



Applying knowledge to improve water quality

Pacific Northwest

Regional Water Program

A Partnership of USDA NIFA
& Land Grant Colleges and Universities

Spring 2007
PNWWATER 106

University of Idaho:

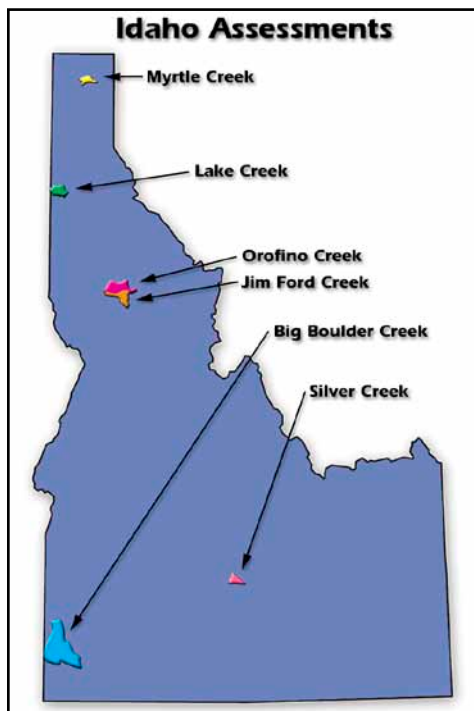
Graduate Students Conduct Biological Assessments of Streams

Biological monitoring has become the preferred method of determining water quality in streams and rivers. The specific biological indicator used in streams is often the macroinvertebrate. Freshwater macroinvertebrates, commonly called benthos, are very small (starting at about the size of a pin point) animals that do not have backbones. These animals live on debris, rocks, sediment, aquatic plants and logs in streams during part of their life cycle. Benthic macroinvertebrates include worms, snails, stoneflies, mayflies, and caddisflies.

Since benthos are not capable of moving very far, they can provide reliable information on water quality within a stream. Benthos represent a large and diverse group of aquatic animals which possess a wide range of tolerance to pollutants including sediments, metals and nutrients. Consequently, by determining the numbers and types of benthos in a stream, scientists can determine existing water quality conditions.



Environmental Science graduate student McClure Tosch measuring the width and depth of a stream channel.



Macroinvertebrates are used in 44 states as the main indicators of water quality in streams. They are preferred over fish, algae, and even chemical indicators for determining water quality in streams because:

- ◆ Macroinvertebrates are found in all water bodies from the most pristine to the most degraded streams.
- ◆ Macroinvertebrates are relatively sedentary; managers can get site-specific information about local disturbances or pollution input.
- ◆ There are many different species that have a wide range of tolerances and responses to environmental conditions.
- ◆ Sampling procedures are well defined and accepted.
- ◆ Life stages are a year or more for insects and the sensitive instars will respond rapidly, while the overall community structure will change gradually to the environmental disturbances.
- ◆ Taxonomic keys are available to help identify individual organisms.
- ◆ Sampling is relatively easy and inexpensive. Biomonitoring is also cheaper and quicker than chemical analysis.



Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska

Cooperative Extension Service
Contact Fred Sorensen:
907-786-6311

<http://www.uaf.edu/ces/water/>

University Publications:

<http://www.alaska.edu/uaf/ces/publications/>

Idaho

University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025

<http://www.uidaho.edu/wq/wqhome.html>

University Publications:

<http://info.ag.uidaho.edu/Catalog/catalog.htm>

Oregon

Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316

<http://extension.oregonstate.edu/>

University Publications:

<http://extension.oregonstate.edu/catalog/>

Washington

Washington State University
WSU Extension
Contact Bob Simmons:

360-427-9670 ext. 690

<http://wawater.wsu.edu/>

University Publications:

<http://pubs.wsu.edu/>

Northwest Indian College
Contact Charlotte Clausing:
360-392-4319

cclausing@nwic.edu or

<http://www.nwic.edu/>

Water Resource Research Institutes

Water and Environmental Research
Center (Alaska)

<http://www.uaf.edu/water/>

Idaho Water Resources
Research Institute
<http://www.boise.uidaho.edu/>

Institute for Water and
Watersheds (Oregon)
<http://water.oregonstate.edu/>

State of Washington
Water Research Center
<http://www.swwrc.wsu.edu/>

Environmental Protection Agency

EPA, Region 10
The Pacific Northwest
<http://www.epa.gov/r10earth/>

Office of Research and Development,
Corvallis Laboratory
<http://www.epa.gov/wed/>

For more information contact
Jan Seago at 206-553-0038 or
seago.jan@epa.gov

The Project

Land Grant Universities, Water Research Institutes, and EPA Region 10 have formed a partnership to provide research and education to communities about protecting or restoring the quality of water resources. This partnership is being supported in part by the USDA's National Institute of Food and Agriculture (NIFA).

Our Goal and Approach

The goal of this Project is to provide leadership for water resources research, education, and outreach to help people, industry, and governments to prevent and solve current and emerging water quality and quantity problems. The approach to achieving this goal is for the Partners to develop a coordinated water quality effort based on, and strengthening, individual state programs.

Our Strengths

The Project promotes regional collaboration by acknowledging existing programs and successful efforts; assisting program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the Project establishes or enhances partnerships with federal, state, and local environmental and water resource management agencies, such as by placing a University Liaison within the offices of EPA Region 10.

- ◆ Research has recorded the responses of many macroinvertebrates to different types of pollution.
- ◆ Most state water agencies have background information on macroinvertebrates. There is also more staff with expertise about insects than fish or periphyton.
- ◆ There are well-established methods for data analysis of the macroinvertebrates communities.

Graduate students in the Environmental Science Program at the University of Idaho have been using macroinvertebrates to assess stream water quality over the last seven years. To date, assessments in six different watersheds have been completed in Idaho (see map). This program provides graduate students with the skills necessary to understand and assess the biological components of watersheds. In addition, the program provides watershed groups and land managers with information about the current status of water quality in their watersheds. These assessments provide important baseline information which can be used to measure progress from the implementation of best management practices.



Environmental Science graduate student Nick Whitaker using a Hess sampler to collect macroinvertebrates from Silver Creek.

National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource Extension and research efforts with eight themes of the USDA's National Institute of Food and Agriculture.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Agreement No. 2008-51130-04734.