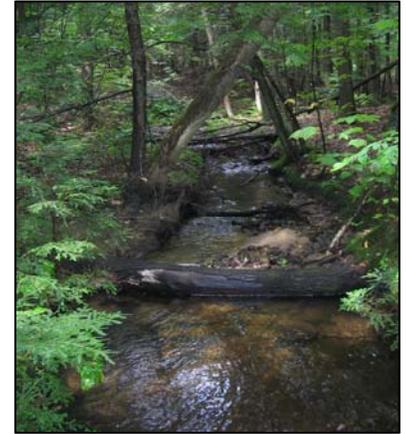




Maine Volunteer River Monitoring Program (VRMP) Quality Assurance Program Plan



SAMPLING and ANALYSIS PLAN (SAP)

Maine Department of Environmental Protection
Bureau of Land and Water Quality
Division of Watershed Management &
Division of Environmental Assessment

Title of SAP: Androscoggin River

Volunteer Group Name: Friends of Merrymeeting Bay (FOMB)

Date of Latest Modification to SAP: July 29, 2009

Date of VRMP QAPP Being Referenced in this SAP: June 10, 2009

Project Duration (if known):

Review & Approval Signatures:

FOMB Board Chair- Research & Advocacy	_____	_____
	Ed Friedman	Date
Maine DEP QA Manager:	_____	_____
	Malcolm Burson	Date
Maine DEP-DEA Representative:	_____	_____
	Barry Mower	Date
Maine DEP-VRMP Biologist:	_____	_____
	Mary Ellen Dennis	Date
Maine DEP-VRMP Coordinator:	_____	_____
	Jeff Varricchione	Date





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Acronyms Commonly Used in This Document

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
VRMP	Volunteer River Monitoring Program



^Δ**[Important Note:** This SAP deals primarily with methods, protocols, site locations, and QA/QC measures used by Friends of Merrymeeting Bay, as covered under Maine DEP's 2009 Volunteer River Monitoring Program QAPP. This document does include additional language supplied by Friends of Merrymeeting Bay that details additional methods that they use and sites that they monitor but which are not covered under the VRMP QAPP. Brackets "[]" and the symbol "^Δ" indicate methods, sites, etc. that are not covered by the VRMP QAPP.]



I. PROJECT MANAGEMENT (cont'd)

1.3 SAP Distribution List

Names & contact information for Maine DEP recipients: *(include name, title, phone number and email)*

- 1) Barry Mower, Biologist, 287-7777, Barry.F.Mower@maine.gov
- 2) Jeff Varricchione, Biologist, 822-6317, Jeffrey.T.Varricchione@maine.gov
- 3) Mary Ellen Dennis, Biologist, 287-7729, Mary-ellen.C.Dennis@maine.gov
- 4) Don Albert, Senior Environmental Engineer, 287-7767, Don.J.Albert@maine.gov

Names & contact information for volunteer group representatives: *(include name, title, organization, and phone number)*

- 1) Ed Friedman, Board Chair-Research & Advocacy, 933-5268, edfomb@suscom-maine.net
- 2) Misty Gorski, Executive Coordinator, 582-5608, fomb@gwi.net
- 3) Bill Milam, WQ Monitor Coordinator, 443-9738, wmilam@suscom-maine.net
- 4) Kermit Smyth, WQ Monitor Coordinator, 725-8420, kcsmaine@netscape.net

Names and contact information of external technical reviewer(s), if any: *(include name, title, organization, and phone number)*

- 1)
- 2)

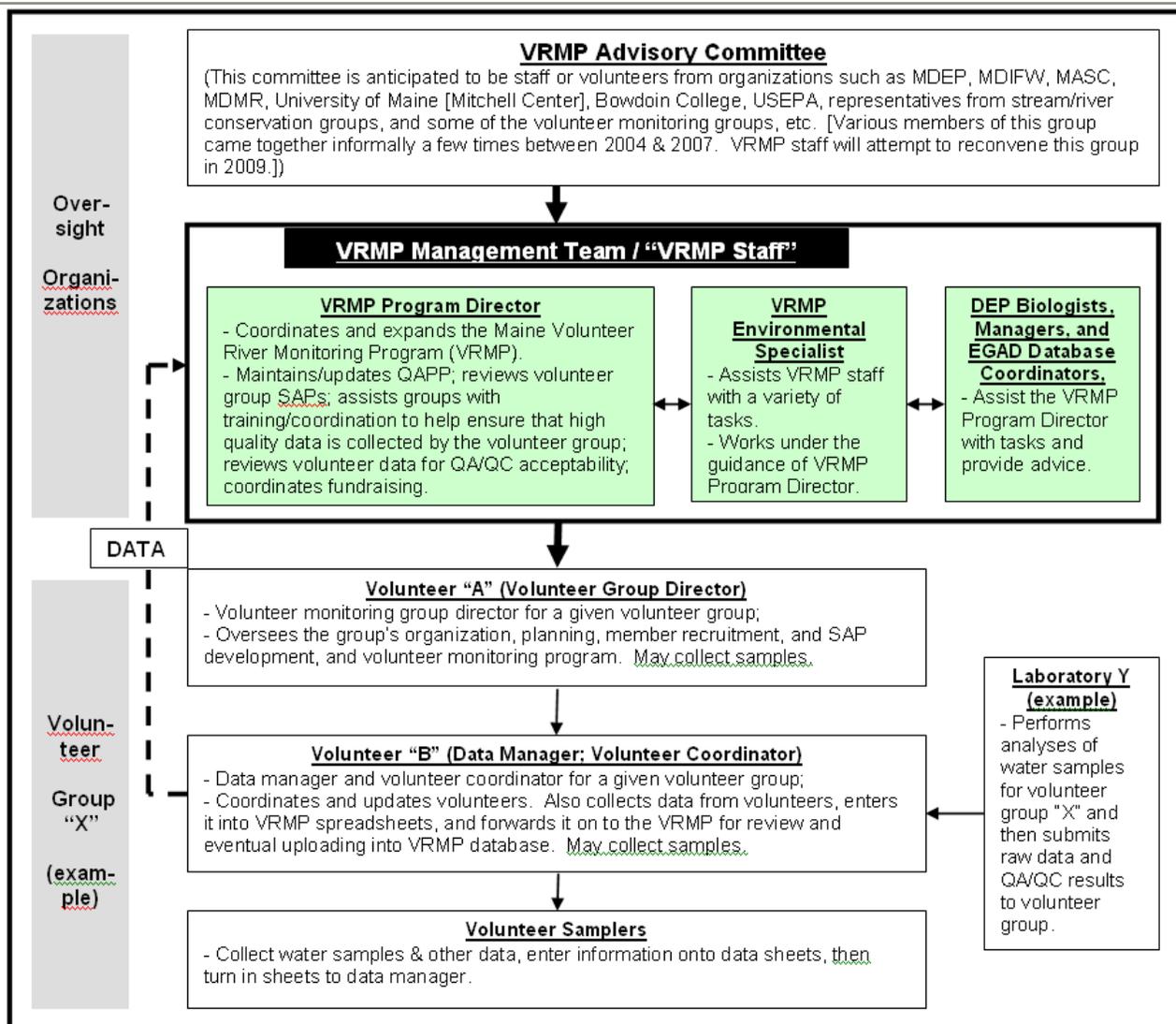


1.4 Project / Task Organization.

Identify the individuals and organizations participating in your project and discuss their specific roles and responsibilities other than those already included in the Maine DEP's Volunteer River Monitoring Program (VRMP) QAPP.

- Include group's coordinator, decision-makers, project data manager, principal data users, laboratories and any other persons critical to the implementation of the SAP.
- Each entry should include the following: name, title, organization, and a brief description of that person's or organization's responsibilities related to this specific project.

An organizational chart that shows relationships/lines of communication among project participants may be appropriate and must identify any subcontractor relationships relevant to environmental data operations, including laboratories providing analytical services. Please sketch out, "paste" in, or append a flow-chart diagram that shows how all these individuals and organizations are related. (Inserting a scanned image of the diagram is acceptable.) The lower half of the following image is a basic example of what your group's flow chart could look like.





1.4 Project and Task Organization (cont'd). Place your table, sketch, flow chart, or list of descriptions here or append to the end of this document (and note as such).

Table A-Project Organization

DEP Project Officer-Jeff Varricchione	DEP's primary contact for project activities, coordinates DEP input for project implementation; evaluates provider performance, completeness, and quality of project activities and deliverables; determines whether additional actions are required to meet project goals.
Friends of Merrymeeting Bay, Board Chair (Research & Advocacy)- Ed Friedman	Provides administration (approves project activities and authorizes expenditure of project funds, ensures project tasks are implemented according to schedule), and coordinates project activities to assure compliance with this SAP and the project workplan. Provides input on monitoring design and site selection. Supervise data collection and recording activities by volunteer water quality monitors; ensure quality assurance and quality control steps carried out by Lab are in accordance with the approved QAPP.
Friends of Merrymeeting Bay Volunteer Coordinators Bill Milam & Kermit Smyth	Coordinate all project water quality monitoring activities to assure implementation in accordance with this SAP and the project workplan. Provide input on SAP development and on project implementation. (Bill Milam-coordinates chemical monitoring & Kermit Smyth coordinates bacteria monitoring)
Friends of Merrymeeting Bay Data Managers – Misty Gorski & Ed Friedman	Oversees data review and entry; may provide input on water quality data reports.
Friends of Merrymeeting Bay Lab Technicians – Ruth Innes, Kermit Smyth & Ed Friedman	Performs [Coliscan &] ^Δ IDEXX Colilert laboratory bacteria analyses at a lab setup housed by John Lichter (Professor of Environmental Studies) at Bowdoin College. Kermit & Ed perform initial processing of IDEXX samples, duplicates [and Coliscan replicates] ^Δ .
Friends of Merrymeeting Bay Volunteer Monitors	Collect water samples at sites and perform testing, record field observations, transmit data to Volunteer Coordinator. Volunteer couriers collect water samples and transport them to lab.
DEP Personnel-Barry Mower, Jeff Varricchione, & Mary Ellen Dennis	Supervises trainings for volunteer monitors and serves as resource during organization and implementation phases. Leads data analysis and interpretation and acts as lead author on water quality data analysis reports.

1.5 Problem Definition/ Project Background/Goals.
Describe your group's expected goals for participating in the VRMP (e.g. baseline data, determine health of watershed, potential for re-classification). In addition to expected goals, state the specific problem to be solved, decision to be made, or outcome to be achieved. In other words, describe the reason the monitoring is being done. Provide sufficient background information to provide a historical, scientific, and regulatory perspective for the project. Describe any known water quality impact issues, studies, local ordinances, or watershed management plans which form the basis for the project. Consider referring to Maine DEP's Land and Water – Monitoring and Assessment website < <http://www.state.me.us/dep/blwq/monitoring.htm> >, Maine DEP's data website < <http://www.maine.gov/dep/gis/datamaps/> >, VRMP staff, or other resources such as < <http://pearl.maine.edu/> > or < <http://learn.bowdoin.edu/apps/hydrology/watersheds/> >.



The Androscoggin River is the third largest river in the state. It has a length of 164 miles and drainage area of 3,450 square miles (2,730 miles in Maine).¹ The headwaters are the Rangeley Lakes in Northwestern Maine. From there it flows into New Hampshire and then back into Maine through the towns of Gilead and Bethel. It continues flowing through the towns and cities of Rumford, Mexico, Dixfield, Jay, Livermore Falls, Lewiston, Auburn, Lisbon, Lisbon Falls, Durham, Brunswick and Topsham where it empties into Merrymeeting Bay. A number of smaller rivers and streams drain to the Androscoggin River along the way including the Rapid River, Sunday River, Swift River, Little Androscoggin River and Sabattus River. Figure A is a map of the Androscoggin River watershed.

The Androscoggin is assigned Class B from the Maine/New Hampshire boundary to its confluence with the Ellis River. It is assigned Class C from the confluence with the Ellis River to Merrymeeting Bay. The “DEP 2008 Integrated Water Quality Monitoring and Assessment Report” lists segments of the river in 4 categories:

- The Livermore impoundment is listed in Category 2 (Rivers and Streams Attaining some Designated Uses-Insufficient Information for other Uses).
- The mainstem, upstream of Gulf Island Pond is listed in Category 4-A (Rivers and Streams with Impaired Use, TMDL Completed). Causes of impairment are phosphorus, dissolved oxygen, total suspended solids, biological oxygen demand, and algal blooms. Comments in the listing state that “EPA approved TMDL 7/18/05 (for solids, DO, BOD, P) but ongoing licensing issues”.
- A number of segments are listed in Category 4-B (Rivers and Streams Impaired by Pollutants-Pollution Control Requirements Expected to Result in Attainment). The cause of non-attainment is dioxin.
- A number of segments are listed in Category 5-D (Rivers and Streams Impaired by Legacy Pollutants). The cause of non-attainment is Polychlorinated biphenyls (PCBs).

The Androscoggin River has a long history of industrial and municipal use over the past 200 years.¹ Beginning in the early 1800s, many dams were constructed by mills in primarily the lower part of the river. By the late 1800s, many textile and lumber mills were in operation from primarily Lewiston to Brunswick. Pulp and paper mills that are still in operation today were established in the early 1900s in New Hampshire, Rumford and Jay. In the 1930s, Central Maine Power built hydroelectric dams that impounded much of the river from Lewiston to Livermore Falls. Some of these uses continue today. “Along its course to the sea, the river is repeatedly dammed. It receives discharges from industrial and municipal sources, as well as polluted runoff from a variety of sources.”² Specific problems include mill discharges, combined sewer overflows (CSOs), dam impacts (28 dams exist) and historical sediment toxins.

Three organizations are currently involved with protecting and restoring the river. The Androscoggin River Watershed Council focuses on the upper part of the river and has been doing monitoring in conjunction with the State of New Hampshire’s Department of Environmental Services Volunteer River Monitoring Program. They will be working with the Maine VRMP also starting in 2009. The Androscoggin River Alliance (ARA) was established in 2005-education, advocacy, and coalition-building are the primary focus of the ARA. In 2009, the ARA will coordinate with FOMB and assist with monitoring focusing on the Lewiston-Auburn area. Friends of Merrymeeting Bay (FOMB) works in the lower part of the river and has been monitoring the river, tributaries going into the Bay and the Bay since 1999. During this time their monitoring has extended up the Androscoggin at times (depending on volunteers) to Livermore

¹ Maine Rivers Website-Androscoggin River Profile

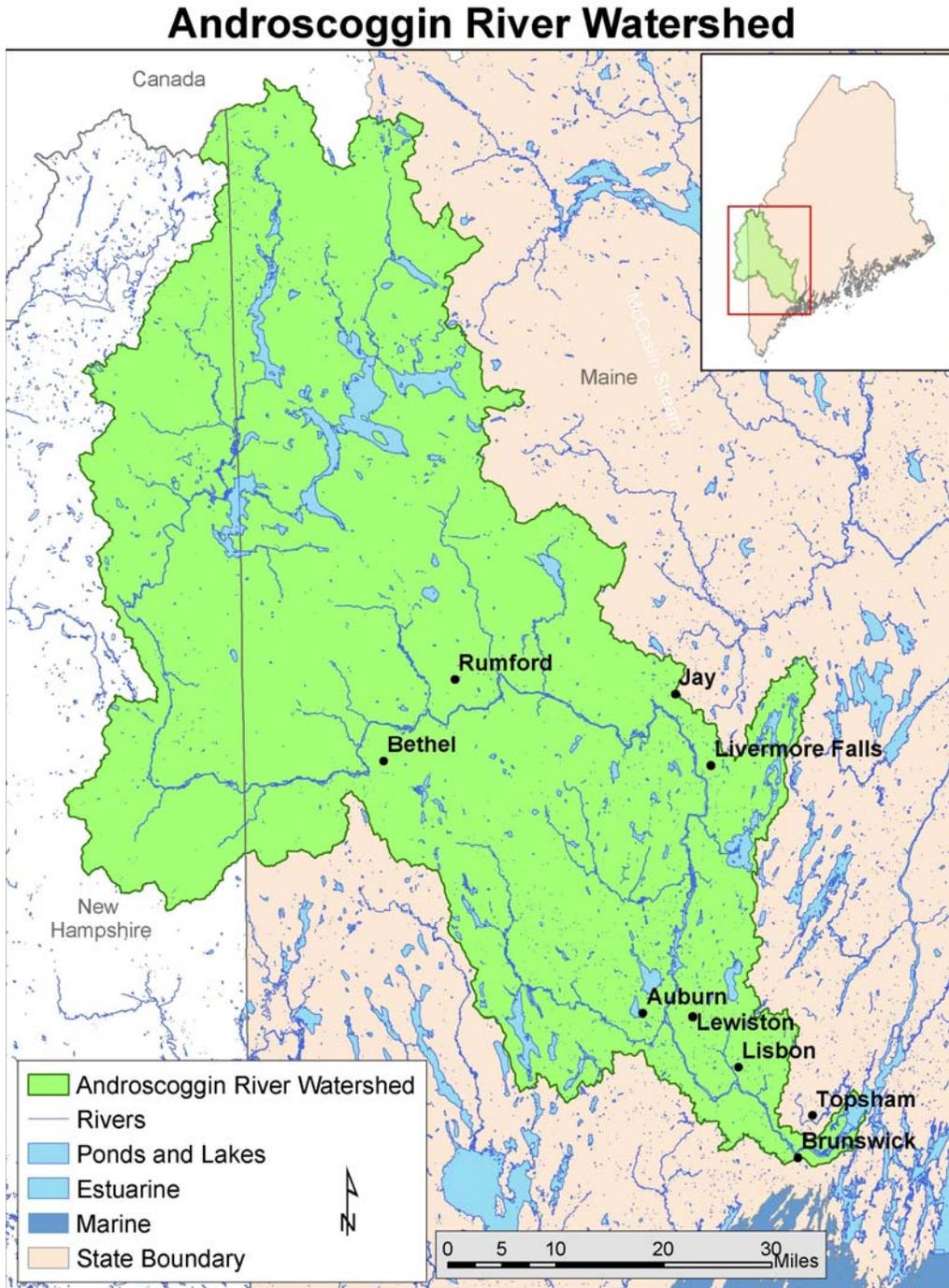
² Androscoggin River Alliance Website-Androscoggin River slideshow



Falls [and on the Kennebec to Solon. They coordinate with the Friends of Casco Bay on training (using methodologies approved in the FOCB EPA QAPP) and sampling dates.]^Δ In 2009, FOMB will also join the Maine VRMP and work under the VRMP QAPP (Quality Assurance Project Plan) and this group-specific SAP for a subset of their sample sites that meet VRMP criteria and which are monitored using established VRMP methods.

The goals of FOMB's participation in the VRMP are to monitor and improve the quality of waters flowing into Merrymeeting Bay through the use of a volunteer network of FOMB members/citizens, and use water quality data to bring about water classification upgrades whenever possible. FOMB have been monitoring for 10 years. (The VRMP wasn't launched until 2009.)

Figure A: Androscoggin River Watershed Map





1.6 Project/Task Description. This section must give an overall picture of how the project will resolve the problem, goal, or question described in the previous section. Provide a brief summary of the “who, what, where, when, why, and how” aspects of the project. Include a general description of the sampling region (detailed site locations are covered later in this SAP [section 10]). Summarize work to be performed, products to be produced, and the schedule/timeline. Attach a general study area map.

The primary purpose of the monitoring performed by Friends of Merrymeeting Bay (FOMB) under this QAPP is to acquire data through DEP criteria that will facilitate the water quality classification upgrade of the lower portion of the Androscoggin River. Friends of Merrymeeting Bay currently monitors at numerous sites from Merrymeeting Bay up to Lewiston; [on the Kennebec from below the Chops up to Solon and at a number of sites around the Bay. FOMB will continue to gather data from sample stations and through methods not accepted by DEP]^A. Sampling done under this SAP will be a subset of the FOMB monitoring. DEP will also be intensively monitoring the river in 2009 (or an upcoming year, depending on weather and flow conditions) for modeling; data gathered by FOMB is intended to supplement monitoring done by DEP.

VRMP sampling will be done at 3 sites on the mainstem in Brunswick. Two sites will be sampled from a boat attached to a mooring and one site from a jetty allowing for representative well-mixed areas of the river to be monitored. FOMB will monitor dissolved oxygen, temperature and specific conductance. Water samples will also be collected for bacteria (*E. coli* and total coliform) and analyzed by FOMB at Bowdoin College. Sampling methods, season, and frequency are discussed later in this document.

1.7 Quality Objectives and Criteria. Discuss your targeted data quality objectives and measurement performance criteria for all parameters that include the following (*See Appendix 1 of the VRMP QAPP for more information*):

- *Precision*: in most cases, using the relative percent difference or “RPD” method
- *Accuracy*: shows how close a sample result is to the actual value
- *Measurement range*: the range of reliable measurements of an instrument or measuring device
- *Quality control samples*: in most cases, 10% of samples should be quality control samples
- *Representativeness*: collecting samples that represent actual stream conditions (example considerations: season, time of day, frequency of sampling)
- *Completeness*: how much data is needed for accurate results
- *Comparability*: methods for collecting data

Refer to Table 3a and section 4.4 of the Volunteer River Monitoring Program QAPP for minimum VRMP standards, as needed, and list any deviations from or additions to Table 3a. Insert or append a table summarizing plans, if necessary.

Representativeness

Water quality monitoring that will be done on the Androscoggin River by FOMB represents spatial conditions on the mainstem in the vicinity of Brunswick-Topsham. Site selection follows VRMP QAPP requirements for monitoring location of sites laterally and vertically in the river to obtain well-mixed representative samples. This will include dissolved oxygen/temperature profiles at all sites ≥ 3 meters in depth and early morning monitoring during at least the critical months of July and August. Monthly monitoring will be done April through mid-October. Biweekly monitoring will run June through September. Use of DO meters during the first year will not begin until mid-July when delivered by DEP. [Winkler titration of DO is used by most



FOMB volunteers and has been since 1999. A number of FOMB sampling sites do not meet DEP VRMP standards but still provide for broader representation of the river.]^Δ Therefore, monitoring will be done over a range of seasonal and river conditions and includes critical periods for parameters that will be monitored. It is recognized that monitoring will not be done during colder months (i.e. mid-October through March), though it is expected that during those months biota are not exposed to stressful low dissolved oxygen conditions that typically occur during warmer months. Also, bacteria related to recreational use, are generally not an issue during colder months though this may shift with possible climate or recreational use changes.

Comparability

Water quality data gathered for this project will be comparable to and in coordination with monitoring done by Androscoggin River Alliance (ARA) and Androscoggin River Watershed Council (ARWC). Both ARA and ARWC have joined the Maine VRMP and will follow the VRMP and their individual SAP for data that will be collected and accepted under the VRMP program. Additionally, since the DEP Division of Environmental Assessment is providing input and review, there will be an additional level of review. Volunteers will use the methods outlined in this SAP for collection, standardized sampling and analytical methods. Data results will be reported in standard units of measure. The data collected will be comparable to monitoring done in subsequent years for the following reasons.

- 1) FOMB is motivated to have their data accepted and used by DEP.
- 2) Sample sites are established at boat moorings and a jetty (which FOMB states gives the sampler easy access to “center of flow” water) with known locations.
- 3) Sampling methods are consistent with DEP protocol for sampling in large rivers.

Completeness

The FOMB have a number of volunteers so there should not be a problem with monitoring being completed as planned. There are 2 Volunteer Coordinators-one coordinates chemical monitoring and one coordinates bacteria monitoring. Therefore the 2 Coordinators will ensure to the best of their abilities that monitoring is done.

In general, the more frequently samples are successfully collected at any given site, the more complete a data set will be. Frequency of sampling will be once every two weeks. Other various Maine DEP programs also collect data in rivers and streams such as the Androscoggin River, which should help to provide a more complete understanding of conditions in the river.

Precision, Accuracy and Measurement Range

Volunteers in the VRMP Program are required to meet the statewide data quality objectives and measurement performance (i.e. precision, accuracy, measurement range, quality control samples) listed in Appendix A (VRMP QAPP-Table 3a) for the parameters they will be sampling.

Field duplicates will be collected or measured to assess the precision of volunteer equipment and techniques. A “field duplicate” for a water quality meter (or thermometer) will be collected as follows: after the first reading/measurement has been made and recorded, the probe will be removed for approximately 15-30 seconds and then re-immersed in the river/stream to collect a second reading/measurement (which may take a few moments to stabilize, depending on the type of meter being used). A “field duplicate” for a water grab sample will be a second water grab sample collected, in a separate sample container, approximately 15-30 seconds after the first water grab sample was collected (for bridge sampling on large rivers-this will be immediately following collection of the first sample).



Appendix B lists the frequency of precision (duplicate) measurements or samples required of volunteer samplers, as well as laboratories performing analyses for volunteer groups. A field duplicate will be obtained by each volunteer, for at least 10% (1 duplicate per 10 samples collected or monitored) of their own sampling method for any given parameter per year. As an example, Volunteer “X” collects 1 temperature measurement, 1 dissolved oxygen measurement, 1 *E. coli* bacteria, and 1 total coliform bacteria sample on July 17, 2009 at site “Y”. The volunteer will collect 10 samples (or less) at this site during the course of the year, with 1 set of samples collected every 2 weeks. In order to meet the minimum number of precision measurements, the volunteer shall collect at least 1 duplicate measurement per parameter that year.

1.8 Training Requirements/Certification. Groups participating in the VRMP must be trained or recertified by VRMP/DEP staff on an annual basis. In addition, identify and describe any specialized training or certifications needed by personnel in order to successfully complete the project or task. Refer to training and certification details included in the Volunteer River Monitoring Program QAPP (see section 4.5) as needed.

Each year, all volunteers will be certified or re-certified through a training session provided by staff from the Maine DEP VRMP Program. The volunteer(s) will receive training on the use of dissolved oxygen/temperature/conductivity meter, water sampler and collection of water samples for bacteria. The DEP trainer will use the VRMP “Volunteer Certification Form” to record volunteer information and checks. Safety will also be covered during the training. Volunteers are encouraged to work in teams allowing for increased reliability, coverage and increased safety during collection visits. If volunteers work alone, they are cautioned about the dangers of working around streams/rivers and advised on practices to increase safety (e.g. informing family/friend about sampling plans, wearing a life jacket, carrying a cell phone).

The Data Managers will be responsible for collecting field sheets and entering the data into a Pre-EDD spreadsheet. The Data Managers will receive additional training.

Water quality samples for bacteria (*E. coli* and total coliform) will be analyzed by FOMB at Bowdoin College using IDEXX Colilert equipment. The bacteria lab will be inspected and certified by the VRMP through a procedure/checklist similar to that used by the “Maine Healthy Beaches” Program. In addition, bacteria growth media will be subjected to quality control checks (per each lot # of IDEXX “quantitray” media trays in possession by FOMB) by Nelson Analytical Lab (similar to the Maine Healthy Beaches Program).

1.9 Documentation and Records. Describe the process and responsibilities for ensuring the appropriate project personnel have the most current approved version of the QAPP and SAP, including necessary updates.

The SAP will be reviewed annually to determine if any changes are necessary (e.g. changes in SOPs, additions/deletions/re-location of sampling sites, additions/deletions of parameters that are sampled). Modifications may be made at the discretion of Friends of Merrymeeting Bay Board and then circulated amongst VRMP staff and the MDEP Quality Assurance Manager for review and approval. The FOMB Board Chair is responsible for ensuring that volunteers receive a copy of the most current SAP. It will be posted on the VRMP website.



1.9a Detail the types of data and other records that will be kept in this volunteer group's archives (electronic or hardcopy) as well as how that information will be forwarded on to the VRMP. If these details are exactly the same as those described in sections 4.6 and 5.10 of the VRMP QAPP, then a reference to that document is sufficient. If this volunteer group plans any deviations from those protocols, then specify below. (Records can include raw data, data from other sources such as databases or literature, field logs, sample preparation and analysis logs, instrument printouts, model input and output files, reports, and results of calibration and QC checks.)

Field Forms: Each monitor or team of monitors maintains the field forms for the sampling station(s) to which that are assigned. Field forms are given to the Volunteer Coordinators who will review the forms and forward to the Data Manager for entry into the Pre-EDD spreadsheet. The spreadsheet and copies of all field forms will be sent periodically or at the end of the field season to VRMP "headquarters" in the DEP-Portland office.

Lab Forms: Lab forms used for tracking and analysis of bacteria will be completed by the Lab Analyst and forwarded to the Data Manager for entry into the Pre-EDD spreadsheet. The spreadsheet and copies of all lab forms will also be sent periodically or at the end of the field season to VRMP "headquarters" in the DEP Portland office.

Results of field measurements and lab analyses are reviewed by DEP. The data will be uploaded into the EGAD database following protocols outlined in section 5.10 of the VRMP QAPP.

1.9b Identify any other records and documents applicable to the project that will be produced, such as annual reports and audit reports, if applicable. Specify or reference all applicable requirements for the management of records and documents, including location and length of retention period.

Not applicable.

II. DATA GENERATION AND ACQUISITION

2.0 Sampling Process (Experimental) Design. Describe the experimental data generation or data collection design for the project including the following:

- *Sampling locations:* Provide a list, table, or map that shows the geographic locations of sample stations. Be sure to include the geographic coordinates (UTM is strongly desired). Contact the VRMP if you need assistance documenting location of sampling. Provide driving directions to individual sampling locations. (Appendix 6 {Sampling Site Location Form} of the VRMP contains the necessary form for documenting this information.)
- *Measurement parameters of interest*
- *Sampling methods*
- *Sampling frequencies* including numbers of samples and monitoring period
- *Design of the sampling network*
- *Rationale for sampling design* (i.e., addressing the group's goals, representativeness, safety, landowner permission, etc.)

Insert or append tables, as necessary. Refer to sections 5.1 and 5.2 of the VRMP QAPP for guidance.



VRMP water quality monitoring represents spatial conditions on the mainstem in the vicinity of Brunswick-Topsham. Site selection follows VRMP QAPP requirements for site selection of sites laterally and vertically in the river to obtain well-mixed representative samples. [Non-VRMP approved sampling continues upriver to Lewiston and downriver into Merrymeeting Bay. A number of FOMB sampling sites, not included in the VRMP provide broader representation of the river.]^Δ

Monthly monitoring for temperature, dissolved oxygen, bacteria (*E. coli*, total coliform) and specific conductance will be done in April and October. Biweekly monitoring for the same parameters will run June through September. The monitoring schedule will include early morning sampling during at least the critical months of July and August. Use of DO meters during the first year did not begin until mid-July when delivered by DEP.

Field measurements for temperature, dissolved oxygen and conductivity will be done with a YSI 85 Dissolved Oxygen/Temperature/Conductivity meter at all three VRMP sites [and at four additional non-VRMP sites]^Δ. The meter will have a cable long enough to reach to near (within 1-m of) the riverbed at sampling locations. [DO is measured at all additional sites using Winkler titration as it has been since 1999.]^Δ Water samples for bacteria will be collected with a DEP-designed bacteria sampling device (which use sterile Whirl-Paks for water collection) and analyzed by FOMB at Bowdoin College. The three VRMP sites are: the “Brunswick Canoe Mooring (BCM)”, “Water Street Mooring (WSM)”, and “Brunswick Bay Bridge (BBB)” sites. Standard operating procedures (SOPs) for these methods are contained in Appendix C.

Sample Sites

Monitoring will be done at 3 sites. See Figure B (Sampling Stations Map), Table B (Sampling Stations) and Appendix G for sampling station descriptions and photographs.

Table B-Sampling Stations (Downstream to Upstream)

Location	Sample Location	Depth*	Site #	Latitude **	Longitude	Est GPS error (ft)	Source (GPS)
Brunswick Canoe Mooring	Mid-channel mooring- sample by boat	6-10 ft	BCM	43° 54' 52.66" N	69° 58' 33.78" W		Map
Water Street Mooring	Mid-channel mooring- sample by boat	15 ft	WSM	43° 55' 34.26" N	69° 57' 16.83" W		Map
Brunswick Bay Bridge	Mid-channel- sample off jetty (easy access to "center of flow" water according to FOMB)		BBB	43° 56' 08.55" N	69° 53' 26.98" W		Map

* Depths were obtained from IF&W maps. Note that these depths are estimates and may vary depending on flow conditions.

** Latitude/longitude are estimated from GIS. GPS coordinates will be obtained in the field and included in “Appendix G Site Descriptions_Photos”.

Figure B. Sample Stations Map

Androscoggin River Sampling Stations Brunswick/Topsham Area



2.1 Sampling Methods. Describe the procedures for collecting samples and identify the sampling methods and equipment, including any implementation requirements, sample preservation requirements, decontamination procedures, and materials needed for projects involving physical sampling. Insert or append tables and SOPs as necessary. Refer to sections 4.4, 5.1, and 5.2, as well as Appendix 2 (VRMP Standard Operating Procedures {SOPs} Catalog), of the VRMP QAPP for guidance as needed. Include new SOPs or methods under development by your group as appendices to this SAP, recognizing that they need to be approved by the VRMP for acceptance of data into its databases. Discuss how problems are addressed in section 3.0 below.

Dissolved oxygen, temperature and specific conductance measurements are performed in the field using YSI 85 meters/probes. Dissolved oxygen/temperature profiles will be done at all sites ≥ 3 meters in depth. Volunteers take grab samples for bacteria and specific conductance measurements at either mid-depth or 1 meter. Bacteria are analyzed by FOMB's lab technician, Ruth Innes, at Bowdoin College, using IDEXX's Colilert Quantitray/2000 procedures. The SOPs for each of the parameters are in Appendix C.



All sample sites are located on the mainstem of the Androscoggin River. Appendix H describes the required river/stream sampling and monitoring locations (i.e. longitudinal, vertical and horizontal position in the channel). FOMB monitors will have equipment including long water quality meter cables and samplers to allow sampling at required locations and depths.

Field Duplicates: Field duplicates will be obtained by each volunteer for at least 10% (1 duplicate per 10 samples collected or monitored) of their own sampling efforts. The Program Director will assign and track duplicate sampling by the volunteers. Data from field duplicates will be reviewed throughout the season to assess whether there are any problems.

2.2 Sample Handling and Custody. Describe the requirements for sample handling and custody in the field, laboratory, and transport, taking into account the nature of the samples, the maximum allowable sample holding times before extraction or analysis, and available shipping options and schedules for projects involving physical sampling. Refer to the VRMP QAPP as needed (section 5.3 and Appendix 2 and 8). Please note any deviations from these VRMP recommended procedures so that they may be reviewed. Indicate which laboratory will be used to analyze your samples, if applicable. (See section 4.5 of the VRMP QAPP for information about laboratories that can be used by volunteer groups wanting to have their data in the VRMP database.) Sample handling includes storage immediately following collection and transportation to a laboratory. Examples of sample labels and chain-of-custody or sample submission forms/logs should be included when they differ from those in the VRMP QAPP (section 5.3, Appendix 10). Discuss how problems are addressed in section 3.0 below.

Appendix E contains a table from the VRMP QAPP that provides sample holding times for water quality parameters of the VRMP.

Sample containers and accompanying data sheet for lab analysis are labeled with the following:

- a) Volunteer group name
- b) Name of the volunteer(s) who collected the sample or at least initial
- c) Date and time of sample collection
- d) Site ID number
- e) Type of analysis to be performed

Water quality samples for bacteria are transported to the Bowdoin College lab for analyses.

2.3 Analytical Methods. Identify the analytical methods and equipment required, including sub-sampling or extraction methods, and any specific performance requirements for the method. Where appropriate, refer to section 5.4 of the VRMP QAPP and its SOPs (in Appendix 2 and 8) or to SOPs from other laboratories. Specify the laboratory turnaround time needed, if important to the project schedule. Discuss how problems are addressed in section 3.0 below.

Bacteria (*E. coli* and total coliform) are analyzed using IDEXX Colilert method. [FOMB continues to split some samples for Coliscan analyses in order to compare methods. Coliscan tests are about ½ the operating expense of IDEXX and commonly used by volunteer monitor groups.]^Δ



2.4 Quality Control. Identify any QC activities needed for each sampling, analysis, or measurement technique that differ from those listed in the VRMP QAPP (sections 4.4 and 5.5) and associated SOPs (Appendix 2). For any additional QC activities, list the associated method or procedure, acceptance criteria, and corrective (or response) action. Be sure to describe how sample bottles or containers, if used, will be appropriately prepared (rinsed, sterilized, etc.) prior to sampling, by either a laboratory or the volunteer group.

Monitors follow VRMP Program SOPs for each parameter monitored. A field duplicate will be obtained by volunteers for at least 10% (1 duplicate per 10 samples collected or monitored) of their own sampling efforts for all parameters.

For water samples requiring laboratory analysis, duplicate samples will be obtained for at least 10% of samples (i.e. 1 duplicate per 10 samples) collected per parameter. This set of samples will be designated as a set of replicates for that particular sampling event on the label. Comparisons of duplicate results versus “original sample” results will be expected to meet the criteria in Appendix A.

2.5 Instrument/Equipment Testing, Inspection and Maintenance. Identify any instrument/equipment testing, inspection and maintenance activities that differ from those listed in the VRMP QAPP (section 5.6) and associated SOPs (Appendix 2). For any different or additional procedures, describe how they will be implemented and documented to assure quality. Also describe how deficiencies are to be resolved, when re-inspection will be performed, and how the effectiveness of the corrective action shall be determined and documented. Describe or reference how periodic preventive and corrective maintenance of measurement or test equipment and their components affecting quality shall be performed to ensure availability and satisfactory performance of the systems (refer to specific equipment manuals if necessary). Identify the equipment and/or systems requiring periodic maintenance. When appropriate, assemble such activities into SOP format to be appended to the SAP.

Appendix I contains a table from the VRMP QAPP that provides equipment inspection and maintenance requirements (Table 5a from the VRMP QAPP).

2.6 Instrument/Equipment Calibration and Frequency. Identify all instruments and other equipment used for data generation/collection activities that must be controlled and, at specified periods, calibrated to maintain performance within specified limits. As stated in the VRMP QAPP (sections 4.4, 4.5, 5.5, and 5.7), instruments will be calibrated and checked against VRMP reference instruments and standards during annual VRMP volunteer certification/recertification workshops. Refer to SOPs for use of each instrument/piece of equipment for specific details about additional calibrations (e.g., most dissolved oxygen meters need to be calibrated each day that it is used to make measurements). For any procedures differing from those found in the VRMP QAPP Appendix 2 (SOPs), describe how each will be implemented and documented to assure quality including: the basis for the calibration, certified equipment and/or standards used for calibration and how records of calibration shall be maintained and be traceable to the instrument.

Appendix I contains a table from the VRMP QAPP that provides maintenance and calibration requirements (Table 5a from the VRMP QAPP).



2.7 Inspection/Acceptance of Supplies and Consumables. Describe how and by whom supplies and consumables (i.e. standard materials and solutions, sample bottles, reagents, hoses, deionized water, potable water, electronic data storage media, etc.) shall be inspected and accepted for use in the project. State the acceptance criteria for such supplies and consumables. Refer to the VRMP QAPP (section 5.8), associated SOPs, and equipment manuals as needed.

Standards and reagent used by DEP for calibration and analysis will be checked to ensure they have not expired and disposed of according to DEP lab procedures.

2.8 Non-direct Measurements. Identify any types of data needed for project implementation or decision-making that is obtained from non-measurement sources such as computer databases, programs, literature files or publications, historical information, maps, data from other monitoring groups, or geographic information systems (GIS). Describe the intended use of the data. Define the acceptance criteria for the use of such data in the project, if applicable, and specify any limitations on the use of the data. Refer to the VRMP QAPP (section 5.9) and associated SOPs as needed.

Not applicable.

2.9 Data Management. Trace the path of the data from their collection/generation to their final use or storage (i.e. the field, the office, the laboratory, town conservation commission, report to watershed council, or stream team, as well at the VRMP and its EGAD database). Describe or reference the standard record-keeping procedures, document control system, and the approach used for data storage and retrieval on electronic media, if different than that detailed in the VRMP QAPP (section 5.10), as they apply to your group. Discuss the control mechanism for detecting and correcting errors and for preventing loss of data during data entry to forms, reports, and databases. Provide examples of any forms or checklists to be used. Identify and describe all data handling equipment and procedures to process, compile, and analyze the data, including procedures for addressing data generated as part of the project as well as data from other sources, as they apply to your group. Describe any data management processes not addressed by the VRMP QAPP (see section 5.10).

Forms for Data Collection and Chain of Custody (Lab Sample Submission)

Volunteers use standardized VRMP field forms. Volunteers are advised to carefully review and double check their forms, and ensure the forms are complete and legible. The FOMB Data Manager collects the forms and inputs the data into the Pre-EDD spreadsheet. The field data sheets are checked against the data entry. The FOMB Data Manager will also look for suspect data and contact the VRMP Program about questions or problems. The Pre-EDD spreadsheet and field forms are submitted to the VRMP either periodically through the field season or at the end of the sampling season.

Field data chain of custody is initiated by each water sample volunteer. Sample containers for bacteria are appropriately labeled by the Volunteer Coordinator prior to sample collection. VRMP field data sheet and lab chain of custody forms are in Appendix D. The Data Manager enters the lab results into the Pre-EDD spreadsheet. The Pre-EDD spreadsheet and lab results are submitted to the VRMP either periodically through the field season or at the end of the field season.

Appendix J (VRMP QAPP-Section 5.10) outlines the data management, input and review steps taken in managing the VRMP data. Data not meeting the limits for the measured parameters will be discarded at the VRMP level prior to data uploads into the DEP-EGAD database,



however original, complete records can still be maintained by the FOMB at their discretion. Appendix K contains the criteria used to review/validate data (VRMP QAPP-Table 6).

III. ASSESSMENT AND OVERSIGHT

3.0 Assessment and Response Actions / Problem Resolution. Describe problem assessment/detection and specific to the project not addressed by the VRMP QAPP (section 6.1). Assessments can include data quality objectives, sampling and analytical methods, data management, audits of test procedures and methods. Discuss the information expected and the success criteria (i.e., goals, performance objectives, acceptance criteria specifications) for each assessment proposed. Include information as to how any problems identified through these assessments will be corrected and who will carry this out. Describe how and to whom the results of each assessment shall be reported. Include details on how the corrective actions will be verified and documented.

Field activities are performed by volunteer monitors trained by DEP personnel. The VRMP will review all data for QA/QC issues. If problems are encountered (i.e. water quality objectives are not being met), the VRMP Coordinator or staff will communicate directly with FOMB. Procedures and equipment may need to be examined to determine which steps are critical for resolving the problem and getting the volunteer to point where they can sample properly. When laboratory quality objectives are not met, and best professional judgment suspect analytical error, the lab will be contacted and resolution to the problem will be sought. Problems detection and resolution will be documented and kept on files by the VRMP Program.

3.1 Reports to management. Describe reports to VRMP staff specific to the project not addressed by the VRMP QAPP (section 6.2). Identify the frequency and distribution of reports issued to inform VRMP staff of project status including results of system audits, periodic data quality assessments, and significant quality assurance problems/recommended solutions or corrective actions. Identify the individual responsible for such reports, recipients of the reports, and any specific actions recipients are expected to take as a result of the reports.

The VRMP Program will keep track of volunteers trained at workshops. At the end of the sampling season, DEP personnel will analyze the water quality and write a report. The report will be provided to the FOMB and other VRMP groups.

IV. DATA VALIDATION AND USABILITY

4.0 Data Review, Verification and Validation. State any criteria used to review and validate (accept, reject, or qualify) data, specific to the project not addressed by the VRMP QAPP (section 7.1), especially as they may apply to your group.

VRMP Program staff is responsible for final review of all field data and laboratory results. Data will be reviewed against Appendix K (Table 6: Criteria used to review/validate data from the VRMP QAPP). Field and lab duplicates may also be used to assist with decisions.



4.1 Verification and Validation Methods. Describe any data verification and validation methods not addressed by the VRMP QAPP (section 7.2), especially as they may apply to your group. These may occur at any step from initial data acquisition through the duration of the project. Discuss how issues shall be resolved and the system for resolving such issues. Describe how the results are conveyed to the VRMP and other data users. Provide examples of any forms or checklists to be used. Identify any project-specific calculations required.

VRMP Program staff reviews data submitted by volunteers and the lab for outliers and follows up with the FOMB. Problematic data (as outlined in the above steps) or data collected by volunteers who are not currently certified will not be included in the VRMP water quality database (i.e. EGAD). The “problematic data” may, however, be kept by FOMB and in VRMP files and archives.

4.2 Reconciliation with Data Quality Objectives. Describe how it will be determined if the actual data collected meets the data quality objectives described in Section 1.7. If the data does not meet outlined objectives, describe how it will be utilized. Describe how reconciliation with data quality objectives will be documented, issues will be resolved, and how limitations on the use of the data will be reported to decision-makers outside of those identified under the VRMP QAPP (section 7.3).

Data completeness, accuracy and precision will be evaluated periodically by VRMP Coordinator or staff. Sampling collection methods, equipment and procedures will be reviewed by the VRMP Coordinator or staff to identify the source of problems and corrected as necessary. Data will also be periodically evaluated for representativeness and comparability.



List of References.

- Androscoggin River Alliance Website. Accessed 6/2/2009. www.cleanandroscoggin.org/.
- Androscoggin River Watershed Council Website. Accessed 6/2/2009. www.avcnet.org/arwc/.
- Friends of Merrymeeting Bay Website: www.friendsofmerrymeetingbay.org ; [for FOMB data collected outside of the VRMP, go to last section in "Cybrary"].
- Maine Department of Environmental Protection. "2008 Integrated Water Quality Monitoring and Assessment Report". Document number DEPLW0895. Available at: www.maine.gov/dep/blwq/docmonitoring/305b/index.htm.
- Maine Department of Environmental Protection. As of 6/2/2009. Water Quality Classification. Available at www.maine.gov/blwq/docmonitoring/classification/index.htm
- Maine Rivers Website, Accessed 6/2/2009. "Androscoggin River Profile-A Brief History by Doug Watts". www.mainerivers.org/androscoggin.htm.
- Maine Volunteer River Monitoring Program / Maine Department Environmental Protection. 2009. Maine Volunteer River Monitoring Program (VRMP) Quality Assurance Program Plan (QAPP). Version 1 (June 10, 2009); includes appendices. Prepared by Jeff Varricchione, Maine Department of Environmental Protection, Portland, ME. <http://www.maine.gov/dep/blwq/docstream/vrmp/publication.htm>
- Oregon Department of Environmental Quality. 2004. Volunteer Water Quality Monitoring Sample and Analysis Plan.
- U. S. Environmental Protection Agency (USEPA), 1996. The Volunteer Monitor's Guide To Quality Assurance Project Plans. Office of Wetlands, Oceans and Watersheds; USEPA document # 841-B-96-003; Washington, D.C., 59 pp.
< <http://www.epa.gov/owow/monitoring/volunteer/qappcovr.htm> > (as of 2/8/05)
- Virginia Department of Environmental Quality. 2007. Virginia Citizen Water Quality Monitoring Program Methods Manual.