

In order to assure high quality biomonitoring data, SalmonWeb encourages participants to:

- Use standardized sampling protocols,
- To document the details of their sampling process, and
- To locate local experts who can provide technical advise and assistance.

QUALITY Quality Assurance procedures provide guidance for collecting high quality data. It is important to collect data using standardized protocols and to formalize procedures that assure the representativeness of the data.

QAPP SalmonWeb also encourages local groups to write a **quality assurance project plan (QAPP)** *before* collecting any samples. A quality assurance project plan is a written document that outlines the procedures a monitoring project will use to ensure that the samples participants collect and analyze, the data they store and manage, and the reports they write are of high enough quality to meet project needs.

METADATA The SalmonWeb internet site requires all data to be accompanied by **metadata**. **Metadata** is written information indicating the sampling, picking, sorting, taxonomic identification, and data analysis methodologies used. It also provides information regarding who sampled and analyzed the samples. This type of information provides insight to the quality of data collected as well as providing project information.

RESOURCES

- Quality Assurance Outline
- Metadata Outline
- Elements of a Quality Assurance Project Plan (QAPP)

OBJECTIVES Workshop participants will:

- Understand the components of a Quality Assurance Plan
- Fill out a draft Metadata page

Quality Assurance Outline

* The following description of quality assurance is adapted from River Watch Network's Benthic Macroinvertebrate Monitoring Manual.

Quality assurance procedures provide assistance in assuring the accuracy and precision of monitoring efforts. SalmonWeb recommends the following quality assurance steps.

Duplicate Samples. For every 10 samples collected, collect an extra sample in one riffle to help assure representativeness of samples collected.

Duplicate Collection. On a regular schedule, another team or a professional aquatic biologist collects samples at the same site, at the same time (within a day) as the volunteer team. Samples are analyzed separately by a professional lab. The results of the two sampling events are compared.

All Samples are Saved. Samples are all preserved in 90% ethyl alcohol, archived in labeled vials, and can be processed at any one time.

Verification by a Professional. Identification of organisms by volunteers can be checked by an aquatic biologist or entomologist familiar with the organisms.

Voucher Collection. All processed samples should be saved for later verification by professionals. Samples should be stored in labeled vials filled with 90% ethyl alcohol with seals that prevent the alcohol from evaporating. Samples should be checked every few months and the alcohol replenished, if needed. All samples should be stored in a central repository with a designated organization or individual responsible for maintenance.

Reference Collection. Examples of each family or major group found should be positively identified by an experienced person. These examples should be stored in vials with a label that correctly identifies the organism. This collection is used to compare with the unknown critters from your river samples to help you identify them.

Uniform Habitat Assessment by the Same People. The same people should carry out the habitat assessment at all the sampling sites to assure consistency in the subjective observations and estimates.

Metadata Outline

Metadata is a report of how your data was collected. This information details who is responsible for project planning and data management, the types of data collected, how the data was collected, and the types of quality assurance procedures used. It is a report that helps others understand the quality level of your data. SalmonWeb provides standardized methodologies for sampling, picking, sorting, and analyzing data. However, there are always nuances to collecting data. If a sample spills or a novice monitor forgets one step in the sampling protocol, the metadata is a useful place to document such events.

Use the following outline to create your metadata:

- 1. Contact Information.** Names of people responsible for project design and implementation.
Name, address, phone number, email number.
- 2. Sample collection information.**
Date. day/month/year
Monitors. Who collected samples on this day. Name, address, phone, email.
Location. Latitude/longitude of sampling area. (Include USGS map reference number)
- 3. Site description. Provide the information from the Sampling Description Form (see the *Sampling section of this notebook*) to describe the physical character of the sampling site. Sketch the sampling area and surrounding land. This does not need to be uploaded to the web page, but is a good reference for future sampling events and new monitors. Include upstream influences (culvert locations, agricultural areas, clear cut areas, housing developments, road crossings, wooded areas, etc.)**
- 3. Protocols. Describe procedures used for each step of monitoring process.** Include descriptions of quality assurance procedures.
Sampling Protocol. Describe the sampling procedure followed. Include any mistakes or alterations made due to sampling error (i.e., sample spillage or contamination).
Sample preservation. Describe how samples were stored after collection. Include date when samples were preserved.
Sample analysis. Describe how the benthic macroinvertebrates were picked, sorted and identified. Include the names of the people or laboratories performing each of these tasks. Include date of when samples were analyzed.
Data verification. Describe how data verified before data analysis conducted. Include description of data entry procedures.
Data analysis. Describe procedure for conducting statistical evaluations of Data (i.e., Index of Biological Integrity computation equations, metrics included, taxonomic level(s) used).
- 5. Associated professionals.** List any expert monitors associated with your project. Include name, address, phone, email contact information of each resource professional providing assistance. Describe their level of involvement in the project.

Quality Assurance Project Plan

A quality assurance project plan is a written document that outlines the procedures a monitoring project will use to ensure that the samples participants collect and analyze, the data they store and manage, and the reports they write are of high enough quality to meet project needs. The following description of a quality assurance project plan is an excerpt from EPA document 841-B-96-003: The Volunteer Monitor's Guide to Quality Assurance Project Plans. The complete document may be obtained by calling the EPA National Center for Publications and Information (1-800-490-9198).

ELEMENTS OF QUALITY ASSURANCE PROJECT PLAN (QAPP):

1. Title and Approval Page. This page includes the title and date of the QAPP; names of the organizations involved in the project; names, titles, and signatures of all appropriate approving officials such as project manager and QAPP officer.
2. Table of Contents. A table of contents should include section headings with appropriate page numbers and a list of figures and tables.
3. Distribution List. List the individuals and organizations that will receive a copy of your approved QAPP and any subsequent revisions. Include representatives of all groups involved in your monitoring project.
4. Project/Task Organization. Identify all key personnel and organizations that are involved in your program, including data users. List their specific roles and responsibilities. In many monitoring projects, one individual may have several responsibilities. An organizational chart is a good way to graphically display the roles of key players.
5. Problem Definition/Background. In a narrative, briefly state the problem your monitoring project is designed to address. Include any background information such as previous studies that indicate why this project is needed. Identify how your data will be used and who will use it.
6. Project/Task Description. In general terms, describe the work volunteers will perform and where it will take place. Identify what kinds of samples will be taken, what kinds of conditions they will measure, which are critical, and which are of secondary importance. Indicate how you will evaluate your results—that is, how you will be making sense out of what you find. For example, you may be comparing your water quality reading to State or EPA standards, or comparing your macroinvertebrate evaluations to State-established reference conditions or historical information.
7. Data Quality Objectives. Describe how good your data needs to be to meet your project's objectives. An example of this for biological monitoring is what level of taxonomic identification you plan to achieve.
8. Training Requirements/Certification. Identify any specialized training or certification requirements that volunteers will need to successfully complete tasks. Discuss how you will provide such training, who will be conducting the training, and how you will evaluate volunteer performance.
9. Documentation and Records. Identify the field and laboratory information and records you need for this project. These records may include raw data, quality control checks, field data sheets, laboratory forms, and reference collections. Include information on how long, and where, records will be maintained. Copies of all forms to be used in the project should be attached to the QAPP.
10. Sampling Process Design. Outline the experimental design of the project including information on the types of samples required, sampling frequency, sampling period (e.g., season), and how you will select sample sites and identify them over time. Indicate whether any constraints such as weather, seasonal variations, stream flow or site access might affect scheduled activities, and how you will handle those constraints. Include site safety plans.

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11. Sampling Methods Requirements. Describe your sampling methods. Include information on parameters to be sampled, how samples will be taken, equipment and containers used, sample preservation methods used, and holding times (time between taking samples and analyzing them). If samples are composites (i.e., mixed), describe how this will be done. Describe procedures for decontamination and equipment-cleaning. (For example, Surber sampler nets need to be thoroughly rinsed and examined for clinging organisms between sampling events.) Most of this information can be presented in a table or you may cite any protocols that contain this information.
12. Sample Handling and Custody Requirements. Sample handling procedures apply to projects that bring samples from the field to the lab for analysis, identification, or storage. These samples should be properly labeled in the field. Labels should include sample location, sample number, date and time of collection, sample type, sampler's name and method used to preserve sample. Describe the procedures used to keep track of samples that will be delivered or shipped to a laboratory for analysis. Include any chain-of-custody forms and written procedures field crews and lab personnel should follow when collecting, transferring, sorting, analyzing, and disposing of samples.
13. Analytical Methods Requirements. List the analytical methods and equipment needed for the analysis of each parameter, either in the field or the lab.
14. Quality Control Requirements. List the number and types of field and laboratory quality control samples (QC) taken. Quality control samples help identify when and how contamination might occur. For most projects, there is no set number of field or laboratory QC samples which must be taken. The general rule is that 10% of samples should be QC samples. This means that if 10 samples are collected, at least one additional sample must be added as a QC sample. The laboratory must run its own QC samples. For new projects, it is a good idea to increase the number of QC samples (up to 20%) until you have full confidence in the procedures you are using.
15. Instrument/Equipment Inspection and Maintenance Requirements. Describe your plan for routine inspection and preventative maintenance of field and lab equipment and facilities. Identify what equipment will be routinely inspected, what spare parts and replacement equipment will be on hand to keep field and lab operations running smoothly. Include an equipment maintenance schedule, if appropriate.
16. Inspection Acceptance Requirements for Supplies. Describe how you determine if supplies such as sample bottles, nets, and reagents are adequate for your program's needs.
17. Data Acquisition Requirements. Identify any types of data your project uses that are not obtained through your monitoring activities. Examples of these types of data include historical information, information from topographical maps or aerial photos, or reports from other monitoring groups. Discuss any limits on the use of this data resulting from uncertainty about its quality.
18. Data Management. Trace the path your data takes, from field collection and lab analysis to data storage and use. Discuss how you check for accuracy and completeness of field and lab forms, and how you minimize and correct errors in calculations, data entry to forms and databases, and report writing. Provide examples of forms and checklists. Identify the computer hardware and software to use to manage your data.
19. Assessments and Response Actions. Discuss how you evaluate field, lab, and data management activity, organizations (such as contract labs), and individuals in the course of your project. These can include evaluations of volunteer *performance* (for example, through field visits by staff or in laboratory refresher sessions); audits of *systems* such as equipment and analytical procedures; and audits of *data quality* (e.g., comparing actual data results with project quality objectives). Include information on how your project will correct any problems identified through these assessments. Corrective actions might include calibrating equipment more frequently, increasing the number of regularly scheduled training sessions, or rescheduling field or lab activities.

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20. Reports. Identify the frequency, content, and distribution of reports to data users, sponsors, and partnership organizations that detail project status, results of internal assessments and audits and how quality assurance problems have been resolved.
21. Data Review, Validation and Verification Requirements. State how you review data and make decisions regarding accepting, rejecting, or qualifying the data. All that is needed here is a brief statement of what will be done, by whom.
22. Validation and Verification Methods. Describe the procedures you use to validate and verify data. This can include comparing computer entries to field data sheets; looking for data gaps, analyzing quality control data such as chain of custody information, checking calculations, examining raw data for outliers or nonsensical readings and reviewing graphs, tables and charts. Include a description of how errors, if detected, will be corrected, and how results will be conveyed to data users.
23. Reconciliation with Data Quality Objectives. Once the data results are compiled, describe the process for determining whether data meet project objectives. This should include calculating and comparing the project's actual data quality indicators to those you specified at the start of the project, and describing what will be done if they are not the same. Actions might include discarding data, setting limits on the use of data, or revising the project's data quality objectives.