



# 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: \_\_\_\_\_

Volunteer Group Name: \_\_\_\_\_

Date of Latest Modification to SAP: \_\_\_\_\_

Date of VRMP QAPP Being Referenced in this SAP: \_\_\_\_\_

Project Duration (if known): \_\_\_\_\_

### Review & Approval Signatures:

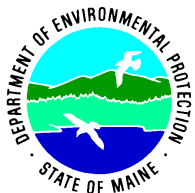
Volunteer Group's Project Manager: \_\_\_\_\_  
Name (printed & signature) Date

Volunteer Group's Data Manager: \_\_\_\_\_  
Name (printed & signature) Date

Maine DEP QA Manager: \_\_\_\_\_  
Name (printed & signature) Date

Maine DEP-DEA Representative: \_\_\_\_\_  
Name (printed & signature) Date

Maine DEP-VRMP Coordinator: \_\_\_\_\_  
Name (signature) Date





## **Table of Contents**

### i. Lists of Tables, Figures, Appendices, and Acronyms Commonly Used in This Document

#### **I. PROJECT MANAGEMENT**

- 1.0 Title and Approval Page
- 1.1 Table of Contents
- 1.2 List of Tables, Figures, and Appendices
- 1.3 Distribution List
- 1.4 Project Task/Organization
- 1.5 Problem Definition/ Project Background
- 1.6 Project /Task Description
- 1.7 Quality Objectives and Criteria
- 1.8 Training Requirements/Certification
- 1.9 Documents and Records

#### **II. DATA GENERATION AND ACQUISITION**

- 2.0 Sampling Process (Experimental) Design
- 2.1 Sampling Methods
- 2.2 Sample Handling and Custody
- 2.3 Analytical Methods
- 2.4 Quality Control
- 2.5 Instrument / Equipment Testing, Inspection, and Maintenance
- 2.6 Instrument / Equipment Calibration and Frequency
- 2.7 Inspection / Acceptance of Supplies and Consumables
- 2.8 Non-direct measurements
- 2.9 Data Management

#### **III. ASSESSMENT AND OVERSIGHT**

- 3.0 Assessment and Response Actions / Problem Resolution
- 3.1 Reports to Management

#### **IV. DATA VALIDATION AND USABILITY**

- 4.0 Data Review, Verification, and Validation
- 4.1 Verification and Validation Methods
- 4.2 Reconciliation with Data Quality Objectives

#### **V. REFERENCES**



## List of Tables

## List of Figures

## List of Appendices

- Appendix A: Data Quality Objectives (Table 3a from VRMP Program QAPP)
- Appendix B: Frequency of precision measurements or samples required of volunteer samplers and/or laboratories performing analyses for volunteer groups (Table 3c) from VRMP Program QAPP)
- Appendix C: Standard Operating Procedures (SOPs) for water quality measurements using meters or kits
- Appendix D: Water Sample Field Data Sheet and Chain-of-Custody for VRMP Program
- Appendix E: Sample Holding Times (Table 3d from the VRMP Program QAPP)
- Appendix F: Sampling Site Location Form Template (Appendix 6 from VRMP Program QAPP)
- Appendix G: Site Descriptions and Photographs for *Group X's* Sampling Sites
- Appendix H: Required River/Stream Sampling and Monitoring Locations (i.e. longitudinal, vertical, and horizontal position in the channel) for inclusion in the VRMP (Table 4a from VRMP Program QAPP)
- Appendix I: Generic Maintenance, Testing, and Inspection Procedures for Field Meters, Test Kits, and Other Equipment that should be considered in volunteer groups SAPs and VRMP SOPs (Table 5a from the VRMP Program QAPP)
- Appendix J: Data Management, Data Input, and Review – Volunteer Group Phase (Section 5.10, Subsection B-1, from the VRMP Program QAPP)
- Appendix K: Criteria used to review/validate data (Table 6 from the VRMP Program QAPP)

## 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



## **I. PROJECT MANAGEMENT (cont'd)**

### **1.3 SAP Distribution List**

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

- 1)
- 2)
- 3)
- 4)

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

- 1)
- 2)
- 3)
- 4)

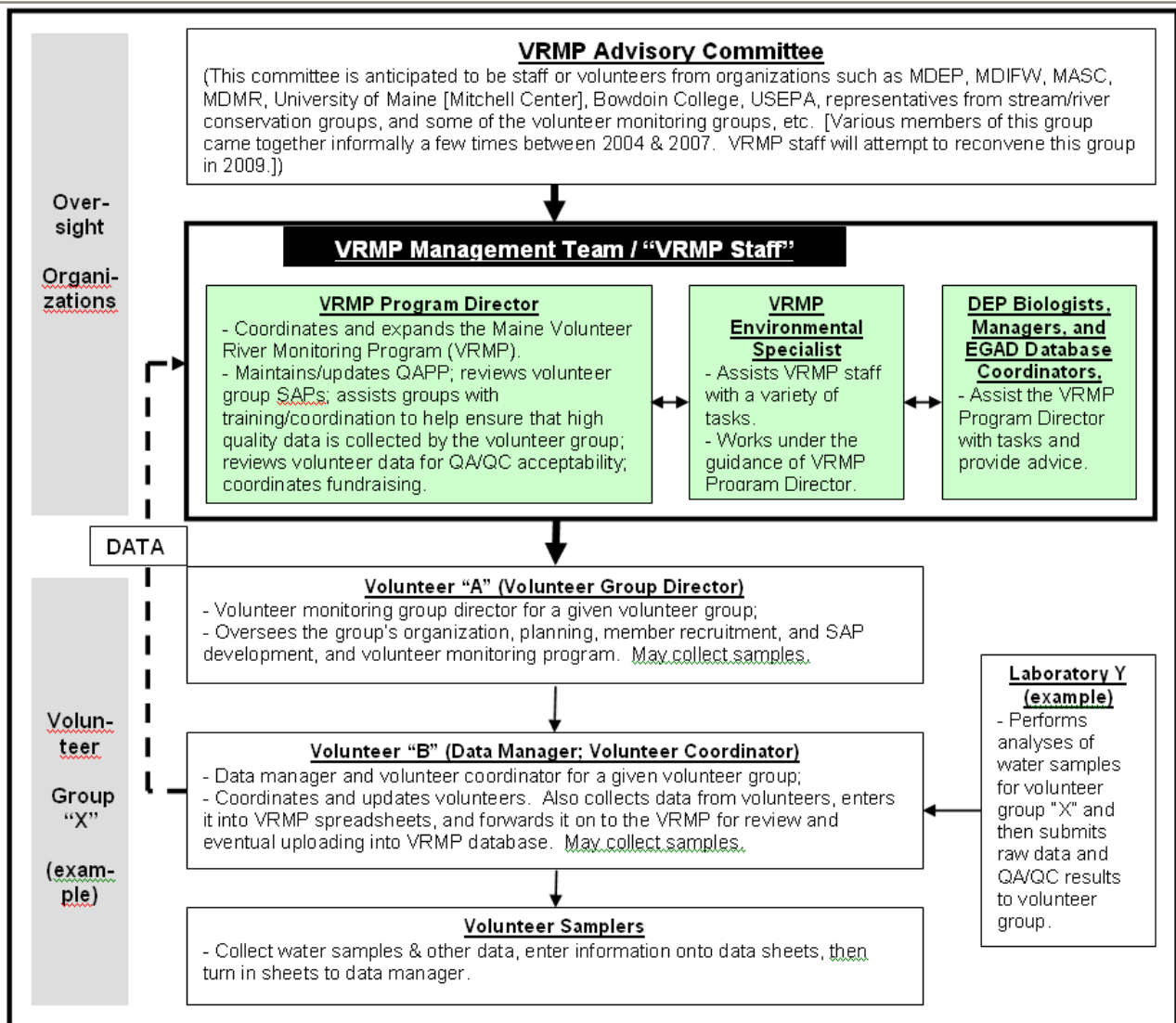
**Names and contact information of external technical reviewer(s), if any:** *(include name, title, organization, and phone number, and email address)*

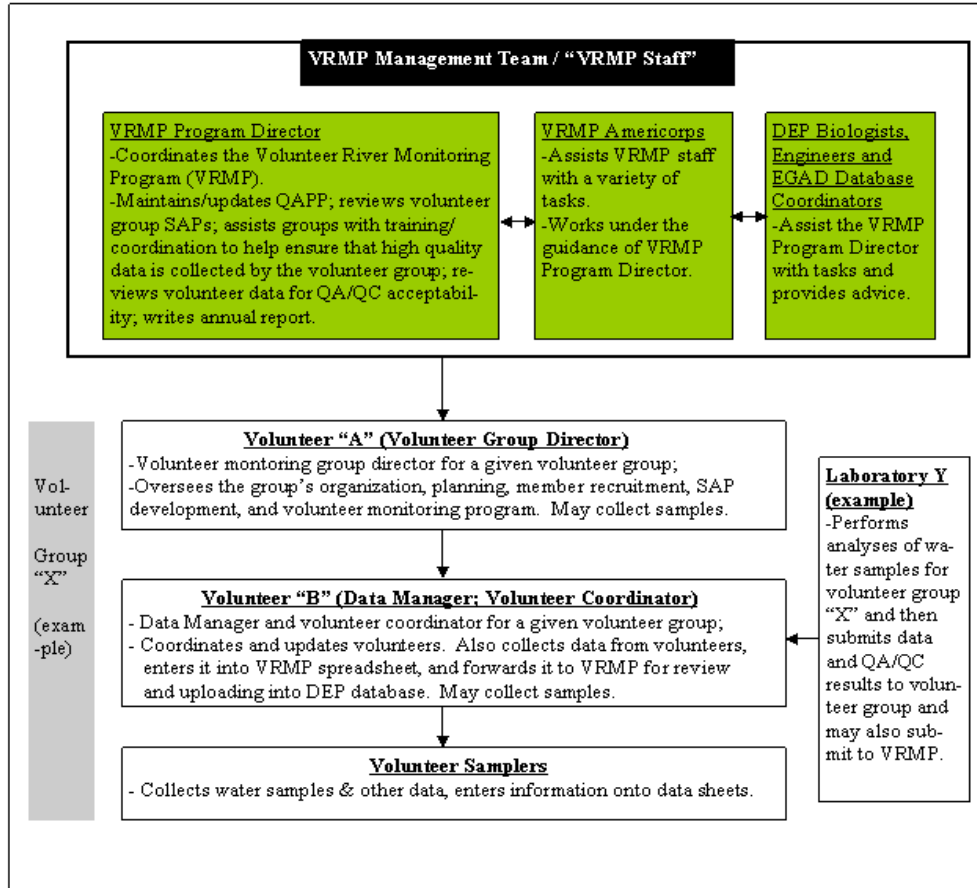
- 1)
- 2)



### 1.4 Project / Task Organization.

- Identify the individuals and organizations participating in your project and outline 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.
- Use or include an organizational chart or table that identifies reporting relationships between and within organizations and between personnel participating in the project.





**1.5 Problem Definition / Project Background.**



- 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 Rivers and Streams website < <http://www.maine.gov/water/rivers-streams/index.htm> >.

### **1.6 Project / Task Description.**

- Provide an overview of the project.
- 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.
- 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 2.0]).
- Summarize work to be performed, products to be produced, and the schedule/timeline. Attach a general study area map.

### **1.7 Quality Objectives and Criteria.**

- Discuss your targeted data quality objectives and measurement performance criteria for all parameters that include the following. Refer to Table 3a and Table 3c and list any deviations or additions.
  - *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
- Discuss the representativeness of sampling design and monitoring schedule: collecting samples that represent actual stream conditions (example considerations: season, time of day, frequency of sampling).
- Discuss the completeness required (completeness is the a measure of the number of samples you



must take to be able to use the information as compared to the number of samples you plan to take).

- Discuss comparability (extend that data can be compared to past data from the project or data from another project).
- (*See Appendix 1 of the VRMP QAPP for more information*). Refer to section 4.4 of the Volunteer River Monitoring Program QAPP for minimum VRMP standards. Insert or append a table summarizing plans, if necessary.





### **1.8 Training Requirements / Certification.**

- Groups participating in the VRMP must be trained or recertified by VRMP/DEP staff on an annual basis.
- 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.
- List laboratories that will be part of the study design. Contact the VRMP Coordinator for a list of approved laboratories and the parameters for which they are approved.

### **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.
- 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.)
- 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.



## 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:

- *Design of the sampling network (i.e. sampling locations):* Provide a list or 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. (Appendix 6 {Sampling Site Location Form} of the VRMP contains the necessary form for documenting this information.)
- *Specific water quality, hydrology, habitat and biology parameters to be sampled or monitored.*
- *Sampling methods* (provide brief summaries here). The details regarding sampling methodologies, protocols and SOPs are saved for Section 2.1.
- *Sampling frequencies* including and sampling season(s) including numbers of samples and monitoring period.
- *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.

### 2.1 Sampling Methods.

- Describe the procedures for collecting samples.
- 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 of the VRMP QAPP for guidance as needed, as well as Appendix 2 (VRMP Standard Operating Procedures {SOPs} Catalog).
- Refer to Table 3a of the VRMP QAPP for data quality objectives and Table 3d for typical preservation requirements for various parameters.



## **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, storage temperature requirements, 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.)
- 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).

## **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.

## **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 (or if new containers shall be used), by either a laboratory or the volunteer group.



### **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.
- 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.

### **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).
- 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.

### **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.



## **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.
- If collecting weather data refer to websites such as [www.weather.com](http://www.weather.com); [www.weather.gov](http://www.weather.gov); <http://www.maine.gov/mema/weather/weather.htm>.

## **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, as well as 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).



### III. ASSESSMENT AND OVERSIGHT

#### **3.0 Assessment and Response Actions / Problem Resolution.**

- Describe problem assessments and detection procedures specific to the project not addressed by the VRMP QAPP (section 6.1). Assessments can be done on data versus data quality objectives, sampling and analytical methods, data management, audits of test procedures and methods.
- Discuss the information expected from the problem assessments/detections 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, who will carry this out and how the effectiveness of the corrective action(s) will be assessed.
- 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.

#### **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.



## 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. Table format is preferred.

### **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.

### **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).



**List of References.** List any other references as needed.

Maine Volunteer River Monitoring Program / Maine Department Environmental Protection.  
June 10, 2009. Maine Volunteer River Monitoring Program (VRMP) Quality Assurance  
Program Plan (QAPP). Prepared by Jeff Varricchione and Lisa Vickers, Maine  
Department of Environmental Protection, Portland, ME.

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.

Oregon Department of Environmental Quality. 2004. Volunteer Water Quality Monitoring  
Sample and Analysis Plan.





## **Appendices**

Attach appendices as needed.