



Tools and Tips for Enhancing Data Comparability

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Citizen Environmental Monitoring in Appalachia

November 2004

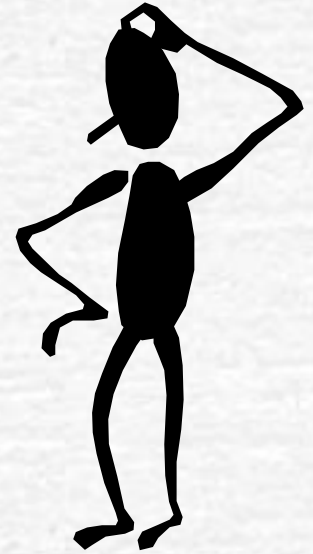
Presentation Outline

- National Water Quality Monitoring Council
 - Framework for Monitoring
 - National Environmental Methods Index
- USDA-CSREES Volunteer WQ Monitoring Proj.
 - Matrix of Monitoring Activities
- NJ's Tiered Approaches to Volunteer Monitoring
- Practical steps to enhance comparability-
Discussion

Why Focus on Collaboration & Comparability?

Critical differences in:

- project design,
- methods,
- data analysis, &
- data management . . .



. . .make it difficult for monitoring information to be shared by more potential data users

National Water Quality Monitoring Council

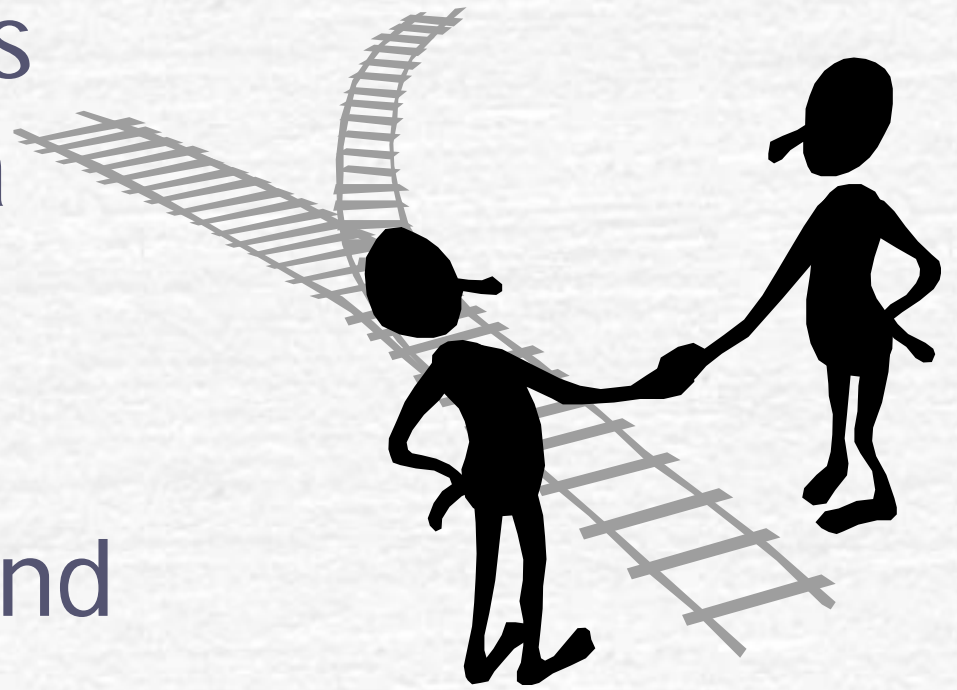
The National Water Quality Monitoring Council provides a national forum to coordinate consistent and scientifically defensible methods and strategies for improving water quality monitoring, assessment, and reporting.



- **Framework for Monitoring**
- **National Environmental Methods Index (NEMI)**
- **Water Quality Data Elements**
 - **Conferences**
- **Promoting State Monitoring Councils**

Development of a national monitoring strategy requires that we create a **framework** for enhancing

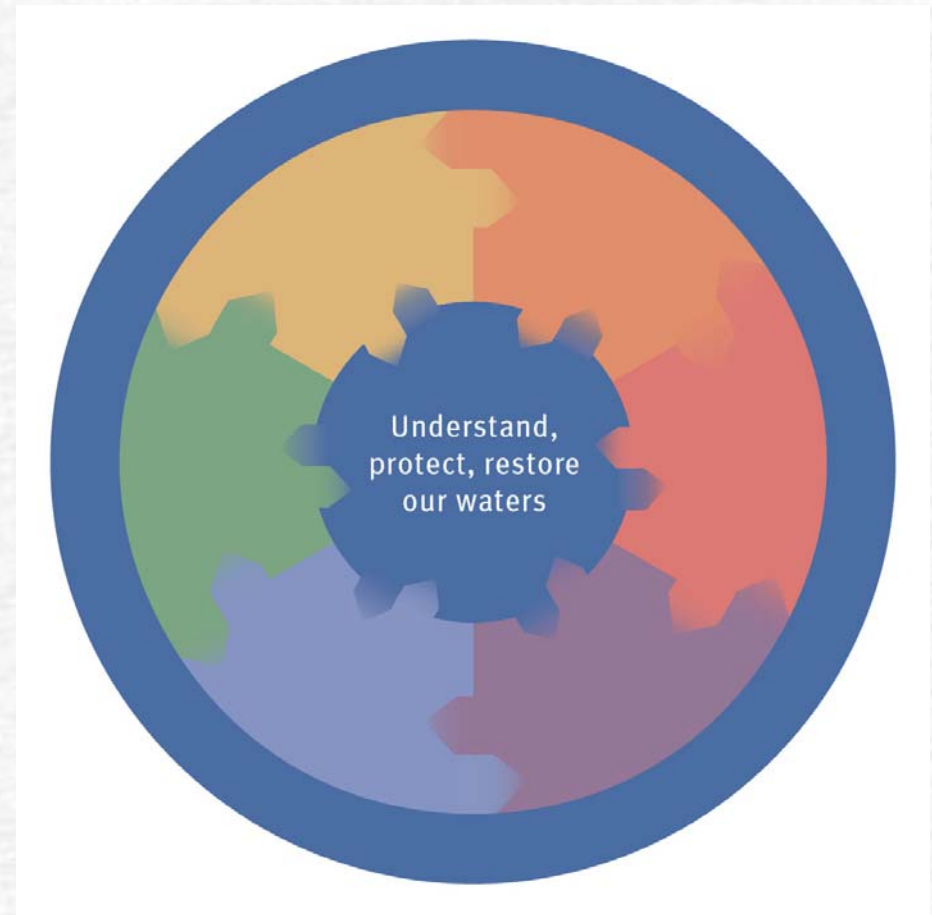
collaboration and ***comparability*** among programs



What is a Monitoring Framework?

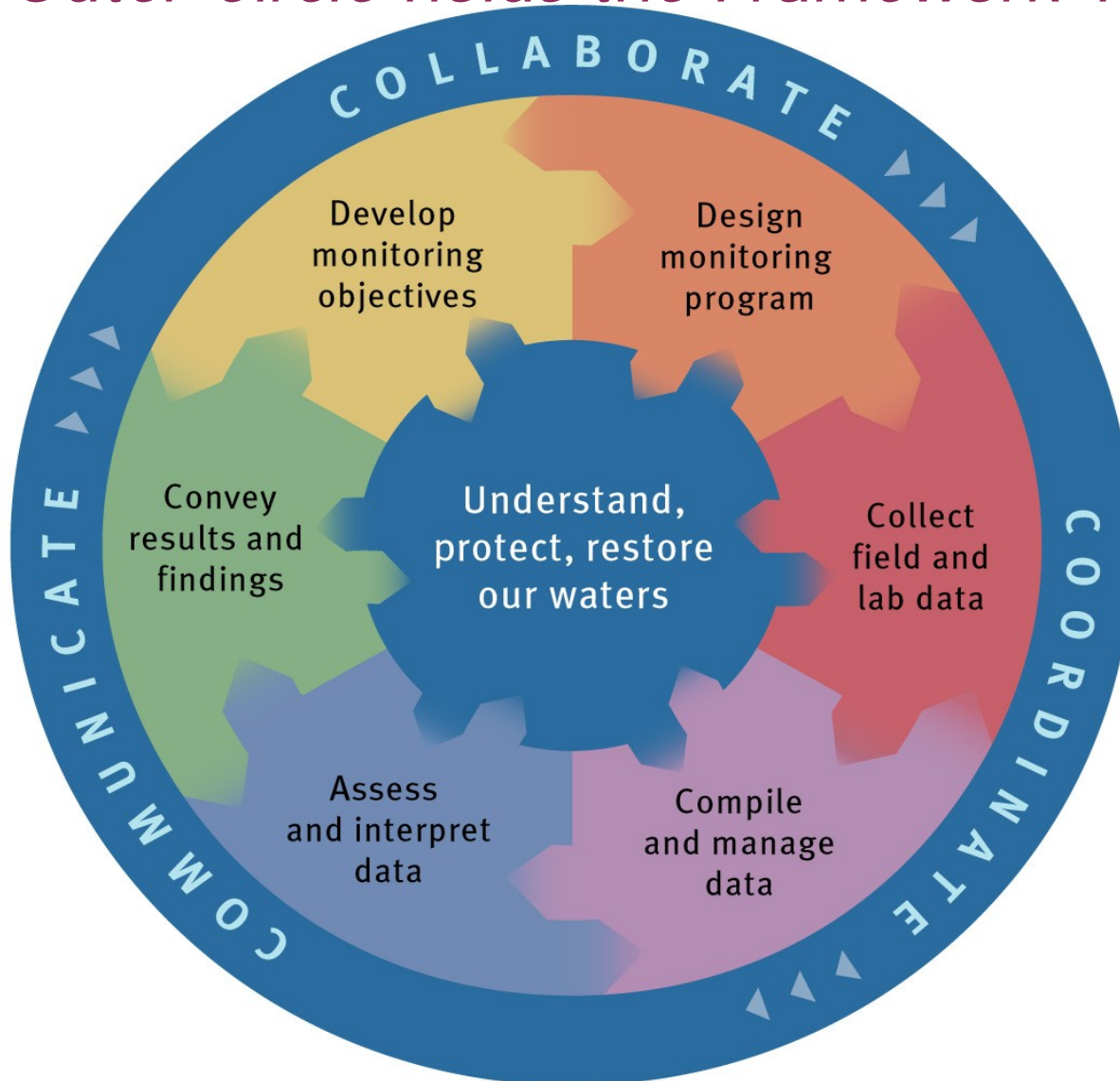
- The process of monitoring and assessment should principally be seen as a *sequence of related activities* that
 - start with the definition of information needs and
 - end with the use of the information product.

UN/ECE Task Force on Monitoring and Assessment (2000)



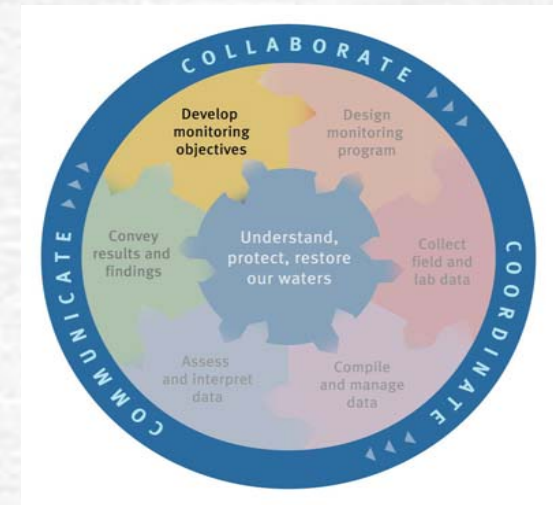
The Framework for Monitoring:

The Outer Circle holds the Framework Together



Develop Monitoring Objectives

- Why are you monitoring?
- Who will use the data?
- What will the data be used for?



Education/
Awareness



Assess
Impairment



Legal/
Regulatory

Increasing Time - Rigor - QA - Expense

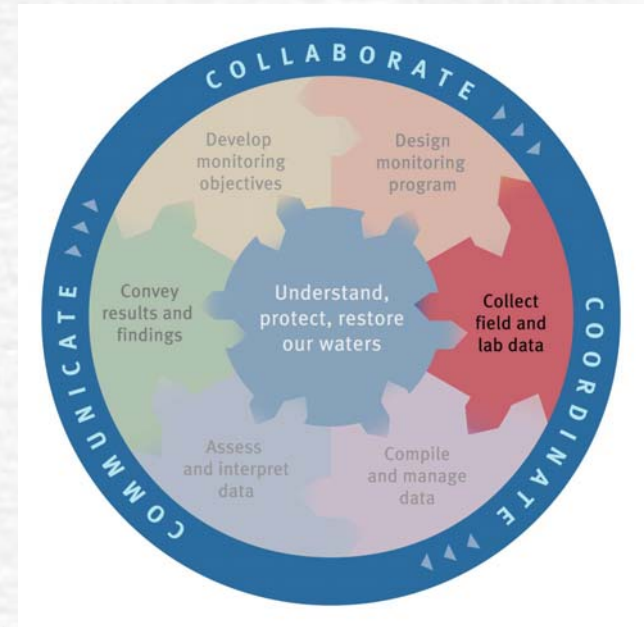
Design Monitoring Program

- Identify the environmental setting and water-quality issues
- Articulate and document overall monitoring/information strategy
- Public participation process
- Communication strategy
- Sampling network design
 - Site selection, what to monitor
 - How often, for how long
- What methods to use for all aspects of program from sample collection to reporting results



Collect Field and Lab Data

- Identify optimal methods (NEMI)
- Sample management plan
- Train and certify personnel
- Document sampling site location
 - (GPS, photos)
- Coordination with partners
- Laboratory operations coordination
- Laboratory Analyses
- Data handling/Data audits/Meta data



Compile and Manage Data

- Capture field and lab data
 - electronic/PDA or paper or both
- Spreadsheet or Database ?
- Database design / Security features
- Data validation/audits
- Meta data documentation
 - Water Quality Data Elements (WQDE)
- Data swap with partners
- Raw data products
- Archiving data
- Data Verification



National Environmental Methods Index



Mission

“To allow rapid communication and comparison of critical parameters of methods for use with methods selection and/or methods modifications and data comparability”

www.nemi.gov

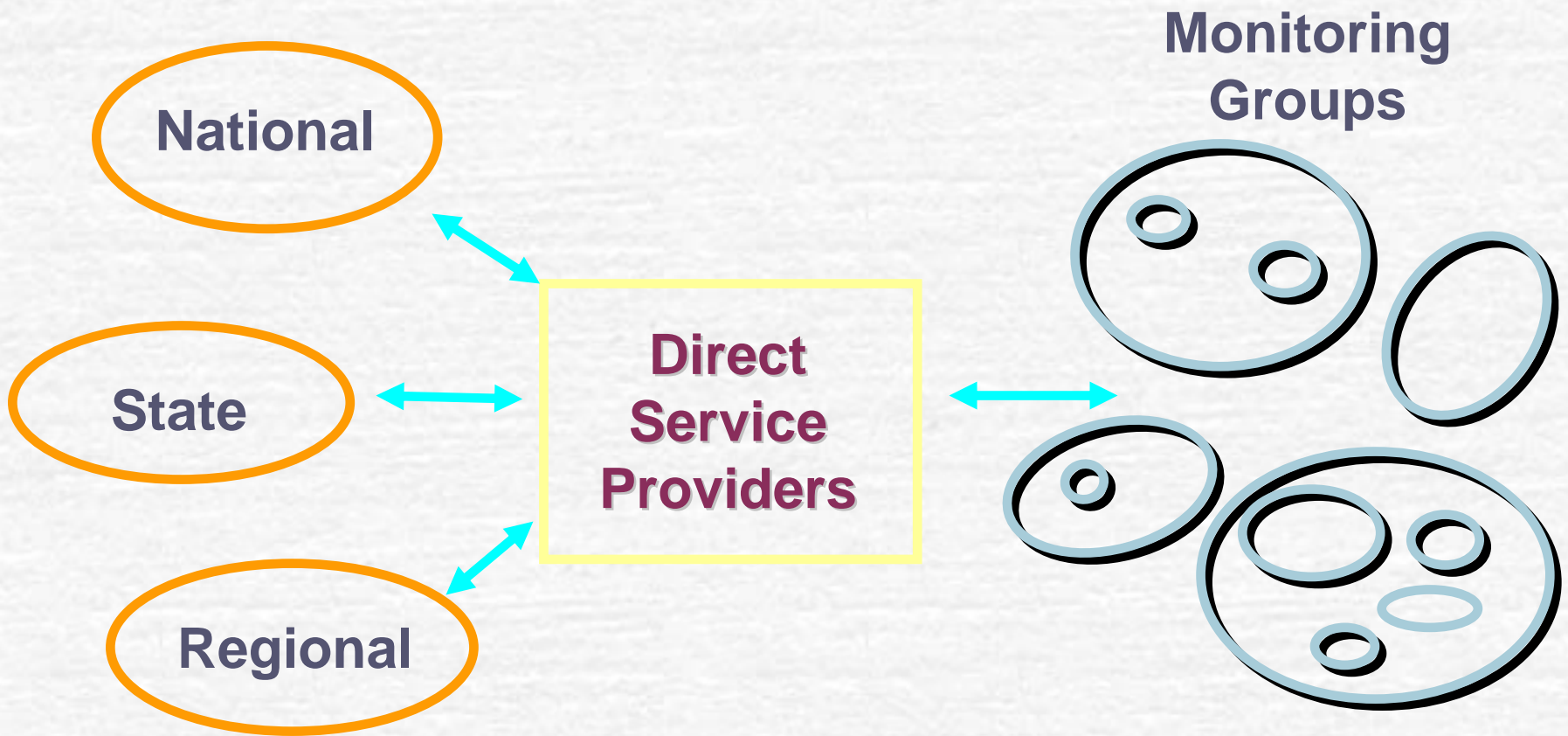
The Benefits of NEMI

User-friendly database searchable over the Internet, users worldwide can obtain methods information with only a standard Internet connection and browser

- No special equipment or sophisticated software is needed to access the information
- Has all the info needed to compare methods and data quality
- 750+ methods currently in NEMI



The Volunteer Monitoring "System"



National

- USEPA
 - Numerous Web sites
 - Guidance documents
 - *Volunteer Monitor* Newsletter
 - National Directory of Volunteer Programs
- Cooperative Extension
 - National Facilitation Project
- NOAA
 - Sea Grant
 - National Estuarine Research Reserves
- National, regional conferences

This Volunteer Water Quality Monitoring National Facilitation Project is designed to build a comprehensive support system for Extension volunteer water quality monitoring efforts across the country. The goal is to expand and strengthen the capacity of existing Extension volunteer monitoring programs and support development of new groups.

Volunteer Monitoring National Facilitation Project

- Project Description (382 K pdf file)
- Outreach Materials and Activities
- Nationwide Inquiry
- Online Databases
- Training Sessions and Materials

Extension Volunteer Monitoring Programs

Related Research and Educational Efforts **NEW!**

Other National Facilitation Projects ➔

- NEMO
- Best Education Practices
- Pollution Assessment and Prevention



Guide for Growing Programs

- Using the Guide (803 K pdf file)
- Why Monitoring Makes Sense (582K pdf file)
- Designing Your Monitoring Strategy (1.8 M pdf file)
- Monitoring Matrix (80 K pdf file)**
- Effective Training (986 K pdf)
- Monitoring Equipment Suppliers (437KB pdf file)
- Direct Links to Monitoring Programs' Manuals (online)
- Quality Assurance
- Volunteer Management
- Outreach Tools
- Locating Support and Funding

Special Topics

- Highlighted Program **NEW!**
- Highlighted Program Archives **NEW!**
- Job postings
- Link to Highlighted Program archives
- Volunteer E-Coll Monitoring Project

www.usawaterquality.org/volunteer

Selecting Methods : The Continuum of Monitoring Data Use

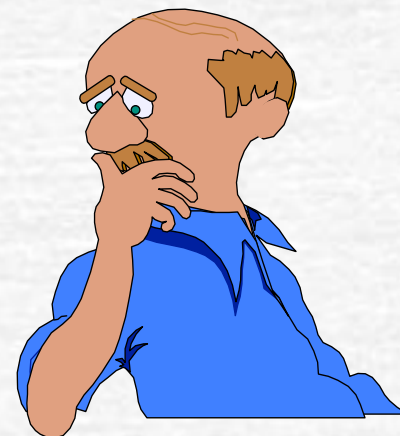


Increasing Time - Rigor - QA - Expense \$\$

Geoff Dates, River Network

Selecting Methods: Important Questions to Consider

- **Why** do you want to monitor?
- **Who** will use the data?
- **How** will the data be used?
- **How good** do the data need to be?
- **What resources** are available?
- **What type of monitoring** will you do?



Modified from EPA Volunteer Stream Monitoring Methods

Matrix of Monitoring Activities

The following table describes in broad terms some of the monitoring activities typically performed by volunteers. This matrix is intended to help direct the selection of monitoring activities according to data objectives and available resources. The table is arranged with the monitoring activities that generally require less effort and resources at the top, increasing in complexity toward the bottom. Within each monitoring activity, there is also often a range of data objectives and resources needed, with more intense data objectives requiring more resources.

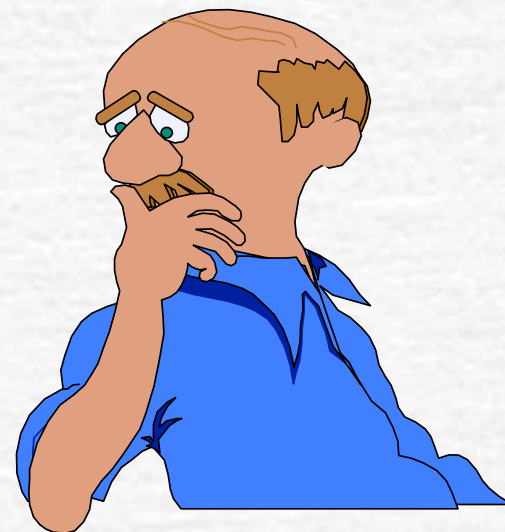
Monitoring Activities	Data Objectives	Examples of Activities	Resources Needed			
			Equipment & Supplies	Education & Training	Frequency of monitoring	QA/QC Level & Standards
Shoreline Survey	Educational; General awareness; Gross problem identification or screening; Baseline data; Targeting sites for additional study	Field observations; shoreline land use assessment; I.D. potential sources of pollutants	Map of waterbody, field data sheets Optional: Camera, GPS unit	Understanding of maps and features of concern. Can be self taught or training on how to complete maps and data sheets	Annually	No formal QA/QC plan required. Field Observations on standard forms.
Watershed Assessment	Educational; General awareness; Gross problem identification or screening; Baseline data; Targeting sites for additional study	Field observations, watershed wide land use assessment, I.D. potential sources of pollutants	Map of watershed, field data sheets Optional: camera; permission to access private property, GPS unit	Understanding of maps and features of concern. Can be self taught or training on how to complete maps and data sheets	Annually or less often	No formal QA/QC plan required. Field Observations on standard forms.
Habitat Assessment	Educational; General awareness; Gross problem identification or screening; Baseline data; Targeting sites for additional study/restoration	Visual assessment of critical habitat features; may include measurements of some features. Intensive surveys measure channel depths, sinuosity, etc.	Map of waterbody, field data sheets, measuring tape, measuring stick Optional: camera; permission to access private property, GPS unit	Understanding of maps and features of concern. Training in evaluating habitat features and in how to complete maps and data sheets recommended	Several times a year during different seasons or less is typical, many programs assess habitat annually	Basic written plan – assessment purpose, methods, sites, and schedule.

Selecting Methods: Matrix of Monitoring Activities

- Monitoring activities/Type of monitoring
- Data objectives
- Example activities
- Equipment and supplies
- Education and training
- Frequency of monitoring
- QA/QC level and standards
- Duration of monitoring
- Intensity of analysis/Complexity of approach

QA/QC: The Monitoring Conundrum

"Any **conclusions** reached as a result of tests or analytical determinations **are charged with uncertainty**. No test or analytical method is so perfect, so unaffected by the environment or other external contributing factors, that it will always produce exactly the same test or measurement result or value."



VARIABILITY HAPPENS

Uncertainty

What we know we don't know

Ignorance

What we don't know we don't know

The experience of the trainer has a direct effect on the results. More experienced trainers lead to better trained volunteers.

A. Mimo Project SEARCH

QA/QC: Variability Happens

“Where such situations seem to exist (that is, identical results) **either the measurement is not sensitive enough to detect differences or the person making the measurement is not performing it properly.**”



**IDENTICAL
RESULTS DO NOT
MEAN PERFECTION**

Quality is Assured through:

- Training
- Repetition
- Routine sampling
- Monitoring multiple indicators
- QA/QC field and laboratory testing
- Adhering to established procedures

The most important factor determining the level of quality is the cost of being wrong.

New Jersey's Tiered Approach

- Allows for volunteers to pick their level of monitoring involvement based on:
 - Intended purpose for monitoring
 - Intended data use
 - Intended data users

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Tiers Provide Options for Involvement

- Tier A: Environmental Education
- Tier B: Stewardship
- Tier C: Community Assessment
- Tier D: Indicators/Regulatory Response

Tier C: Community &/or Watershed Assessment

Quality Needed

Data Users

- Local decision-makers
- Watershed association
- Environmental organizations
- Possibly NJ DEP

Data Use

- Assess current conditions
- Track trends
- Source track down of Nonpoint source pollution

- Medium/high level of rigor
- Data needs to reliably detect changes over time & space
- QAPP approved & on file w/ intended data user.
- Training required



Credibility doesn't mean having
the most exacting techniques.

It means
delivering on your promises,
no matter how small or large.

-Meg Kerr, River Rescue

How Do You Define Comparability?



Thanks!

- Linda Green, 401-874-2905, lgreen@uri.edu
- www.uri.edu/ce/wq/
 - then click on URI Watershed Watch
- www.usawaterquality.org/volunteer
- www.nemi.gov
- <http://water.usgs.gov/wicp/acwi/monitoring/>