	6.21	3.7	30.33	13.47
	12.55	18:14	8.79	88.00	6.21	3.6	30.50	13.41
	14.42	18:15	8.61	85.94	6.20	3.7	30.44	13.30
	17.47	18:16	8.56	85.38	6.26	3.8	30.53	13.28
	18.69	18:17	8.41	83.64	6.28	3.9	30.64	13.14
	22.4	18:18	7.96	79.00	6.23	4.5	31.92	13.04
	25.06	18:19	4.97	48.56	6.11		35.32	12.36

09-THB, Thayer Brook, Newell Pond Road Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	Narrative
07/14/2008	05:15							<10		
08/04/2008	10:25							70	ND	ND
09/15/2008	12:36							<10		
10/18/2008	17:40	9.19	92.2	6.48	2.9	31.59	13.46			

02-THB, Thayer Brook, Forrest Road Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/18/2008	14:47	11.69	99.7	6.75	2.4	44.73	7.44
11/25/2008	16:53				11.6	27.53	2.06

05A-CLD, Cold River, Forrest Road Bridge, Acworth

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	230[A]	Narrative
07/14/2008	06:50							0.009	24	0.12
08/04/2008	08:35							0.007		0.061
09/15/2008	11:18							0.010		ND
10/18/2008	14:16	12.01	105.9	6.66	2.9	61.81	9.00			
11/25/2008	16:44				24.6	41.84	0.97			

06-CRB, Crane Brook, Crane Brook Road, Acworth

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Ammonia	N02+N03
Standard	NA	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	Narrative	Narrative	Narrative
04/23/2008	13:25	37.40	16.50	5	0.007	ND	ND	ND

01-XCB, Unknown Tributary to Crane Brook, Boscomb Hill Road

Date	Time of Sample	Specific Conductance (µS/cm)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Ammonia	Nitrate (mg/L)	N02+N03
Standard	NA	(µS/cm as chloride surrogate)	<406	Narrative	Narrative	Narrative	Narrative	Narrative
04/23/2008	12:57	225.00	110	0.130	1.6	0.82		0.083
07/14/2008	06:35		870	0.230			0.44	
08/04/2008	08:15		TNTC	0.610			0.24	
09/15/2008	11:05		9000	0.200	1.3		0.49	

05-CRB, Crane Brook, 100' Downstream of Unknown Tributary at Holden Hill Road, Acworth

Date	Time of Sample	Specific Conductance (µS/cm)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Ammonia	N02+N03
Standard	NA	(µS/cm as chloride surrogate)	<406	Narrative	Narrative	Narrative	Narrative
04/23/2008	12:55	82.50	1140	0.940	12	7.3	0.18

01-CRB, Crane Brook, Upstream of Confluence with Cold River, Acworth

Date	Time of Sample	N02+N03
Standard	NA	Narrative
04/23/2008	12:40	0.62

12-WAB, Warren Brook, Prentice Hall Road Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	10:58	11.39	107.6	7.06	4.2	50.27	11.38
11/25/2008	16:03				4.8	42.20	1.93

09-WAB, Warren Brook, Second Crossing of Route 123 Downstream of Warren Lake Dam, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	12:08	12.15	109.3	6.78	2.9	53.11	9.44
11/25/2008	16:08				5.9	42.72	2.04

07-WAB, Warren Brook, Route 123 Bridge at Town Barn, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	12:21	12.63	110.3	6.77	2.8	53.96	8.51
11/25/2008	16:14				9.5	38.02	2.36

03-CAB, Camp Brook, Camp Brook Road Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	10:45	12.12	99.8	6.66	3.4	58.47	6.08
11/25/2008	15:50				7.8	56.36	2.04

05-WAB, Warren Brook, Site of Former Cooper Hill Road Culvert, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	12:29	12.31	103.4	6.40	4.7	68.06	7.03
11/25/2008	16:23				15.4	48.40	1.87

03-WAB, Warren Brook, Route 123 Upstream of Junction with Route 12A, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	Narrative	Narrative
09/15/2008	10:45							70	0.011	ND	ND
10/19/2008	12:45	12.40	109.9	6.74	3.9	72.63	9.50				
11/25/2008	16:29				38.6	51.06	2.27				

01-WAB, Warren Brook, Route 123A Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Aluminum
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	230[A]	Narrative	Narrative
02/06/2008	12:29					70.80	0.20		14		
02/13/2008	00:00					68.10	0.10		14		
02/26/2008	16:40					56.40	0.70				
03/05/2008	17:15					75.40	1.10				
03/08/2008	14:55					68.00	2.00				
07/14/2008	06:20							0.007		0.11	0.063
07/21/2008	13:00	8.54	98.2	6.85	8.6	82.62	20.95				
08/04/2008	08:05							0.012		ND	0.099
09/15/2008	10:55							0.011		ND	0.097
10/19/2008	13:01	12.73	114.0	7.07	2.8	78.22	10.13				
11/25/2008	16:36				28.5	51.50	2.85				

03T-CLD, Cold River, Wooden Dam Below Confluence with Warren Brook, Alstead

Date	Time of Sample	*E. coli* (CTS/100mL)
Standard	NA	<406
07/14/2008	06:10	40
08/04/2008	07:55	>2000
09/15/2008	10:40	150

03-CLD, Cold River, Route 123 Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	11:36					64.00	0.20	13
02/13/2008	17:50					61.40	0.10	12
02/26/2008	16:10					52.00	0.20	
03/05/2008	17:20					67.10	0.40	
03/08/2008	14:30					59.40	1.50	
07/21/2008	11:37	8.93	101.0	6.68	7.6	66.50	20.21	
10/19/2008	13:18	13.46	116.5	7.09	2.7	67.39	8.77	
11/25/2008	19:21				29.7	44.75	1.73	

03-CLD-PIPE-2, Route 123 Bridge, Alstead

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	12:15	232.00	1.60	77
02/13/2008	18:05	638.00	4.10	230
02/26/2008	16:25	683.00	6.80	
03/05/2008	17:40	329.60	7.40	
03/08/2008	14:45	46.20	1.60	

03-CLD-PIPE-1, Route 123 Bridge, Alstead

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	11:45	151.50	0.50	
02/13/2008	17:55	877.00	0.20	340
03/05/2008	17:35	278.00	0.40	
03/08/2008	14:40	40.30	1.80	

01-DAB, Darby Brook, Comstock Road Bridge, Alstead

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	10:16					64.00	0.20	12
02/13/2008	17:40					55.00	0.10	13
02/26/2008	16:00					57.50	1.20	
03/05/2008	18:40					48.60	0.30	
03/08/2008	15:10					52.50	1.20	
07/21/2008	09:19	9.18	100.4	6.75	7.9	63.92	18.42	
10/19/2008	13:30	13.59	112.3	7.09	2.8	72.82	6.81	
11/25/2008	20:37				13.4	43.81	2.88	

02-CLD, Cold River, Drewsville, Route 13 Bridge, Walpole

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	230[A]	Narrative
02/06/2008	11:13					64.90	0.30		12	
02/13/2008	17:25					63.70	0.10		13	
02/26/2008	15:45					56.00	0.50			
03/05/2008	17:50					67.20	0.50			
03/08/2008	14:10					60.40	1.60			
07/14/2008	05:40							0.008	29	0.15
07/21/2008	10:59	8.79	104.5	6.68	19.9	69.75	20.87			
08/04/2008	07:30							0.008		0.15
09/15/2008	10:02							0.012		ND
10/19/2008	15:08	12.85	116.6	7.09	2.0	71.68	10.86			

02-CLD PIPE, Drewsville, Route 123 Bridge, Walpole

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	11:13					295.30	2.30	99
02/13/2008	17:30					341.20	1.30	130
02/26/2008	15:30					149.90	4.20	
03/05/2008	17:55					204.20	2.60	
03/08/2008	14:20					124.40	2.00	
10/19/2008	15:12	12.81	114.7	7.28	2.7	93.53	10.28	

01-LBK, Little Brook, Ball Hill Road, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Total Phosphorus (mg/L)	TKN	Nitrate (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	<406	Narrative	Narrative	Narrative
04/23/2008	14:05					51.70	15.90				
07/14/2008	05:50							130	0.023		ND
07/21/2008	11:17	7.58	85.8	6.22	4.5	76.16	20.16				
08/04/2008	07:35							110	0.017		0.13
09/15/2008	10:20							110	0.014	ND	0.18

01-XLB, Unnamed Tributary to Little Brook, Ball Hill Road, Langdon

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	(µS/cm as chloride surrogate)	Narrative
04/23/2008	14:10	311.00	16.30

03A-GRB, Great Brook, 100' Upstream from Little Brook, Acworth

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	Nitrate (mg/L)
Standard	NA	(µS/cm as chloride surrogate)	Narrative	<406	Narrative
04/23/2008	14:20	45.50	12.40		
08/04/2008	07:45			60	0.11
09/15/2008	10:15				0.18

03-GRB, Great Brook, Route 12A Bridge at Ball Hill Road, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
04/23/2008	14:00					46.30	12.90
10/19/2008	15:54	13.22	111.3	7.06	2.1	63.51	7.56
11/25/2008	19:32				11.4	51.17	2.62

02-GRB, Great Brook, Covered Bridge on Cheshire Turnpike, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphours (mg/L)	Nitrate (mg/L)	N02+N03
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	Narrative	Narrative
03/08/2008	14:00					57.20	1.40			
09/15/2008	10:08								0.12	
10/16/2008	13:06					62.10	11.30	ND		0.054
10/19/2008	15:19	12.83	111.3	7.13	1.7	64.99	8.93			

03-RAB, Ram Brook, Jewett Road, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	15:29	11.60	103.0	6.59	2.8	144.33	9.82
11/25/2008	19:47				5.2	131.20	6.49

01-RAB, Ram Brook, 100' Upstream of Confluence with Great Brook, Langdon

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphours (mg/L)	Total Phosphorus (mg/L)	Nitrate (mg/L)
Standard	NA	(µS/cm as chloride surrogate)	Narrative	Narrative	Narrative	Narrative
10/16/2008	12:52	123.70	10.70		0.018	1.0

03-BMB, Brush Meadow Brook, Jewett Road, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
10/19/2008	15:36	12.43	104.5	6.88	5.1	171.00	7.60
11/25/2008	19:55				62.2	101.60	1.78

01-BMB, Brush Meadow Brook, 100' Upstream of Confluence with Great Brook, Langdon

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Nitrate (mg/L)
Standard	NA	NA	Narrative	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	Narrative
10/16/2008	12:36					153.70	10.70	0.024	0.98
10/19/2008	15:47	10.01	87.1	6.74	12.0	314.00	8.95		
11/25/2008	19:39				5.7	180.30	2.73		

01-JEB, Jewett Brook, 50' Upstream of Confluence with Great Brook, Langdon

Date	Time of Sample	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Nitrate (mg/L)
Standard	NA	(µS/cm as chloride surrogate)	Narrative	Narrative	Narrative
10/16/2008	12:22	57.00	10.00	0.048	0.12

01-GRB, Great Brook, Cold River Road Bridge, Langdon

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Total Phosphorus (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	N02+N03
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	Narrative	230[A]	Narrative	Narrative
02/06/2008	11:02					62.50	0.30		8.5		
02/13/2008	17:00					59.10	0.20		7.2		
02/26/2008	15:15					56.90	0.90				
03/05/2008	18:10					61.70	0.30				
07/14/2008	05:30							0.008		0.36	
07/21/2008	10:32	9.50	104.1	6.57	4.7	70.09	18.92				
08/04/2008	07:20							0.011		0.17	
09/15/2008	10:00									0.17	
10/16/2008	13:40					72.10	11.30	0.007			0.16
10/19/2008	14:58	13.53	117.7	7.27	2.5	74.73	9.23				
11/25/2008	20:08				22.1	54.94	2.72				

01-MTB, Mountain Brook, Cold River Road Bridge, Walpole

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
07/21/2008	10:05	9.43	101.7	6.51	2.9	41.22	18.18
10/19/2008	14:48	13.09	108.6	7.14	3.8	40.25	7.35
11/25/2008	20:14				9.3	22.78	3.82

01-CLD, Cold River, Route 12 Bridge, Walpole

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative	230[A]
02/06/2008	10:41					66.70	0.30	12
02/13/2008	16:40					63.50	0.10	11
02/26/2008	15:00					58.20	0.90	
03/05/2008	18:20					65.00	0.50	
03/08/2008	13:20					57.80	1.80	
07/21/2008	09:49	9.05	102.3	6.70	16.7	74.49	20.58	
10/19/2008	14:36	13.70	118.0	7.19	2.5	78.79	8.93	
11/25/2008	20:27				31.8	49.01	2.17	

APPENDIX B:
Interpreting VRAP Water Quality Monitoring Parameters

Chemical Parameters

Dissolved Oxygen (DO)

- **Unit of Measurement:** concentration in milligrams per liter (mg/L) and percent saturation (%).
- **Description:** A measure of the amount of oxygen in the water: Concentration is a measure of the amount of oxygen in a volume of water; saturation is a measurement of the amount of oxygen in the water compared to the amount of oxygen the water can actually hold at full saturation. Both of these measurements are necessary to accurately determine whether New Hampshire surface water quality standards are met.
- **Importance**: Oxygen is dissolved into the water from the atmosphere, aided by wind and wave action, or by rocky, steep, or uneven stream beds. The presence of dissolved oxygen is vital to bottom-dwelling organisms as well as fish and amphibians. Aquatic plants and algae produce oxygen in the water during the day, and consume oxygen during the night. Bacteria utilize oxygen both day and night when they process organic matter into smaller and smaller particles.

Class A NH Surface Water Quality Standard: 6 mg/L at any place or time, or 75% minimum daily average – (unless naturally occurring).

Class B NH Surface Water Quality Standard: 5 mg/L at any place or time or 75% minimum daily average – (unless naturally occurring).

Several measurements of oxygen saturation taken in a 24-hour period must be averaged to compare to the 75 percent daily average saturation standard. The concentration of dissolved oxygen is dependent on many factors including temperature and sunlight, and tends to fluctuate throughout the day. Saturation values are averaged because a reading taken in the morning may be low due to respiration, while a measurement that afternoon may show that the saturation has recovered to acceptable levels. Water can become saturated with more than 100 percent dissolved oxygen.

pH

- **Unit of Measurement:** units (no abbreviation).
- **Description:** A measure of hydrogen ion activity in water, or, in general terms, the acidity of water. pH is measured on a logarithmic scale of 0 to 14, with 7 being neutral. A high pH indicates alkaline (or basic) conditions and a low pH indicates acidic conditions. pH is influenced by geology and soils, organic acids (decaying leaves and other matter), and human-induced acids from acid rain (which typically has a pH of 3.5 to 5.5).
- **Importance:** pH affects many chemical and biological processes in the water and this is important to the survival and reproduction of fish and other aquatic life. Different organisms flourish within different ranges of pH. Measurements outside of an organism's preferred range can limit growth and reproduction and lead to physiological stress. Low pH can also affect the toxicity of aquatic compounds such as ammonia and certain metals by making them more "available" for uptake by aquatic plants and animals. This can produce conditions that are toxic to aquatic life.

Class A NH Surface Water Quality Standard: Between 6.5 and 8.0 (unless naturally occurring).

Class B NH Surface Water Quality Standard: Between 6.5 and 8.0 (unless naturally occurring).

Sometimes, readings that fall below this range are determined to be naturally occurring. This is often a result of wetlands near the sample station. Wetlands can lower pH because the tannic and humic acids released by decaying plants can cause water to become more acidic.

pH Units	Category
<5.0	High Impact
5.0 – 5.9	Moderate to High Impact
6.0 – 6.4	Normal; Low Impact
6.5 – 8.0	Normal;
6.1 – 8.0	Satisfactory

Specific Conductance or Conductivity

- **Unit of Measurement:** micromhos per centimeter (umhos/cm) or microsiemens per centimeter (uS/cm).
- **Description:** The numerical expression of the ability of water to carry an electrical current at 25° C and a measure of free ion (charged particles) content in the water. These ions can come from natural sources such as bedrock, or human sources such as stormwater runoff. Specific conductance can be used to indicate the presence of chlorides, nitrates, sulfates, phosphates, sodium, magnesium, calcium, iron, and aluminum ions. There is a difference between conductivity and specific conductance. Specific conductance measures the free ion content of water at a *specific* water temperature, whereas conductivity measures the free ion content of water at 25° C. VRAP uses the term "specific conductance" because our conductivity measurements account for temperature. In some studies and programs, the term "conductivity" is used. This term should only be used when the measurement *does not* adjust to a specific temperature.
- **Importance:** Specific conductance readings can help locate potential pollution sources because polluted water usually has a higher specific conductance than unpolluted waters. High specific conductance values often indicate pollution from road salt, septic systems, wastewater treatment plants, or urban/agricultural runoff. Specific conductance can also be related to geology. In unpolluted rivers and streams, geology and groundwater are the primary influences on specific conductance levels.

Class A NH Surface Water Quality Standard: No numeric standard.

Class B NH Surface Water Quality Standard: No numeric standard.

Although there is no formal standard for specific conductance, data collect by VRAP groups and NHDES indicated a very close relationship between specific conductance levels and chloride. In some cases NHDES can use specific conductance measurements as a surrogate for chloride levels. The data collected by NHDES indicate that the chronic chloride standard is correlated with a specific conductance level of approximately 850 µS/cm.

Specific Conductance *(uS/cm)*	Category
0 – 100	Normal
101 – 200	Low Impact
201 – 500	Moderate Impact
> 501	High Impact
> 850	Likely exceeding chronic chloride standard

Turbidity

- **Unit of Measurement:** Nephelometric Turbidity Units (abbreviated at NTU).
- **Description:** A measurement of the amount of suspended material in the water. This material, which is comprised of particles such as clay, silt, algae, suspended sediment, and decaying plant material, causes light to be scattered and absorbed, rather than transmitted in straight lines through the water.
- **Importance:** Higher turbidity increases water temperatures because suspended particles absorb more heat. This, in turn, reduces dissolved oxygen (DO) concentrations because warm water holds less DO than cold water. Higher turbidity also reduces the amount of light that can penetrate the water, which reduces photosynthesis and DO production. Suspended materials can clog fish gills, reducing disease resistance, lowering growth rates, and affecting egg and larval development. As the particles settle, they can blanket the stream bottom, especially in slower waters, and smother fish eggs and benthic macroinvertebrates. Clean waters are generally associated with low turbidity, but there is a high degree of natural variability involved. Rain events can increase turbidity in surface waters by flushing sediment, organic matter and other materials into the water. Human activities such as vegetation removal and soil disruption can also lead to dramatic increases in turbidity levels.

Class A NH Surface Water Quality Standard: As naturally occurs.

Class B NH Surface Water Quality Standard: Shall not exceed naturally occurring conditions bv more than 10 NTU.

Physical Parameters

Temperature

- **Unit of Measurement:** Degrees Celsius (° C)
- **Importance:** Water temperature is a critical parameter for aquatic life and has an impact on other water quality parameters such as dissolved oxygen concentrations, and bacteria activity in water. Water temperature controls the metabolic and reproductive processes of aquatic species and can determine which fish and macroinvertabrate species can survive in a given river or stream.

  A number of factors can have an impact on water temperature including the quantity and maturity of riparian vegetation, the rate of flow, the percent of impervious surfaces contributing stormwater, thermal discharges, impoundments and groundwater.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard

Although there is currently no numerical water quality criteria for water temperature, NHDES is in the process of collecting biological and water temperature data that will contribute to the development of a procedure for assessing rivers and stream based on water temperature and its corresponding impact to the biological integrity of the waterbody.

Chlorophyll-a (Chlor a)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** An indicator of the biomass, or abundance, of planktonic algae in the river. The technical term "biomass" is used to represent "amount by weight." Chlorophyll-a can be strongly influenced by phosphorus, which is derived by natural and human activities.

Importance: Because algae is a plant and contains the green pigment chlorophyll-a, the concentration of chlorophyll-a found in the water gives an estimation of the concentration of algae. If the chlorophyll-a concentration increases, this indicates an increase in the algal population.

Class A NH Surface Water Quality Standard: No numeric standard.

Class B NH Surface Water Quality Standard: No numeric standard.

Chlorophyll-a *(mg/L)*	**Category**
< 3	Excellent
3 – 7	Good
7 – 15	Less than desirable
> 15	Nuisance

Total Phosphorus (TP)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** A measure of all forms of phosphorus in the water, including inorganic and organic forms. There are many sources of phosphorus, both natural and human. These include soil and rocks, sewage, animal manure, fertilizer, erosion, and other types of contamination.
- **Importance:** Phosphorus is a nutrient that is essential to plants and animals. However, excess amounts can cause rapid increases in the biological activity in water. Phosphorus is usually the "limiting nutrient" in freshwater streams, which means relatively small amounts can increase algae and chlorophyll-a levels. Algal blooms and/or excessive aquatic plant growth can decrease oxygen levels and make water unattractive. Phosphorus can indicate the presence of septic systems, sewage, animal waste, lawn fertilizer, road and construction erosion, other types of pollution, or natural wetlands and atmospheric deposition.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard; as naturally occurring, shall contain no phosphorus in such concentrations that would impair any existing or designated uses.

Total Phosphorus *(mg/L)*	**Category**
< 0.010	Ideal
0.011 – 0.025	Average
0.026 – 0.050	More than desirable
> 0.051	Excessive (potential nuisance concentration)

Total Kjeldahl Nitrogen (TKN)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** A measure of the amount of ammonia and organic nitrogen in the water.
- **Importance:** High nitrogen levels can increase algae and chlorophyll-a levels in the river, but is generally less of a concern in fresh water than phosphorus. Nitrogen can indicate the presence of sewage, animal waste, fertilizer, erosion, or other types of pollution.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard; as naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses.

TKN *(mg/L)*	**Category**
< 0.25	Ideal
0.26 – 0.40	Average
0.41 – 0.50	More than desirable
> 0.51	Excessive (potential nuisance concentration)

Other Parameters

Chloride

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** The chloride ion (Cl-) is found naturally in some surface waters and groundwater. It is also found in high concentrations in seawater. Higher-than-normal chloride concentrations in freshwater is detrimental to water quality. In New Hampshire, applying road salt for winter accident prevention is a large source of chloride to the environment. Unfortunately, this has increased over time due to road expansion and increased vehicle traffic. Road salt (most often sodium chloride) readily dissolves and enters aquatic environments in ionic forms. Although chloride can originate from natural sources, most of the chloride that enters the environment is associated with the storage and application of road salt. As such, chloride-containing compounds commonly enter surface water, soil, and groundwater during late-spring snowmelt (since the ground is frozen during much of the late winter and early spring). Sodium chloride is also used on foods as table salt, and consequently is present in human waste. Thus, sometimes chloride in water can indicate sewage pollution. Saltwater intrusion can also elevate groundwater chlorides in drinking water wells near coastlines. Chloride ions are conservative, which means they are not degraded in the environment and tend to remain in solution, once dissolved. Chloride ions that enter ground water can ultimately be expected to reach surface water and, therefore, influence aquatic environments and humans.
- **Importance:** Research shows elevated chloride levels can be toxic to freshwater aquatic life. Among the species tested, freshwater aquatic plants and invertebrates tend to be the most sensitive to chloride. In order to protect freshwater aquatic life in New Hampshire, the state has adopted acute and chronic chloride criteria.

Acute Standard: 860 mg/L.

Chronic Standard: 230 mg/L.

Escherichia Coliform Bacteria *(E. coli)*

- **Unit of Measurement:** Counts per 100 milliliter (cts/100 mL).
- **Description:** An indicator of the potential presence of pathogens in fresh water. *E. coli* bacteria is a normal component in the large intestines of humans and other warm-blooded animals, and can be excreted in their fecal material. Organisms causing infections or disease (pathogens) are often excreted in the fecal material of humans and other warm-blooded animals.
- **Importance:** *E.coli* bacteria is a good indicator of fecal pollution and the possible presence of pathogenic organisms. In freshwater, *E. coli* concentrations help determine if the water is safe for recreational uses such as swimming.

  Several factors can contribute to elevated *E. coli* levels, including, but not limited to rain storms, low river flows, the presence of wildlife, and the presence of septic systems along the river.

Class A NH Surface Water Quality Standard: Unless naturally occurring, shall contain not more than either a geometric mean of 47 *E.coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 153 *E.coli* cts/100 mL in any one sample.

Class B NH Surface Water Quality Standard: Unless naturally occurring, shall contain not more than either a geometric mean of 126 *E.coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 406 *E.coli* cts/100 mL in any one sample.

Metals

Depending on the metal concentration, its form (dissolved or particulate), and the hardness of the water, trace metals can be toxic to aquatic life. Metals in dissolved form are generally more toxic than metals in the particulate form. The dissolved metal concentration is dependent on pH, as well as the presence of solids and organic matter that can bind with the metal to render it less toxic.

Hardness is primarily a measure of the calcium and magnesium ion concentrations in water, expressed as calcium carbonate. The hardness concentration affects the toxicity of certain metals. New Hampshire water quality regulations include numeric criteria for a variety of metals. Since dissolved metals are typically found in extremely low concentrations, the potential contamination of samples collected for trace metals analyses has become a primary concern of water quality managers. To prevent such contamination and to ensure reliable results, the use of “clean techniques” is becoming more and more frequent when sampling for dissolved metals. Because of this, sampling for metals may be more costly and require additional effort than in the past.

New Hampshire Volunteer River Assessment Program

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Concord, NH 03302-0095
p (603) 271-0699 – f (603) 271-7894
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2008

APPENDIX C:

2008 VRAP Field Audit

VRAP staff aim to visit each group annually during a scheduled sampling event to verify that volunteers successfully follow the VRAP protocols. If necessary, volunteers are re-trained during the visit, and the group is notified of the result of the verification visit. During the visit, volunteers were assessed in the following five categories:

1) **Overall Sampling Procedures**

   Appropriate storage of meters, sample collection, laboratory sample collection and transportation, beginning and end of day meter checks, collecting a field replicate, performing QA/QC Meter Checks, and ensuring that all calibration and sampling data are properly documented on the 2008 VRAP Field Data Sheet and the Laboratory Services Login & Custody Sheet.

2) **Turbidity**

   Inspecting and cleaning of glass turbidity vials prior to measurement of standards and samples, performing the *Initial Turbidity Meter Check,* calibrating the meter to a known standard at the beginning of the sampling day, recording the value of the DI turbidity blank *(QA/QC Meter Check)* once during the sampling day, and performing the *"End of the Day Meter Check"* at the conclusion of the sampling day.

3) **pH**

   Inspecting the pH electrode prior to sampling, calibrating to both pH 7.0 and 4.0 buffers prior to each measurement, rinsing and wiping the pH electrode probe prior to and after the measurement of standards and samples, allowing the pH measurement to stabilize prior to recording the measurement, and recording the value of the 6.0 buffer *(QA/QC Meter Check)* once during the sampling day.

4) **Water Temperature/Dissolved Oxygen**

   Ensuring that the meter is allowed an adequate time to stabilize prior to the first calibration, the meter is calibrated prior to each measurement, the calibration value is properly recorded, the chamber reading is properly recorded, that sufficient time is allowed for readings to stabilize, and that a zero oxygen check (*QA/QC Meter Check)* is completed during the sampling day.

5) **Specific Conductance**

   Performing the *Initial Conductivity Meter Check* using a known standard, allowing for the meter to properly stabilize before recording measurements, properly cleaning the probe between stations, and performing the *End of the Day Meter Check* at the conclusion of the sampling day.

During the field audit, VRAP staff offer important reminders and suggestions to ensure proper sampling techniques and re-trained volunteers in the areas needing improvement. Afterwards, the volunteers are sent a follow-up e-mail providing written reminders and suggestions of the methods that need improvement. It is important to ensure that all volunteers attend an annual VRAP training workshop prior to the sampling season to familiarize themselves with proper sampling techniques. Please remember to schedule an annual field audit in 2009.

APPENDIX D:
New Hampshire Watershed Report Cards
Built from the 2008 305(b)/303(d) Surface Water Quality Reports

305(b)/303(d) Integrated Report Background
http://des.nh.gov/organization/divisions/water/wmb/swqa/

The Surface Water Quality Assessment Program produces two surface water quality documents every two years, the "305(b) Report" and the "303(d) List". As the two documents use the same data and assessment methodology, the 305(b) Report and 303(d) List were combined into one Integrated Report. The Integrated Report describes the quality of New Hampshire's surface waters and an analysis of the extent to which all such waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water.

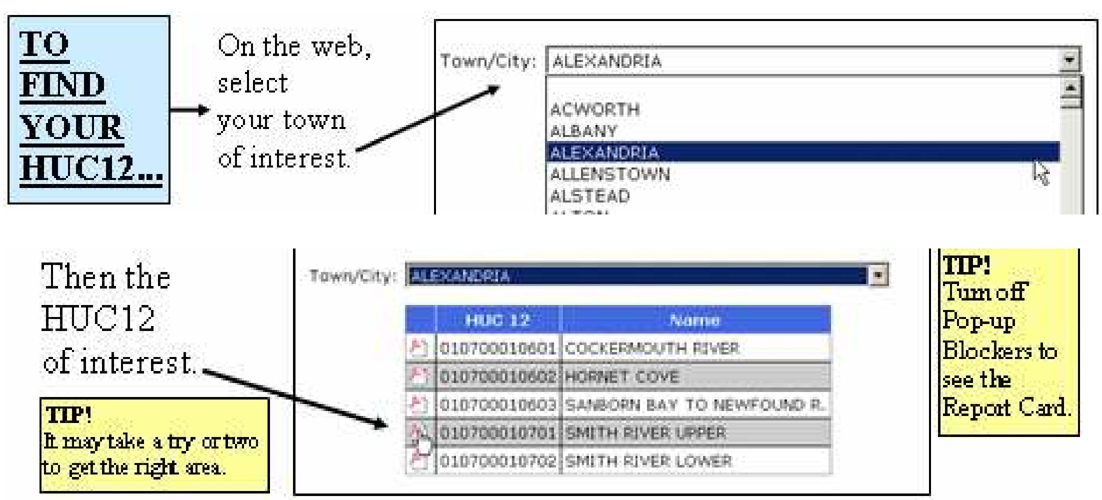
Each Watershed Report Card covers a single 12 digit Hydrologic Unit Code (HUC12), on average a 34 square mile area. Each Watershed Report Card has three components;

1. **Report Card:** A one page card that summarizes the overall use support for Aquatic Life, Primary Contact (i.e. Swimming), and Secondary Contact (i.e. Boating) Designated Uses on every Assessment Unit ID (AUID) within the HUC12.

2. **HUC 12 Map:** A map of the watershed with abbreviated labels for each AUID within the HUC12.

3. **Assessment Details:** Anywhere from one to forty pages with the detailed assessment information for each and every AUID in the Report Card and Map.

How to Find Your HUC12 Watershed Report Card:
http://des.nh.gov/organization/divisions/water/wmb/swqa/report_cards.htm
then go to: http://www2.des.nh.gov/SWQA



What are Assessment Units?

Each waterbody is divided into smaller segments called Assessment Units (AUs). In general, AUs are the basic unit of record for conducting and reporting the results of all water quality assessments. AUs are intended to be representative of homogenous segments: consequently, sampling stations within an AU can be assumed to be representative of the segment. Many factors can influence the homogeneity of a segment. Factors used to establish homogenous

AUs for assessments include: waterbody type, HUC12 boundaries, water quality standards, pollutant sources, Maximum AU size for rivers and streams, major changes in land use, stream order/location of major tributaries, public water supplies, outstanding resource waters, shellfish program categories, designated beaches, and cold water fish spawning areas.

Assessment Unit IDs (AUIDs) for each of the stations your group monitored in 2008 can be found in the sampling station table in this year's VRAP report. Similarly, a list of all current and historic sampling stations for your group can be found on the VRAP webpage at http://des.nh.gov/organization/divisions/water/wmb/vrap/index.htm.

How are the Surface Water Quality Assessment Determinations Made?

All readily available data with reliable Quality Assurance/Quality Control is used in the biennial surface water quality assessments. For a full understanding of how the Surface Water Quality Standards (Env-Wq 1700) are translated into surface water quality assessments we urge the reader to review the 2008 Consolidated Assessment and Listing Methodology (CALM) at
http://des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm (Appendices 4 & 5)

Where Can I find More Advanced Resources?

Additional resources including GIS shapefiles (Appendix 12) of all AUIDs in a sortable EXCEL file (Appendix 22) of the detailed assessments are available at
http://des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm.

How Are Assessments Coded in the Report Card?

Assessment outcomes are displayed on a color scale as well as an alpha numeric scale that provides additional distinctions for the designated use and Parameter level assessments as outlined in the table below.

		Severe	**Poor**	**Likely Bad**	**No Data**	**Likely Good**	**Marginal**	**Good**
		Not Supporting, Severe	Not Supporting, Marginal	Insufficient Information – Potentially Not Supporting	No Data	Insufficient Information – Potentially Full Supporting	Full Support, Marginal	Full Support, Good
Category	**Description**							
*Category 2	Meets standards						2-M or 2-OBS	2-G
Category 3	Insufficient Information			3-PNS	3-ND	3-PAS		
Category 4	Does not Meet Standards;							
4A	TMDL^ Completed	4A-P	4A-M or 4A-T					
4B	Other enforceable measure will correct the issue.	4B-P	4B-M or 4B-T					
4C	Non-pollutant (i.e. exotic weeds)	4C-P	4C-M					
Category 5	TMDL^ Needed	5-P	5-M or 5-T					

* "Category 1" only exists at the Assessment Unit Level.
^ TMDL stands for Total Maximum Daily Load studies (http://des.nh.gov/organization/divisions/water/wmb/tmdl/index.htm)

For More Information:

Ken Edwardson, NHDES Surface Water Quality Assessment Program Coordinator
(603) 271-8864 - Kenneth.Edwardson@des.nh.gov

WATERSHED 305(b) ASSESSMENT SUMMARY REPORT:

HUC 12 010801070201

HUC 12 NAME HEADWATERS-DODGE BROOK

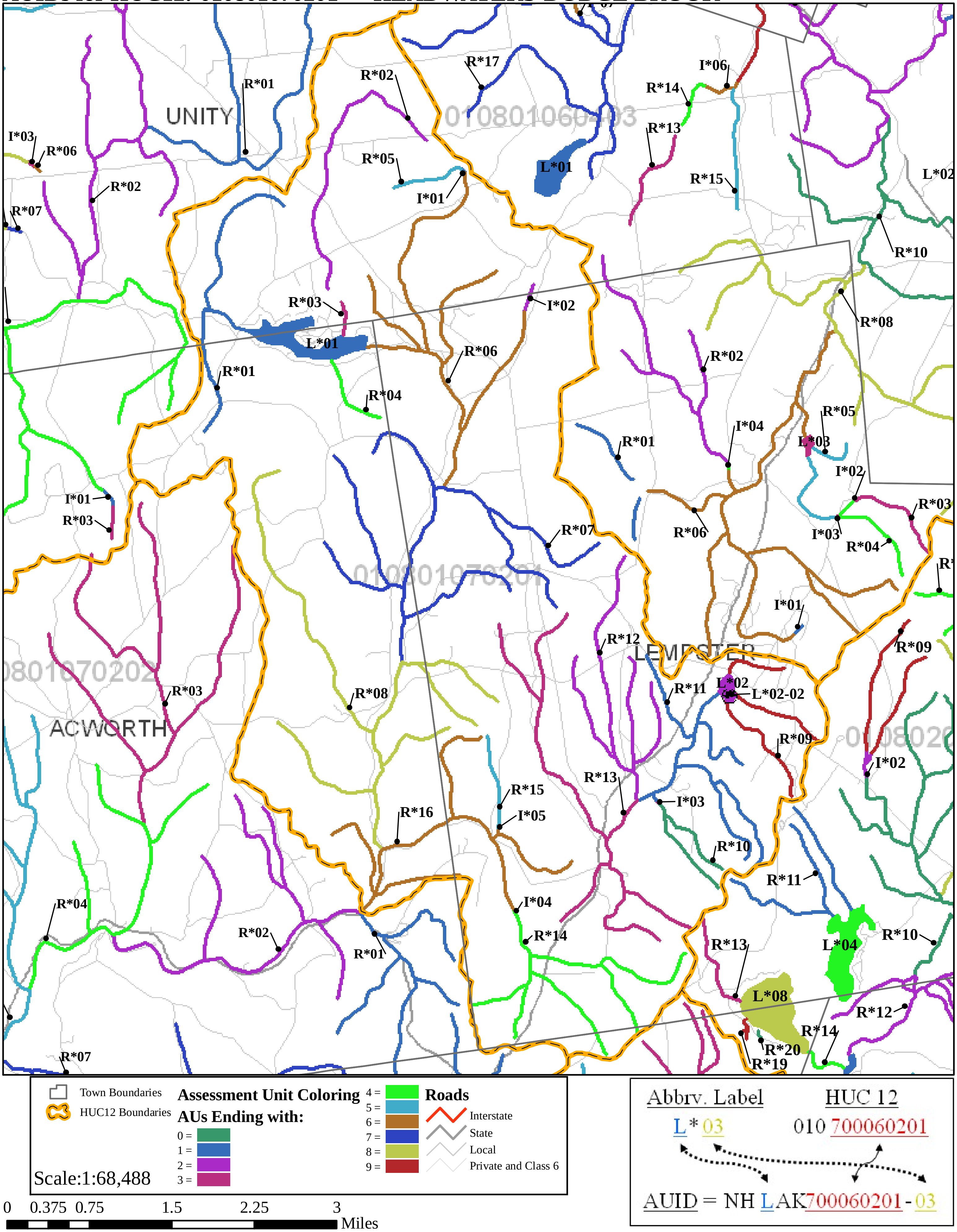
(Locator map on next page only applies to this HUC12)

Assessment Cycle 2008

Good		Full Support Good
Marginal		Full Support Marginal
Likely Good		Insufficient Information – Potentially Full Support
No Data		No Data
Likely Bad		Insufficient Information – Potentially Not Support
Poor		Not Support Marginal
Severe		Not Support Severe

ASSESSMENT UNIT ID	MAP LABEL	ASSESSMENT UNIT NAME	AQUATIC LIFE	SWIMMING	BOATING	FISH CONSUMP.
NHIMP801070201-01	I*01	UNKNOWN RIVER - FARM POND	3-ND	3-ND	3-ND	4A-M
NHIMP801070201-02	I*02	UNKNOWN RIVER - GALLUP MARSH	3-ND	3-ND	3-ND	4A-M
NHIMP801070201-03	I*03	UNKNOWN RIVER - FIRE POND	3-ND	3-ND	3-ND	4A-M
NHIMP801070201-04	I*04	UNANMED BROOK - TRIB TO DODGE BROOK	3-ND	3-ND	3-ND	4A-M
NHIMP801070201-05	I*05	UNANMED BROOK - TRIB TO DODGE BROOK	3-ND	3-ND	3-ND	4A-M
NHLAK801070201-01	L*01	CRESCENT LAKE	4A-M	2-G	2-G	4A-M
NHLAK801070201-02	L*02	DODGE POND	3-ND	3-ND	3-ND	4A-M
NHLAK801070201-02-02	L*02-02	DODGE POND - CAMP KIRKHAM BEACH	3-ND	2-G	2-G	4A-M
NHRIV801070201-01	R*01	COLD RIVER	5-P	2-M	2-G	4A-M
NHRIV801070201-02	R*02	UNNAMED BROOK - TO UNNAMED POND	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-03	R*03	UNNAMED BROOK - TO CRESCENT LAKE	5-M	2-G	2-G	4A-M
NHRIV801070201-04	R*04	UNNAMED BROOK - TO CRESCENT LAKE	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-05	R*05	UNNAMED BROOK - TO UNNAMED POND	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-06	R*06	COLD RIVER	5-M	2-G	2-G	4A-M
NHRIV801070201-07	R*07	COLD RIVER	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-08	R*08	COLD RIVER - UNDERWOOD BROOK	5-P	5-P	2-M	4A-M
NHRIV801070201-09	R*09	DODGE BROOK	5-M	2-G	2-G	4A-M
NHRIV801070201-10	R*10	HAMLIN BROOK - UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-11	R*11	DODGE BROOK	5-P	2-M	2-G	4A-M
NHRIV801070201-12	R*12	DODGE BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-13	R*13	HAMLIN BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-14	R*14	UNNAMED BROOKS - UPPER REACHES OF TRIBS TO DODGE BROOK	5-M	3-ND	3-ND	4A-M
NHRIV801070201-15	R*15	DODGE POND BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070201-16	R*16	COLD RIVER	5-M	3-PAS	3-PAS	4A-M

AUIDs for HUC12: 010801070201 - HEADWATERS-DODGE BROOK



WATERSHED 305(b) ASSESSMENT SUMMARY REPORT:

HUC 12 010801070202

HUC 12 NAME VILAS POOL

(Locator map on next page only applies to this HUC12)

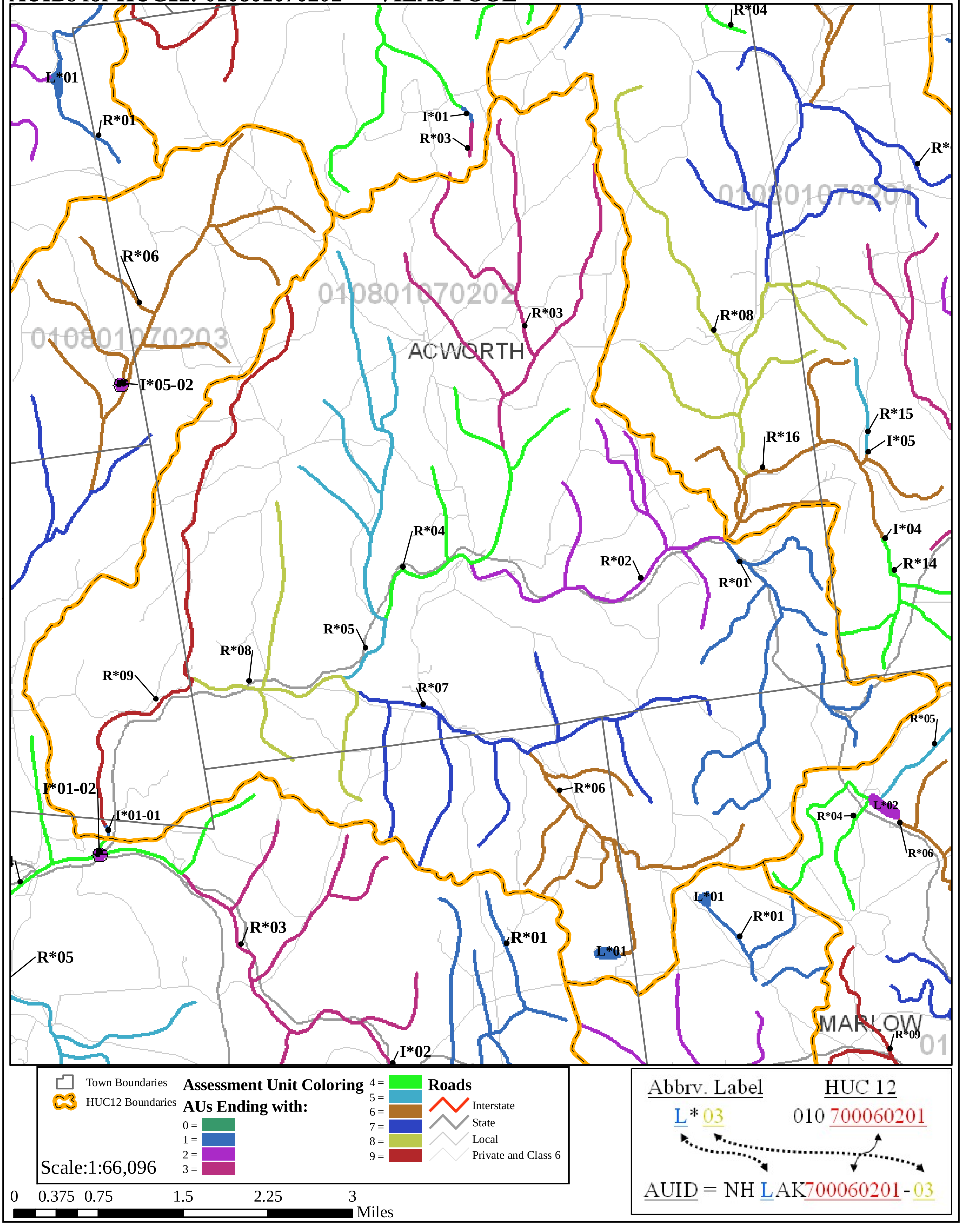
Assessment Cycle 2008

Good		Full Support Good
Marginal		Full Support Marginal
Likely Good		Insufficient Information – Potentially Full Support
No Data		No Data
Likely Bad		Insufficient Information – Potentially Not Support
Poor		Not Support Marginal
Severe		Not Support Severe




ASSESSMENT UNIT ID	MAP LABEL	ASSESSMENT UNIT NAME	AQUATIC LIFE	SWIMMING	BOATING	FISH CONSUMP.
NHIMP801070202-01-01	I*01-01	COLD RIVER - VILAS POND	3-ND	3-ND	3-ND	4A-M
NHIMP801070202-01-02	I*01-02	COLD RIVER - VILAS POOL BEACH	3-ND	5-P	2-G	4A-M
NHLAK801070202-01	L*01	NEWELL POND	5-P	3-ND	3-ND	4A-M
NHRIV801070202-01	R*01	HONEY BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070202-02	R*02	COLD RIVER	5-P	3-ND	3-ND	4A-M
NHRIV801070202-03	R*03	BOWERS BROOK - MILLIKEN BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070202-04	R*04	COLD RIVER - BOWERS BROOK	5-P	5-P	2-M	4A-M
NHRIV801070202-05	R*05	COLD RIVER - MILLIKEN BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070202-06	R*06	GREAT BROOK	5-M	2-G	2-G	4A-M
NHRIV801070202-07	R*07	GREAT BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070202-08	R*08	COLD RIVER - GREAT BROOK	5-P	3-ND	3-ND	4A-M
NHRIV801070202-09	R*09	COLD RIVER - CRANE BROOK	5-P	5-P	5-P	4A-M

AUIDs for HUC12: 010801070202 - VILAS POOL



WATERSHED 305(b) ASSESSMENT SUMMARY REPORT:

HUC 12 010801070203

HUC 12 NAME LOWER TRIBUTARIES

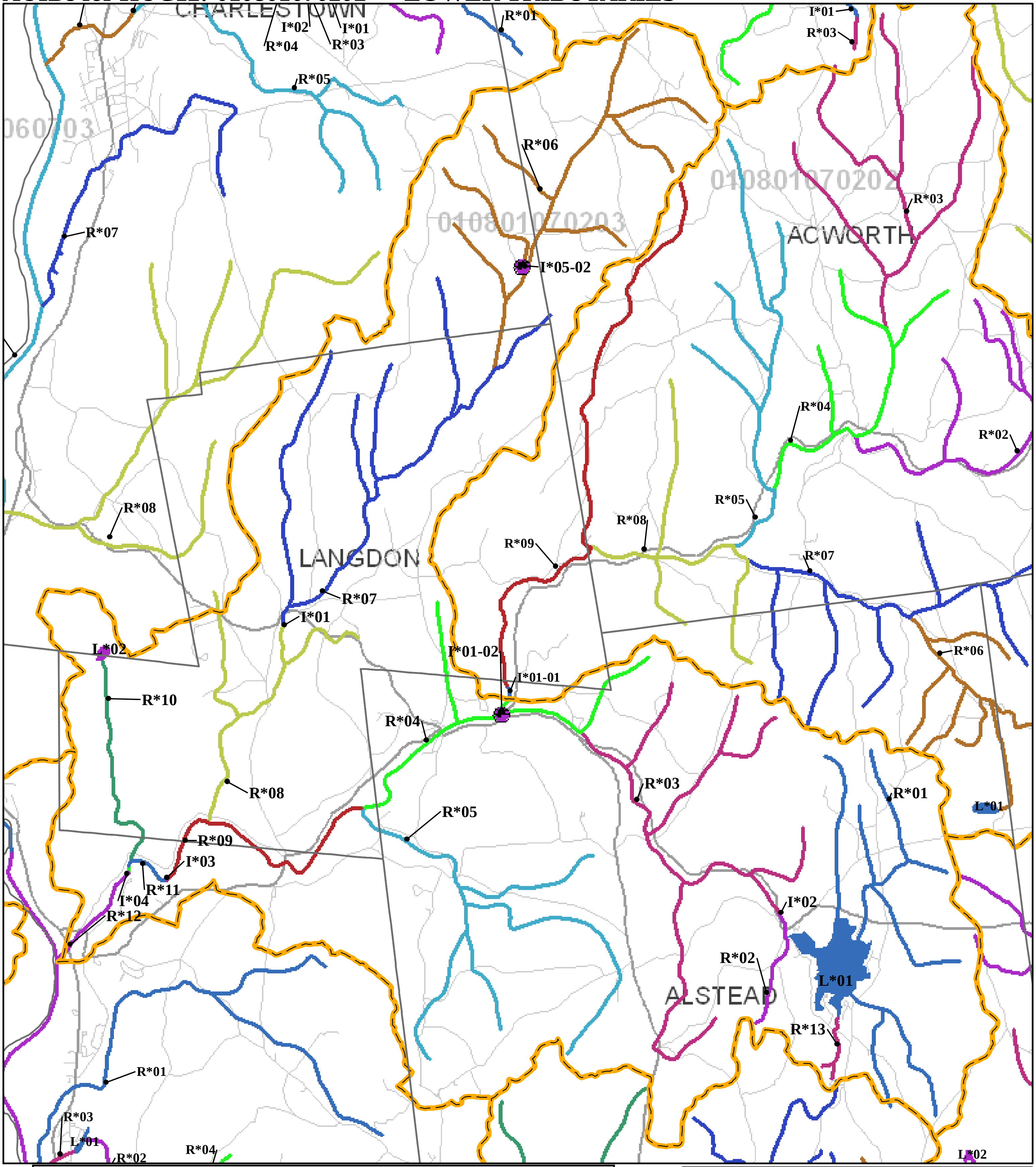
(Locator map on next page only applies to this HUC12)

Assessment Cycle 2008

Good		Full Support Good
Marginal		Full Support Marginal
Likely Good		Insufficient Information – Potentially Full Support
No Data		No Data
Likely Bad		Insufficient Information – Potentially Not Support
Poor		Not Support Marginal
Severe		Not Support Severe

ASSESSMENT UNIT ID	MAP LABEL	ASSESSMENT UNIT NAME	AQUATIC LIFE	SWIMMING	BOATING	FISH CONSUMP.
NHIMP801070203-01	I*01	GREAT BROOK	3-ND	3-ND	3-ND	4A-M
NHIMP801070203-02	I*02	WARREN BROOK	3-ND	3-ND	3-ND	4A-M
NHIMP801070203-03	I*03	COLD RIVER - WATER SUPPLY II	3-ND	3-ND	3-ND	4A-M
NHIMP801070203-04	I*04	COLD RIVER - WATER SUPPLY I	3-ND	3-ND	3-ND	4A-M
NHIMP801070203-05-02	I*05-02	UNKNOWN RIVER - CAMP GOODNEWS BEACH	3-ND	2-G	2-G	4A-M
NHLAK801070203-01	L*01	WARREN LAKE	3-PNS	2-G	2-G	4A-M
NHLAK801070203-02	L*02	NORTH MOUNTAIN POND	3-ND	3-ND	3-ND	4A-M
NHRIV801070203-01	R*01	HALE BROOK	5-P	3-ND	3-ND	4A-M
NHRIV801070203-02	R*02	WARREN BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070203-03	R*03	WARREN BROOK - CAMP BROOK	3-PNS	3-ND	3-ND	4A-M
NHRIV801070203-04	R*04	COLD RIVER - WARREN BROOK	5-P	5-P	2-M	4A-M
NHRIV801070203-05	R*05	DARBY BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070203-06	R*06	GREAT BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070203-07	R*07	GREAT BROOK - LITTLE BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV801070203-08	R*08	GREAT BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070203-09	R*09	COLD RIVER	5-M	5-M	3-PNS	4A-M
NHRIV801070203-10	R*10	MOUNTAIN BROOK	5-M	3-PAS	3-PAS	4A-M
NHRIV801070203-11	R*11	COLD RIVER	3-PAS	3-ND	3-ND	4A-M
NHRIV801070203-12	R*12	COLD RIVER	5-P	2-M	2-G	4A-M
NHRIV801070203-13	R*13	SPRUCE RIVER	5-P	2-G	2-G	4A-M

AUIDs for HUC12: 010801070202 - LOWER TRIBUTARIES



Town Boundaries	
HUC12 Boundaries	

Assessment Unit Coloring
AUs Ending with:

0 =
1 =
2 =
3 =
4 =
5 =
6 =
7 =
8 =
9 =

Roads

Interstate
State
Local
Private and Class 6

Scale:1:75,963

0 0.45 0.9 1.8 2.7 3.6 Miles

Abbrv. Label: L * 03

HUC 12: 010 700060201

AUID = NH L AK 700060201 - 03