Volunteer vs. Professional

Are We Good Enough??

Elizabeth Herron
University of Rhode Island
Cooperative Extension

Yes!

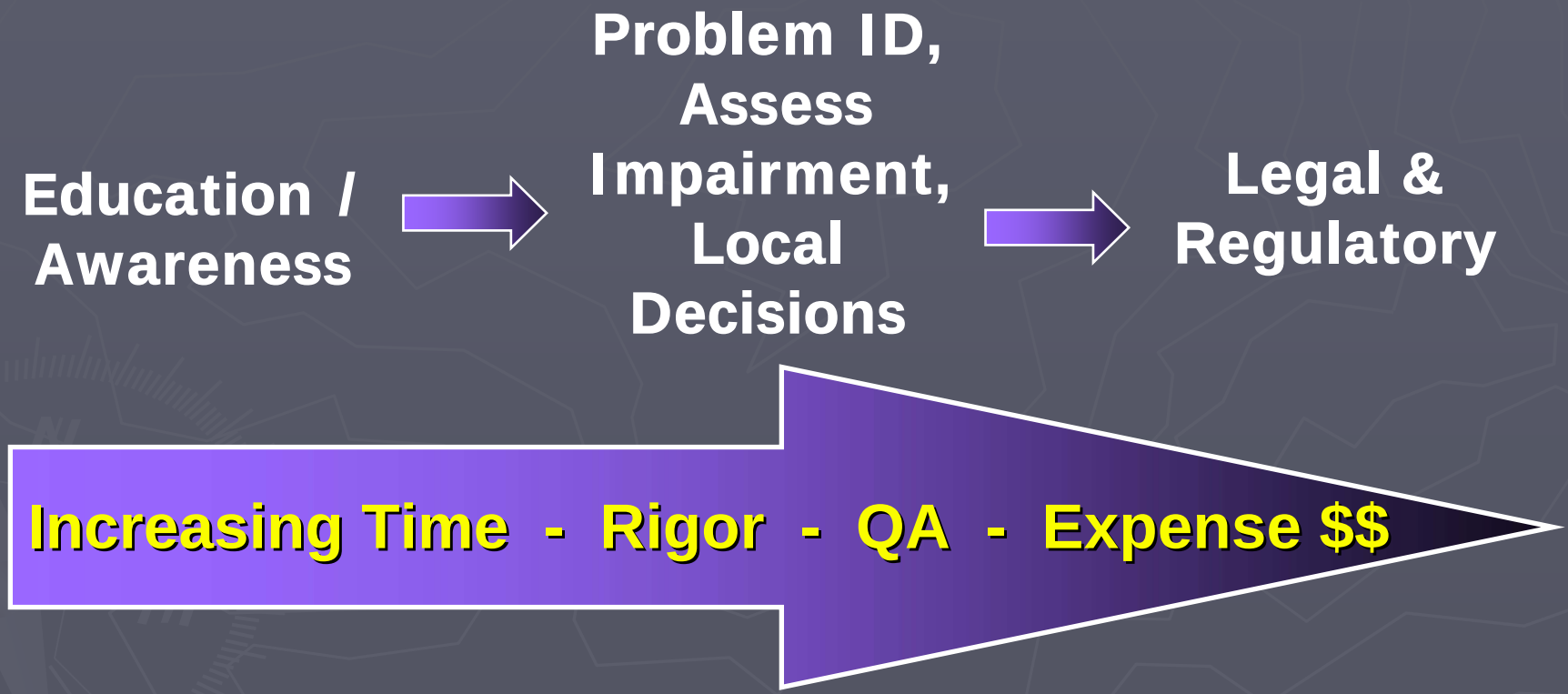
- Questions??

Volunteers and QA/QC Issues

Because government agencies, scientists, and even the general public may be skeptical of data not collected by "experts", citizen volunteer monitoring programs have to work especially hard to establish and maintain their credibility.

- Volunteer Monitor Newsletter

The Continuum of Monitoring Data Use



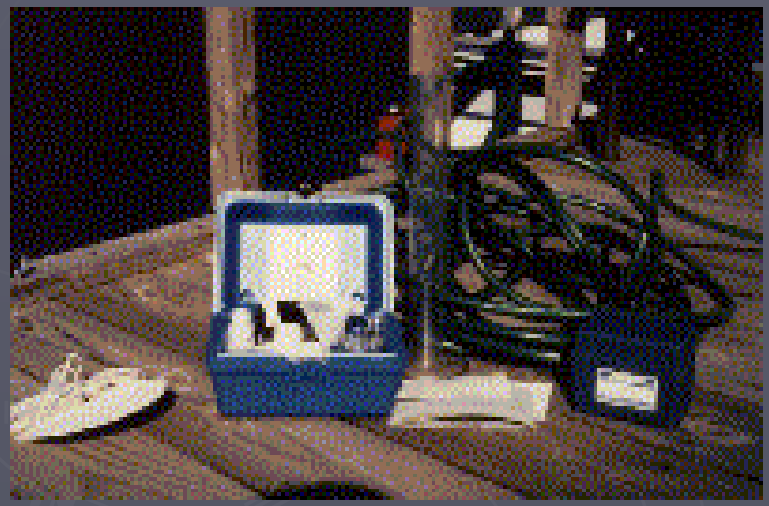
Geoff Dates, River Network

CSREES Volunteer Water Quality Monitoring National Facilitation Project
Applying knowledge to improve water quality

Quality Is Assured Through:

- Training and more training
- Written monitoring procedures
- Repetition (replicate and duplicate sampling)
- Routine sampling
- Monitoring multiple indicators
- QA/QC field and laboratory testing
- Adhering to established procedures

Established Methodology: Professional vs. Volunteer



Volunteers typically use kits or send samples to professional laboratories.

Sampling and analytical methods used are generally comparable to those used by professionals.

Comparison Studies

- URI Watershed Watch
- Florida LAKEWATCH
- More Lakes Studies
  - Lakes of Missouri Volunteer Monitoring Program
  - NH Lakes Lay Monitoring Program
- Illinois RiverWatch
- Statistical Power of Macroinvertebrate Monitoring

URI WW Validation Study Methods:

- Volunteer collected water samples following URIWW protocol
- Staff collected water samples following URIWW protocol with the volunteers' equipment
- Staff collected duplicate samples following EPA approved protocol

Objectives of URI WW Study

- To determine if volunteers collect data statistically similar to professionally collected data
- To determine if the URI Watershed Watch protocol produces data as representative of water quality as US EPA approved protocol

URI WW Results Summary

- No statistically significant differences for parameters monitored!!
- Soluble constituents were least variable
- Particulate based constituents were more variable
- The degree of variability was approximately the same for each protocol for a given parameter

Implications

- URIWW data is of sufficient quality to be included in the 305(b) as Monitored data – and provides + 90% RI lake WQ data
- The time and cost of duplicate water sampling may not be justified for most parameters
- Duplicate sampling for chlorophyll may be justified – resulting in modification of URIWW protocols

Florida LAKEWATCH

- Founded in 1986
- Now has more than 1,000 volunteers
- Monitoring 600 lakes throughout Florida
- Data is used extensively by local lake decision makers, and researchers
- Conducted 3 validation studies:
  - Volunteer vs. professional samplers
  - Chlorophyll extraction methods
  - Fresh vs. frozen samples

LAKEWATCH Comparison Study

- Staff from UF-Dept of Fisheries & Aquatic Sciences sampled alongside volunteers on 125 lakes
- Measured Secchi depths and collected water samples for laboratory analysis
- Results for all parameters found to be equivalent whether samples were collected by volunteers or professionals!

LAKEWATCH Methods Studies

- Chlorophyll Extraction Method:
  - *Standard Methods* calls for extraction with acetone, a hazardous chemical requiring special waste disposal
  - LAKEWATCH switched to heated ethanol extraction
  - Duplicate samples from a number of lakes were analyzed, with no significant differences found over a range of concentrations

LAKEWATCH Methods Studies

- Fresh vs. frozen water samples
  - LAKEWATCH volunteers collect & freeze water samples for later delivery to the laboratory
  - Samples collected from lakes of sizes, depths, and trophic states
  - Samples analyzed at collection, 15, 30, 60, 90, 120, and 150 days
  - For all parameters except pH, only small differences were found between fresh & frozen samples

Some More Lakes Validation Studies

- Lakes of Missouri Volunteer Monitoring Program
  - Compared samples collected by volunteers with those collected by staff and analyzed in program labs
  - Found no significant differences
- NH Lakes Lay Monitoring Program
  - Similar study methodology, same results
- Want More?
  - See our website: www.usawaterquality.org/volunteer

Illinois RiverWatch

- Trainers from EcoWatch shadowed randomly selected volunteer groups as they monitored their sites (habitat assessment and macroinvertebrate assessment)
- Trainer replicated the procedures within 48 hours – without collecting bugs
- For most habitat parameters trainers and volunteers were in agreement
- There was less agreement of stream sediment parameters
- Resulted in changes to training program

Statistical Power of Volunteer Monitoring Protocol

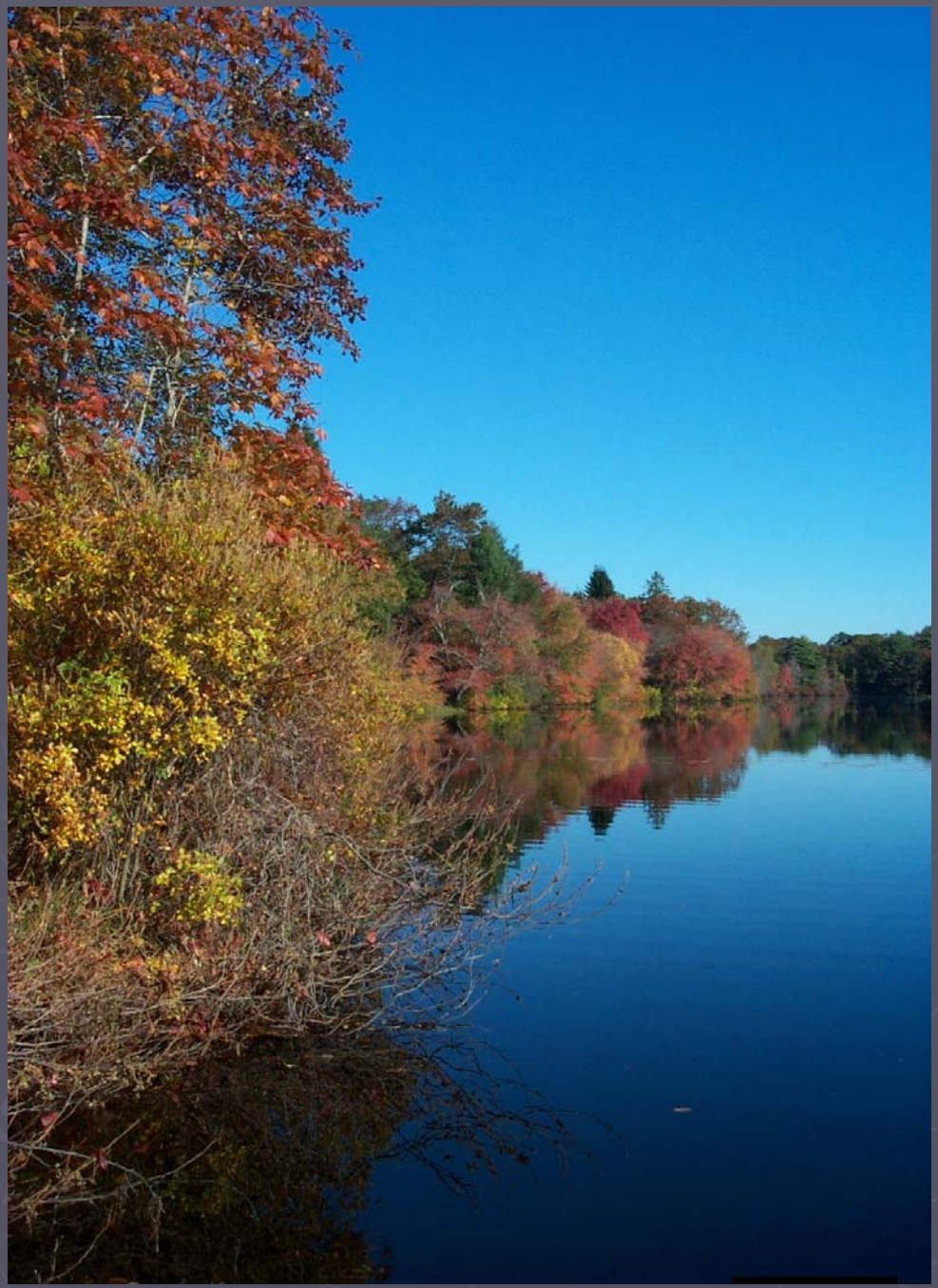
- Seattle area and Upper Merrimack Monitoring Program
- Assessed both field collection and macroinvertebrate identification protocols
- Comparison of Field Methods:
  - Lab method held constant by having both professional and volunteer collected samples analyzed by professional lab
- Lab (Identification) Methods:
  - Replicate samples analyzed by volunteers and professional taxonomists (volunteers to a higher taxonomic level)
- Multimetric indices were calculated from the results of each to determine the power of indices to detect differences in stream condition

Statistical Power

- Seattle: Indices based on professional taxonomists (family level identification) resulted in 13% improved statistical power – at much greater cost
- UMMP: Found statistical differences in raw between identification, but the biometric scores for EPT and Family Biotic Index were statistically the same

QA Comparisons: Volunteers vs. Professionals

- Typically no statistically significant differences were found for most parameters
- Field kits for nutrients often found not to be comparable to laboratory methods
- Macroinvertebrates – biotic index values generally the same



Questions?

Other studies?