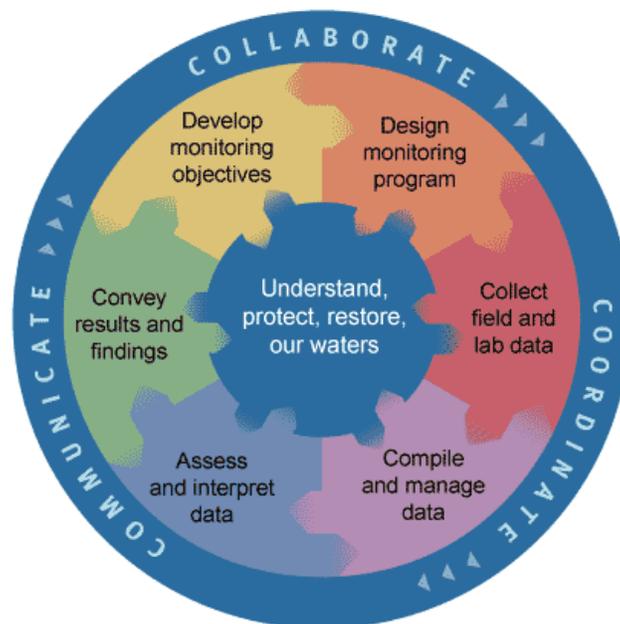


## Water Quality Statistics and Assessment Workgroup

A collaborative effort of the **Water Information Strategies and Methods and Data Comparability Board** workgroups of the **National Water Quality Monitoring Council**

**Abstract:** The National Water Quality Monitoring Council’s (NWQMC) monitoring framework identifies the six steps of monitoring to understand, protect, and restore our waters. The Water Quality Statistics and Assessment (WQSA) workgroup was formed to address the need for better access to available information in two framework elements: primarily, **assess and interpret data** and secondarily, **design a monitoring program**



The Framework for Monitoring

The NWQMC has formed a workgroup to 1) collect and organize information on available statistical techniques and software appropriate for use with water quality data, 2) collect and organize information and guidance on water quality assessment methods, including an update of states’ water quality assessment approaches, and 3) present statistical methods information within the National Environmental Methods Index<sup>1</sup> (NEMI). The third step will include needed modifications to the NEMI database schema and data entry

The workgroup will include representatives from the water resource management community, research, and the private sector. In addition, involvement of organizations currently working towards the development of software and other tools pertaining to environmental statistics will be invited to participate in order to ensure complementary

<sup>1</sup> NEMI is a free, searchable clearinghouse of methods and procedures for both regulatory and non-regulatory monitoring purposes for water, sediment, air and tissues. <http://www.nemi.gov/>



efforts between the various organizations. The workgroup will also identify fields of information to be added to NEMI.

**Challenge:** Currently, guidance for the selection and use of water quality statistical and assessment procedures to meet specific water information needs may be located in many different documents or exist in several forms. In some cases, state and federal environmental agencies and other organizations have separately developed preferred procedures to, for example, compare the mean of a set of measurements to a criterion or evaluate a temporal trend. Alternative procedures may be appropriate and comparable in certain situations, but not in others. It is a major challenge for water information practitioners, including decision-makers, water quality scientists and engineers, statisticians, etc., to be aware of the range of statistical and assessment methods that may exist in both regulatory and research arenas and how they may be used to address a water quality question.

This challenge is similar to that faced when monitoring groups attempt to access information on the many different laboratory or field analytical methods that are available to measure chemical, physical, or biological characteristics of a water resource. The Council, through the Methods Board, created NEMI to assist water information practitioners with this challenge. NEMI is an internet-based search tool that allows users to quickly identify a number of potentially useful chemical, physical, or biological analysis methods from regulatory and non-regulatory sources. NEMI is now widely used, and may also be an effective way to increase the accessibility of information on statistics and assessment methods. Discussions held at the Council meeting in Portland, Oregon in July 2009 indicated general agreement that the WQSA workgroup should explore the use of NEMI for accessing information on water quality statistics and assessment procedures.

**Objectives:** To convene a work group of experts on statistics and water quality assessment to:

- Collect and organize information on available statistical techniques and software for one or more prototype projects (e.g., trend analysis, biological data analysis);
- Collect and organize information and current guidance on assessment methods, including an update of state water quality assessment approaches originally done by Water Environment Research Foundation<sup>2</sup>;
- Make recommendations to modify the NEMI data base to store relevant information on statistical procedures to allow potential users to make informed decisions on the use of statistics for their projects;
- Recommend types of statistics that are appropriate for the proposed National Monitoring Network (NMN) for coastal waters and their tributaries.

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<sup>2</sup> Linnenfeller, B. and L. Griffith. 2007. Evaluating Waterbody Assessment and Listing Processes: Integration of Monitoring and Evaluative Techniques. Water Environment Research Foundation report number 04-WEM-4.



## Outline:

1. **Statistics and Assessment Workgroup Formation:** The WQSA should reflect expertise that can address two topics: what questions are relevant to today's water information practitioners, and what statistical and assessment procedures, tools, and guidance are available and appropriate to help answer those questions. A small working group of water information users and statisticians representing multiple organizations including USGS, USEPA, states, and others was envisioned, and several individuals have indicated their interest in participating. The group would communicate through periodic conference calls, email, and other means to make progress toward the specific goal of developing one or two prototype uses of NEMI. Possibilities considered to date include a temporal trend analysis of water quality and an analysis of biological assessment data. Both could illustrate how NEMI could be used by states to meet their Clean Water Act mandated 303(d) or 305(b) assessment needs and reporting requirements. In addition, it was agreed that a presentation on this effort will be made at the 2010 National Monitoring Conference in Denver.
2. **Collaboration and Coordination with Partner Organizations:** The NWQMC is comprised of representatives from government, academia, and private organizations. The statistics and assessments workgroup will draw from Council members as well as internationally-renowned experts in related fields who have been asked to join this effort.
3. **Statistical Procedures List:** A list of applicable statistical procedures will be generated that are commonly used to analyze field measurements of water quality (and quantity?). The procedures may be divided into several sub-categories, with initial efforts focused on the prototype uses.

## Products:

1. Summary of information and guidance on assessment methods, and updated summary and analysis of state assessment techniques.
2. Catalog of statistical procedures for prototype uses.
3. List of fields to add to NEMI.
4. Recommendations for updating NEMI to include water quality statistical and assessment procedures.