

Equipment, Protocol, and Data Management

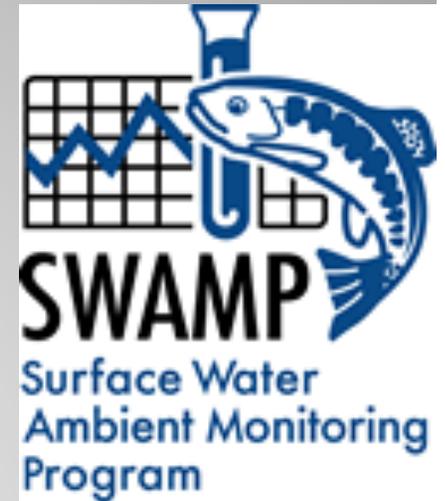


Resources

SWAMP: tasked with assessing water quality in all of California's surface waters. The program conducts monitoring directly and through collaborative partnerships; and provides numerous information products, all designed to support water resource management in California.

http://www.waterboards.ca.gov/water_issues/programs/swamp/

For bioassessment, physical habitat, and quality assurance project plan guidelines



Resources

The Clean Water Team's Tool Box: template files and documents to help manage and organize water quality monitoring data. Most items are part of the Data Quality Management (DQM) system that the Clean Water Team has developed for the collection, management and sharing of reliable data of known quality.

[Part 1: The Basics](#)

[Part 2: Data Validation Kit](#)

[Part 3: Advanced Tools](#)

[Part 4: Monitoring Project Planning Kit](#)



http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_toolbox.shtml

Equipment: Borrowing/ Sharing

Local municipal water districts
Sewage treatment plants
Schools
Tribal, Federal, State agencies
Soil and Water Conservation Districts
Irrigation Districts
Watershed councils
Other volunteer monitoring programs
EPA Regional Offices



Equipment: Purchasing

- Acorn Naturalists
- Ben Meadows
- BioQuip
- CHEMetrics
- Cole-Palmer Instruments
- Fisher Scientific
- Forestry Suppliers
- GREEN / Earth Force
- ✓ Hach
- ✓ LaMotte
- ✓ Thomas Scientific
- ✓ Wards Natural Science Establishment
- ✓ Water Monitoring Equipment & Supply

Monitoring Parameters

Water quality

- pH
- Temperature
- Conductivity
- Turbidity
- DO
- Bacteria
- Nutrients

Bioassessment

- Benthic Macro-invertebrates (BMI)
- Periphyton (Algae)
- Other Assemblages (Fish, Birds, Vegetation, etc.)

PHab (Physical

Habitat

Assessment)

- Substrate
- Flow
- Canopy Cover
- Human Influence
- Channel Characteristics

Special Projects and Atypical Constituents

Mining and Health

Power Plants

Factories

Agriculture

Urbanization

Invasive Species

Feed lots and Dairies



WHAT WOULD YOU MONITOR???

Establishing a Monitoring Plan: Goals and Objectives

Goal (Outcome) – what do you want to happen?

I want the community swimming safely in Deer Creek

Objectives – Specific and measurable

- Reduce bacterial counts in Deer Creek
- Reduce # of algal blooms in Deer Creek
- Reduce nitrate concentrations from wastewater treatment plant by 35%

Revise as needed!

Establishing A Monitoring Plan

Develop Monitoring Objectives

- Problem description
- Watershed description
- Summary of existing data
- Summary of ongoing monitoring efforts

Examples

- Identify changes in water quality
- Identify water quality problems
- Gather information on pollution prevention
- Determine baseline water quality

Design A Monitoring Plan

- ❖ Where will monitoring occur?
- ❖ What parameters or conditions will be measured?
- ❖ How will the parameters be measured?
- ❖ When will the monitoring occur?
- ❖ How will the samples be collected?

**What steps can be taken to assure confidence
in the monitoring plan???**

Technical Advisory Committee

- Budget time and money in projects for this
- Use free resources such as Regional and State Board
- Use larger programs, go to their meetings
- List specific areas where you might need tech assistance
 - Sampling gear
 - Method selection
 - Species identification
 - Review and interpretation of data (Data Quality Assessment)

Sierra Streams Institute Example

- Using SWAMP and Clean Water Team resources
- Attended meetings and invited others to join ours
- Formed TAC with other local watershed groups
- Initial and ongoing laboratory and technical assistance
- Open dialogue about quality and usability of data

Quality Assurance Project Plan

➤ What is the QAPP?

- 24-element document written and approved prior to sample collection
- Outlines project goals
- Describes who (personnel, staff) is doing what (field, lab, reporting)
- Tables with QC samples and control limits
- Outlines the ways you will assess (data verification/validation and interpretation) and report/manage your data

24-Element QAPP

- A1 – Title and Approval Sheet
- A2 – Table of Contents
- A3 – Distribution List
- **A4 – Project/Task Organization**
- **A5 – Problem Definition and Background**
- **A6 – Project/Task Description**
- **A7 – Quality Objectives and Criteria**
- A8 – Special Training/Certifications
- A9 – Documentations and Records
- **B1 – Sampling Process Design (Experimental Design)**
- B2 – Sampling Methods
- B3 – Sample Handling and Custody
- B4 – Analytical Methods
- B5 – Quality Control
- B6 – Instrument/Equipment Testing, Inspection, and Maintenance
- B7 – Instrument/Equipment Calibration and Frequency
- B8 – Inspection/Acceptance of Supplies and Consumables
- B9 – Non-direct Measurements
- B10 – Data Management
- C1 – Assessment and Response Actions
- C2 – Reports to Management
- D1 – Data Review, Verification, and Validation
- D2 – Verification and Validation Methods
- D3 – Reconciliation with User Requirements

What does this mean to my project?

- Use your Monitoring Plan
- Use the SWAMP Template
- Look at other QAPPs or a Program Plan (QAPrP)
- Don't get too bogged down in every section. For example, "will use lab SOPs for instrument calibration." Include SOPs as an appendix
- Delegate sections to your collaborators – lab and field crews
- The QAPP should reflect the scope of the project (i.e., small project, small QAPP)
- Do you need approval prior to sampling?

Why use SWAMP's QA/QC?

- Tested via expert focus groups
- State-of-the-art methods
- Systems for data collection, verification, validation, management, and reporting
- Covers most analyte/matrix combinations in addition to field measurements, toxicity testing and bioassessment studies
- Infrastructure and tools for others
- Peer-reviewed
- **COMPARABILITY**

The Volunteer Monitor's Guide To Quality Assurance Project Plans

Steps to Developing a QAPP

Developing a QAPP is a dynamic, interactive process that should ideally involve state and EPA regional QA experts, potential data users, and key members of the volunteer monitoring project. There are 11 steps a volunteer monitoring project coordinator might take to prepare a QAPP. These are:

<http://www.epa.gov/owowwtr1/monitoring/volunteer/qappexec.htm>

Step 1: Establish a small team whose members will serve as advisors in helping develop the QAPP by offering feedback and guidance throughout the entire process.

Step 2: *Determine the goals & objectives of your project--why it's needed, who will use the data, and how the data will be used.*

Step 3: *Collect background information to help you in designing your project.*

Step 4: *Refine your project's goals once you've collected information.*

Step 5: *Design your project's sampling, analytical & data requirements--what, how, when, and where you'll be monitoring.*

Step 6: *Develop an implementation plan that lays out project logistics.*

Step 7: *Draft your standard operating procedures (SOPs) & QAPP.*

Step 8: *Solicit feedback on your draft SOPs & QAPP from state or EPA regional QA contacts and potential data users.*

Step 9: *Revise your QAPP based on review comments and submit it for approval.*

Step 10: *Once your QAPP is approved, begin your monitoring program.*

Step 11: *Evaluate and refine your project over time, and reflect any major changes in a revised QAPP.*

A QAPP helps the data user and monitoring project leaders ensure that the data collected meet their needs



Basic QA/QC Concepts

Precision -- the degree of agreement among repeated measurements of the same characteristic. It may be determined by calculating the standard deviation, or relative percent difference, among samples taken from the same place at the same time.

Accuracy -- measures how close your results are to a *true* or expected value; can be determined by comparing your analysis of a standard or reference sample to its actual value.

Representativeness -- the extent to which measurements actually represent the true environmental condition or population at the time of sample collection.

Completeness -- the comparison between the amount of valid, or usable, data you originally planned to collect, versus how much you collected.

Basic QA/QC Concepts Continued

Comparability -- the extent to which data can be compared between sample locations or periods of time within a project, or between projects

Detection Limit -- the lowest concentration of a given pollutant your methods can detect

Measurement Range-- the range of reliable measurements of an instrument or method.

Quality Control (QC) Samples -- QC samples help evaluate potential error due to contamination. The general rule is that 10% of samples should be quality control (QC) samples (that could be approximately 20% of your program's analytical budget).

Elements of a QAPP

24 distinct elements can be included

Not all elements may be necessary for all programs

Which elements you include depend on your project's goals, objectives, scope, data uses, and the guidance you receive from your state or EPA regional quality assurance contacts.

The 24 elements are grouped into four overall categories:

- Project Management
- Measurement/Data Acquisition
- Assessment and Oversight
- Data Validation and Usability

Project Management

(elements 1-9)

1. Title and Approval Page
2. Table of Contents
3. Distribution List
4. Project/Task Organization
5. Problem Identification/ Background
6. Project/Task Description
7. Data Quality Objectives for Measurement Data
8. Training Requirements/Certification
9. Documentation and Records

Measurement/Data Acquisition

(elements 10-19)

- 10. Sampling Process Design
- 11. Sampling Methods Requirements
- 12. Sample Handling and Custody Requirements
- 13. Analytical Methods Requirements
- 14. Quality Control Requirements
- 15. Instrument/Equipment Testing, Inspection, and Maintenance Requirements
- 16. Instrument Calibration and Frequency
- 17. Inspection/Acceptance Requirements for Supplies
- 18. Data Acquisition Requirements
- 19. Data Management

Assessment and Oversight

(elements 20-21)

20. Assessment and Response Actions

21. Reports

Data Validation and Usability

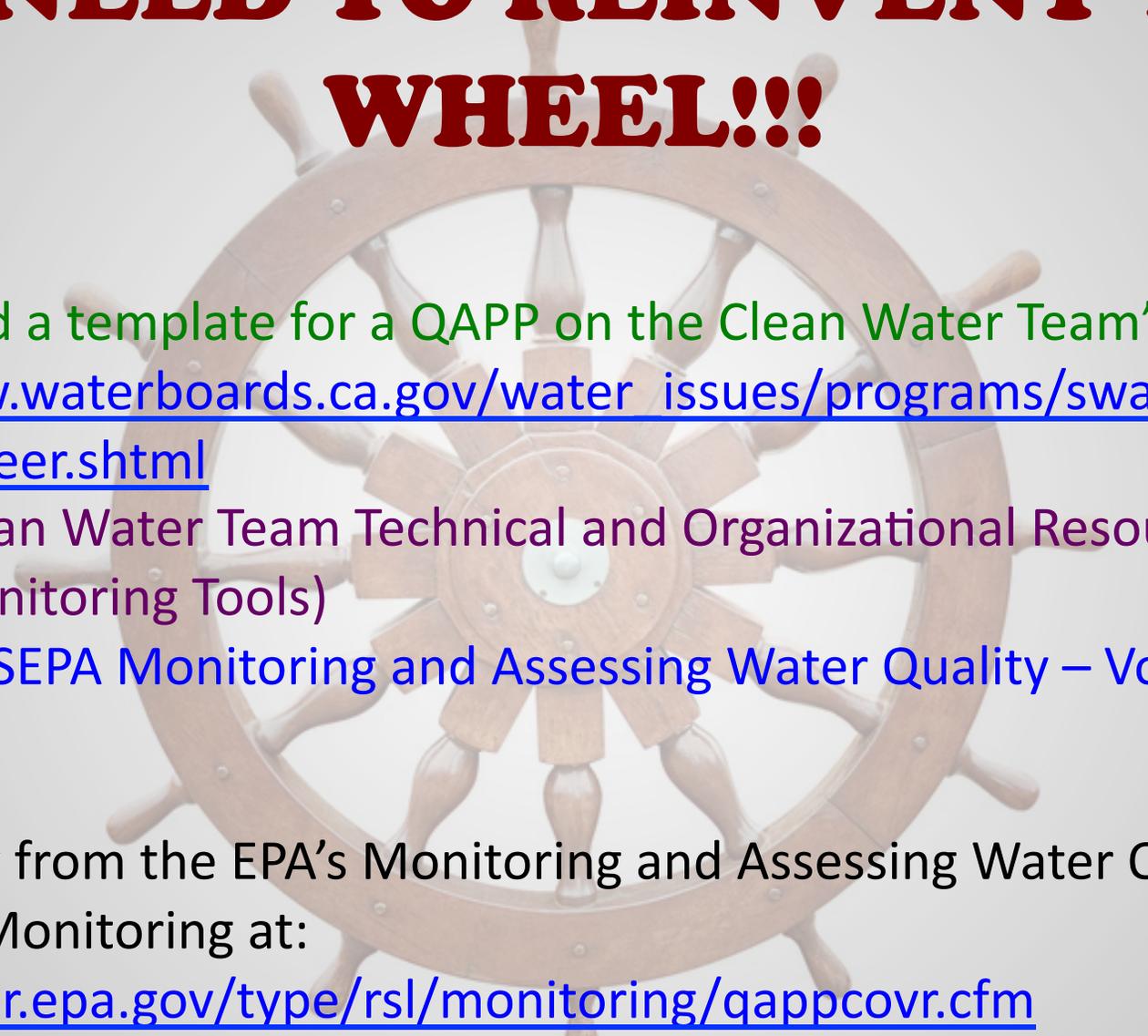
(elements 22-24)

22.Data Review, Validation, and Verification Requirements

23.Validation and Verification Methods

24.Reconciliation with Data Quality Objectives

NO NEED TO REINVENT THE WHEEL!!!



You can find a template for a QAPP on the Clean Water Team's website:
http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_volunteer.shtml

Under: Clean Water Team Technical and Organizational Resources
(Citizen Monitoring Tools)

Click on: [USEPA Monitoring and Assessing Water Quality – Volunteer Monitoring](#)

OR, directly from the EPA's Monitoring and Assessing Water Quality - Volunteer Monitoring at:

<http://water.epa.gov/type/rsl/monitoring/qappcovr.cfm>

Take Home Messages

- **Set Goals:** Use systematic planning, link type of data to project goal
- **Save Resources:** Leverage off existing programs or larger projects
- **Successful Implementation:** Use the RFP, Contract, & QAPP to implement QA/QC
- **Useful Product:** Collect data of known and documented quality that is application-appropriate and that is comparable with data from other efforts

What would make you more confident in citizen science data?

- **What can we do to better incorporate these findings into policy and other decisions?**



**LET'S GO
OUTSIDE!!!!**