

Lower Fox River Watershed School-Based Monitoring Program

www.uwgb.edu/watershed

Program Overview

High school student and teacher teams gain hands on experience in assessing aquatic ecosystems by performing a variety of monitoring activities in selected watersheds of the Fox River Basin. The school monitoring program is a major element of a cooperative watershed monitoring and research program being conducted by university and agency scientists within the basin. Modeled after a successful program in Oregon, standardized methods and annual teacher training sessions allow students to collect quality-assured data in their watersheds. Data from the student monitoring is shared on the project website (www.uwgb.edu/watershed) and at an annual Student Watershed Symposium. The monitoring program is administered by the Department of Natural and Applied Sciences at UW-Green Bay, with additional expertise provided by scientists and students from the UW-Milwaukee Biology Department and the UW-Green Bay Center for Biodiversity.

Major funding for the program is through a four year grant from Arjo Wiggins Appleton, Inc.



Practicing bird counts at the First Annual Student Watershed Symposium, May 2004



Students performing nutrient tests during the "Procedure Challenge" at the 2004 Annual Watershed Symposium



Teachers sorting macroinvertebrate samples during training exercises

Monitoring Approach: How do we collect data?

Modeled after established programs:

- Student Watershed Research Project (SWRP), Oregon
- UWEX Water Action Volunteers
- Cofrin Center for Biodiversity

Program elements:

- Standardized equipment and methods
- Web accessible step-by-step procedure and data sheets
- Annual and periodic training sessions
- QA/QC protocols
 - Synthetic samples
 - Assistance of project staff
 - Duplicate/split samples
 - Teacher training
 - Data audited by project staff
- Comparison to real-time data from UW-Milwaukee and U.S. Geological Survey
- Equipment calibration and maintenance by project staff
- Opportunities for students and teachers to participate in university field research activities



Student-Teacher team collecting streamflow measurements at Apple Creek

Annual Student Watershed Symposium

A symposium is held every spring for students and teachers to share what they have learned with others in the program. The symposium provides a forum for students to participate in the following opportunities:

- Share student research projects
- Present findings in oral and poster formats
- Learn about other watersheds in the Fox River Basin
- Interact with water resource researchers and managers, as well as community members



Students practice bird counts at the 2004 Annual Watershed Symposium



Students from Markesan High School exhibit their poster during the 2004 Student Watershed Symposium



Students, teachers, researchers, and community members discuss findings at the poster session

Annual Teacher Training Workshop

- Held each summer at UWGB for 3 days
- Training in science of watershed monitoring
- Hands-on practice in lab and field
 - Water quality
 - Habitat & macroinvertebrates
 - Birds & frogs
- Learn how to access and utilize university and agency monitoring data
- Curriculum integration
- Plan program activities and improvements



Sampling procedures practice at Baird Creek during the 2003 Teacher Training Workshop



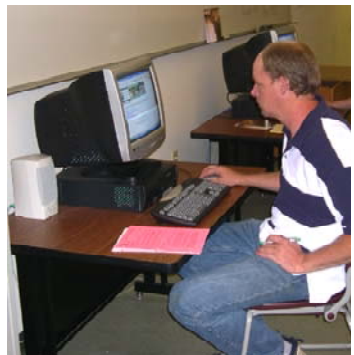
Discussion of monitoring procedures at Apple Creek during the 2004 Teacher Training Workshop

Data Management: What happens to the data?

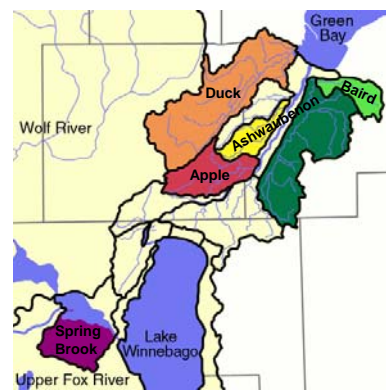
Data collected by the students is entered into the project database online through the project website (www.uwgb.edu/watershed). Data is audited by project staff, and is available for web-based query.

Students and teachers can also access university and agency data and online watershed resources via the project website:

- Real-time flow and rainfall data from USGS
- Fish and macroinvertebrate field data from UW-Milwaukee
- Real-time (previous day) continuous and hourly averaged water quality data (DO, T, pH, conductivity, depth, turbidity) from UW-Milwaukee
- Weather and climate data from various sources
- Water quality references to help interpret what the data means.
- Maps



Training teachers for online data entry at the 2004 Teacher Workshop



Who's Involved and Where's the Monitoring Taking Place?

Five student/teacher teams each monitor a watershed, with 2 stations on their stream. Each team consists of two teachers and 10-25 students.

- Appleton East High School (Apple Creek)
- Green Bay Southwest High School (Duck Creek)
- Markesan High/Middle School (Spring Brook)
- Luxemburg-Casco and Green Bay Preble High Schools (Baird Creek)
- West DePere High School (Ashwaubenon Creek)

Watersheds monitored by students in the program

School-Based Monitoring Program Goals: Why are we monitoring?

- Education: learning by doing and interpreting
- Community Involvement: connection to local watershed issues
- Research: answer questions
- Management: informed decision making



Appleton East students performing nutrient analyses on water samples from Apple Creek

Program Objectives:

- Enhance student understanding of landscape and land use impacts on water quality and stream ecosystems.
- Enhance teacher capacity to teach watershed science by providing hands-on training.
- Collect meaningful data that:
 - Provides a picture of existing conditions within and between watersheds (Baseline).
 - Provides a record of conditions over time (Trends).
 - Can be used by students, teachers, scientists and managers to answer questions about watershed dynamics and integrity (Cause and effect relationships).



Equipment and field procedure sheet for sampling stream pH



Students performing conductivity tests during the "Procedure Challenge" at the 2004 Annual Watershed Symposium

What's being measured? When does the monitoring occur? How is it done?

	Water Quality									Stream Habitat	In-stream Biotic Integrity	Stream Corridor	
	Physical				Chemical							Frogs	Birds
	Stream flow	Temp.	Transparency/Turbidity	Conductivity	pH	DO	Soluble Reactive Phosphorus	Ammonia Nitrogen	Nitrate Nitrogen				
Equipment	Floating Object	YSI 55 DO/Temp. Probe	Transparency/Turbidity Tube, 60 cm	Oakton EC Testr+ low	Oakton pHTester3+	YSI 55 DO/Temp. Probe	Hach DR/850 Colorimeter	Hach DR/850 Colorimeter	Hach DR/850 Colorimeter	Standardized schematic and inventory form	Macro-invertebrate taxonomic keys	GPS units, thermometer	GPS units, binoculars, field guides, CDs
Method	Floating Object Method	Meter and thermistor	Clear tube w/ secchi disk and drain valve	Meter and electrode	Meter and electrode	Meter and polarographic sensor probe	Colorimetric, Ascorbic Acid	Colorimetric, Salicylate	Colorimetric, Cadmium Reduction	USEPA Streamwalk and WDNR WAV	Biotic Index Calculation; WDNR WAV taxonomic key	5 min Amphibian Calling Survey	10 point counts; assisted by professional birder
When Monitored	Fall (September – October), Spring (May), Summer (July – August)									Summer	Summer	3 times in April-June	June

College Credit for High School Students

During their senior year, students involved in the program can enroll in the course *Stream Ecosystem Monitoring Field Experience* (ENV SCI 283x) at UWGB.

Course Objectives:

- Provide hands-on experience in watershed science, including water quality, habitat and biotic monitoring procedures
- Enhance student knowledge and understanding of land use impacts on water quality and stream ecosystems
- Develop ability to communicate scientific results in oral and written formats



Appleton East team at the Apple Creek Campground sampling location, May 2004

Course Requirements:

- Participate in monitoring technique training and a minimum of 35 field monitoring hours
- Participate in a field day with university staff
- Maintain a log of activities
- Present oral or poster presentation at annual symposium
- Prepare a report of monitoring activities and interpretation
- Participate in online discussions with other participating high school teams

References:

Bouchard, R. William, Jr., 2004. *Guide to Aquatic Invertebrates of the Upper Midwest*, University of Minnesota, St. Paul, MN.

EcoWatch® for Windows™ software, YSI, Inc.

Lindbo, D. Torrey, and Stacy L. Renfro, 2003. *Riparian and Aquatic Ecosystem Monitoring: A Manual of Field and Lab Procedures*, 4th Edition, Saturday Academy's Student Watershed research Project (SWRP): Oregon, 2003.

Lower Fox River Watershed Monitoring Program website (www.uwgb.edu/watershed) and procedures.

McCafferty, W. Patrick, 1983. *Aquatic Entomology: The Fisherman's guide and Ecologists' Illustrated Guide to Insects and Their Relatives*, Jones and Bartlett: Boston, MA.

Peterson, Roger Tory, and Virginia Marie Peterson, 2002. *Birds of eastern and Central North America*, 5th edition, Houghton Mifflin Company, Boston.

Various bird CDs.

Water Action Volunteers, *Key to Macroinvertebrate Life in the River*, UW-Extension and Wisconsin DNR.