

TAKING ACTION!

This lesson is targeted to grades 5-9 and subject areas science, social science and fine arts. The information may be adapted to other grade levels.

Recipe for Action

Combine one bunch of students with equal amounts of solid planning, positive attitude and creative thinking. Fortify mixture with dashes of guidance (as needed) and allow it all to blend. As excitement comes to a boil, add liberal quantities of encouragement. Throw in pinches of patience, flexibility and persistence at regular intervals and sprinkle entire combination with an atmosphere of fun. When recipe bears fruit, share results with others. Serves all involved--and serves them well. Continues to serve indefinitely.

Reprinted with permission, *Taking Action, Project WILD*, 1995.

Individual involvement is an important step in developing awareness of and appreciation for the environment. Besides improving some aspect of the natural resources, taking environmental action results in personal rewards like enhanced confidence, increased self-esteem and the development of decision-making, critical-thinking and cooperative-learning skills.

Environmental action projects can range from the construction of homemade sampling equipment used to monitor a local stream to practicing water conservation at home through shortened shower times or consolidated laundry loads. Examples of some Illinois student-driven action projects include Jason Spanel's wetland restoration project and the Rivers Project (see page 188). Examples of citizen-based aquatic action projects described are the Illinois Environmental Protection Agency's Volunteer Lake Monitoring Program and the Kankakee River Project (see pages 188-189). To learn more about environmental action projects and how to organize a student-driven project, review the book *Taking Action--an educator's guide to involving students in environmental action projects*, Project WILD, 1995.

A variety of resource professionals work in the field of aquatic resource protection and management. Students will review a number of these careers to learn the role each plays and the education requirements needed for a career in this

field.

Water Sampling

Background

The types and numbers of organisms found in a stream are indicators of the health of the habitat. Collecting data from the same location(s) over a number of years provides information on trends in habitat changes. The complexity of a sampling operation is dependant on the amount of time, money and interest you have to invest. Additional information on water quality tests and their importance can be found in Unit 2, Lesson 2.

Aquatic Organisms

Stream or lake samples are taken to determine the total number of organisms present in the habitat. Pollution-sensitive organisms such as mayflies, stoneflies and caddisflies are susceptible to physical and chemical changes in the stream. Pollution-tolerant organisms like midges and worms are able to adapt to most conditions. The presence or absence of these organisms is a quick indicator of water quality. When a stream is polluted, pollution-sensitive organisms decline in number or disappear, while pollution-tolerant organisms increase in variety and number.

Benthic macroinvertebrates are commonly used as indirect indicators of pollution. Benthic macroinvertebrates include aquatic insects, snails, worms, freshwater clams, mussels and crayfish. These organisms are found on the bottom of water bodies at least in some stage of their life cycle. Aquatic insects are the most common group of aquatic organisms. The advantages of studying these organisms are that they are sensitive to environmental changes, easy to sample, relatively immobile, continuous indicators and are usually at the base of the food chain.

Many stream sampling manuals and programs exist which can provide detailed information on recommended procedures. Sample data collection and macroinvertebrate identification sheets are provided, which can be modified to fit your needs. With younger children, less emphasis may be placed on specific identification, with their focus being to sketch the organism, record where it was collected and how many were found. Additional information, such as water temperature, air temperature, pH and dissolved oxygen, may be collected if equipment is available.

Sample Programs

Illinois RiverWatch Network Coordinator Illinois
Department of Natural Resources
Division of Ecosystems
One Natural Resources Way
Springfield, IL 62702-1271
217/785-5409

Rivers Curriculum Project
Southern Illinois University at Edwardsville
Box 2222
Edwardsville, IL 62026
618/692-3788
email: rivers@siue.edu

Save Our Streams
The Izaak Walton League of America
707 Conservation Lane
Gaithersburg, MD 20878
1-800/BUG-IWLA

Sample Manuals

Mitchell, M. K. and W. B. Stapp. 1995. *Field manual for water quality monitoring*. Thomson-Shore, Inc., Dexter, Michigan. 272 pp.

Examples of Successful Action Programs

Student-Driven

J. N. Spanel Wetland Restoration and Interpretive Site
As a 15-year-old Boy Scout, Jason Spanel spotted a wasteland near a shopping center in Harrisburg, Illinois and decided that his Boy Scout Troop should develop a wetland there.

With permission from the developer, he set out to develop the temporary water holding basin into a wetland. A variety of businesses and organizations participated, and Jason received a number of grants to help defray costs of planting and construction materials. Jason's wetland is a marvelous example of how wildlife habitat can belong in an urban setting.

Rivers Project

The Rivers Project is an integrated, multi-dimensional science, social science, mathematics and language arts project developed to introduce water quality dimensions into the nation's high schools. Educators attend a week-long summer session to learn sampling techniques. Teachers and their students conduct water quality tests, learn about the cultural and historic impact of the river, assess data and write about rivers. For more information contact the Rivers Project, P.O. Box 2222, SIUE, Edwardsville, IL 62026-2222; email: rivers@siue.edu; phone 618/692-2446.

Illinois Middle School Groundwater Project

This cooperative project between many state agencies, local organizations and schools provides opportunities for students from more than 200 middle schools to study groundwater through hands-on experiences. For more information contact the Groundwater Project, P.O. Box 2222, SIUE, Edwardsville, IL 62026-2222; email: rivers@siue.edu; phone 309/672-6906 or 618/692-2446.

Citizen-Driven

Kankakee River Project

Since 1983, the Northern Illinois Anglers Association has sponsored the Annual Kankakee River and Streams Clean Sweep Outing. One of the most extensive programs of its kind in the nation, the outing involves volunteers from scouting and community groups, sportsmens' clubs and school organizations.

Volunteers are assigned sections along a 60-mile stretch of the river. An emphasis is placed on collecting cans, bottles, paper litter and other easily removed trash. Special crews are formed to deal with larger items of debris. Contact the Northern Illinois Anglers Association, P.O. Box 188, Bourbonnais, IL 60914 for additional information.

Illinois RiverWatch Program

This statewide partnership of organizations and individuals, including educator and student groups, works to monitor, restore and protect the rivers and streams of Illinois. Established in 1993, RiverWatch is composed of trained volunteers who conduct biological stream monitoring, collect stream habitat data, cleanup stream corridors and engage in various additional stream protection activities. For more information, contact the RiverWatch Network office, Illinois Department of Natural Resources, One Natural Resources Way, Springfield, IL 62702-1271; phone 217/785-5409.

Willow Post Stabilization Techniques

Streambank erosion is a serious threat to land along many creeks and streams in Illinois. For centuries, these creeks and streams meandered through Illinois' countryside, gently shaping and reshaping the landscape. As streambanks erode, stream channels increase in width, soil is transported downstream and vegetation is uprooted or covered with silt, decreasing habitat for fish and wildlife. Willow-posts have been used in some instances to stabilize streambanks.

After willows are dormant in the winter, posts are cut and placed into holes made by an excavator. Rows of posts are placed 4-feet apart beginning at the water's edge and extending up the streambank. The lower row of posts is anchored with cedar trees and the disturbed soil is seeded with native prairie grasses, perennial grasses and legumes.

In the spring, the posts sprout roots, and trees begin to grow. This technique costs \$7-15 per foot, compared to \$50-200 per foot for traditional stabilization methods. For additional information contact the Illinois State Water Survey, 1320 S. W. Monarch, P.O. Box 697, Peoria, IL 61652-0697; phone 309/671-3196.

Ohio River Sweep and RiverWatchers

The Ohio River Sweep cleanup is held the third Saturday of June each year along the Ohio River and its tributaries. More than 2,100 volunteers from six states bordering the river band together to pick up more than 9,000 tons of debris. The Sweep is organized by the Ohio River Valley Water Sanitation Commission (ORSANCO). RiverWatchers, a citizen volunteer monitoring program was initiated in 1992 and involves students from grades K-12 in the collection of water samples. For more information contact ORSANCO, 534 Kellogg Avenue, Cincinnati, OH 45228; phone 1-800/359-3977.

Grants and Education Programs

Illinois Schoolyard Habitat Action Grant Program

The grant program is based on the idea that youth and teachers need opportunities to take environmental action. Children, their educators and community are encouraged to conduct a habitat improvement project on school property. Recipients are granted up to \$600 and the opportunity to receive free seedling stock and technical assistance from the Illinois Department of Natural Resources. Contact the Illinois Department of Natural Resources, Schoolyard Habitat Action Grant Program, One Natural Resources Way, Springfield, IL 62702-1271 (phone: 217/524-4126) for additional information.

Federal Junior Duck Stamp Design Contest

The Federal Junior Duck Stamp Design Contest is an arts curriculum designed to teach wetland and waterfowl conservation to students in grades K-12. It was developed in 1990 with the support of the National Fish and Wildlife Foundation and is administered by the U.S. Fish and Wildlife Service. Students may enter the State contest, with Illinois' "Best of Show" entered in the national competition. Students preparing the top three national entries are

awarded a free three-day trip to Washington, D.C. For entry guidelines, contact the Illinois Department of Natural Resources, Educational Services Section, One Natural Resources Way, Springfield, IL 62702-1271; phone 217/524-4126. Visit the Web page at <http://dnr.state.il.us/lands/education/CLASSRM/RIBBON/MAIN.HTM> to see winning entries from past contests.

Zebra Mussel Mania Traveling Trunk: Illinois-Indiana Sea Grant Program

Illinois-Indiana Sea Grant is encouraging children to learn more about zebra mussels and other exotic species through the Zebra Mussel Mania Traveling Trunk. The trunk is filled with ten interdisciplinary, hands-on activities, experiments, games, stories and other resources. This resource provides educators with materials to teach about the full range of problems associated with zebra mussels and other nonindigenous species. There are five lending centers in Illinois where you can borrow a traveling trunk. For more information contact the Illinois-Indiana Sea Grant Program, University of Illinois, 65 Mumford Hall, 1301 W. Gregory Dr., Urbana, IL 61801; phone 217/333-9448.

Illinois Environmental Protection Agency Lake Education Assistance Program

The Lake Education Assistance Program is part of the education initiative within the Illinois Lake Management Program Act. The program provides up to \$500 for schools or not-for-profit organizations to participate in lake- or watershed-related educational field trips and activities. Projects selected for funding will enhance inland lake or lake watershed education of teachers, students, organizations and/or the community. Recipients are reimbursed for activities and supplies. Application deadlines are September 30 and January 31 annually. Contact the Illinois Environmental Protection Agency, Division of Water Pollution Control, P.O. Box 19276, Springfield, IL 62794-9276; phone 217/782-3362 for additional information. Applications may be accessed at <http://www.epa.state.il.us/water/conservation-2000/leap/index.html>.

ACCESS TO FISHING PROGRAM

The Access to Fishing Program, which began in 1995, is a unique way to encourage novice anglers of any age to get more involved with fishing. In order to get people, especially children, interested in fishing, they need to be able to try the sport. Enter the Illinois Department of Natural Resources (IDNR), Division of Fisheries. This program loans, free of charge, fishing equipment to children and adults interested in fishing. The Access to Fishing Program removes the "hurdle" of having to initially purchase fishing equipment. This program gives the recent fishing clinic participant, the first-time angler, or even an experienced angler, ready access to the sport of fishing, without making the initial monetary investment.

Fishing gear, purchased by the IDNR, is stored at a lending location (library, park district, nature center, recreation department, etc.) and checked out and returned much like a book from the library. Basic tackle (hooks, weights, bobbers) and literature on how to fish and fish identification is also provided to each angler. The fishing gear is maintained by volunteers from fishing clubs and civic organizations.

To locate the Access to Fishing Program loaner site nearest to you, contact the Illinois Department of Natural Resources, Urban Fishing Program Coordinator in your region.

Northeastern Illinois

Region II Urban Fishing Coordinator
9511 Harrison Street
Des Plaines, IL 60016
847/294-4137

Chicago

Chicago Urban Fishing Coordinator
9511 Harrison Street
Des Plaines, IL 60016
847/294-4137

Northwestern Illinois

Region I Urban Fishing Coordinator
2317 East Lincolnway, Suite A
Sterling, IL 61081
815/625-2968

East Central Illinois

Region III Urban Fishing Coordinator
One Natural Resources Way
Springfield, IL 62702-1271
217/782-6424

West Central & Southern Illinois

Regions IV and V Urban Fishing Coordinator
4521 Alton Commerce Parkway
Alton, IL 62002
618/462-1181

HOOKED ON FISHING, NOT ON DRUGS

The Future Fisherman Foundation is the educational arm of the American Sportfishing Association (the trade association of North American tackle manufacturers). In 1986, the Future Fisherman Foundation received a letter from sixteen year old Matthew Deakins, who said that his interest in fishing had kept him off of drugs and that he felt that it could do the same for others. At his request, a short video documentary was produced and shown at various locations nationally. Curriculum and program materials were first developed for use in the Harrison County schools in West Virginia. Today, "Hooked on Fishing, Not on Drugs" (HOFNOD) is an award winning, registered program of the Future Fisherman Foundation that combines sportfishing, environmental education and drug prevention into one powerful package. HOFNOD is a supplementary, interdisciplinary drug prevention program for young people in grades kindergarten through twelve. If fully implemented, it exceeds all of the criteria established by the U.S. Department of Education for successful drug prevention programs. It uses the fun activities of fishing and the aquatic environment to meet drug prevention objectives. HOFNOD can be integrated throughout language arts, mathematics, science, social science, art, health, physical education/recreation and guidance. It also works as an elective class, an exploratory class for three, six or nine weeks, or as an after school activity.

Anyone interested in exploring the possibility of establishing a HOFNOD program in their school should contact their Illinois regional urban fishing program coordinator (see below) or the Future Fisherman Foundation at 703/519-9691 or by writing 1033 North Fairfax Street, Suite 200, Alexandria, VA 22314.

Northeastern Illinois

Region II Urban Fishing Coordinator
9511 Harrison Street
Des Plaines, IL 60016
847/294-4137

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847/294-4137

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HOMEMADE STREAM SAMPLING EQUIPMENT

Macroinvertebrate sampling equipment can be easily constructed using materials commonly found in the home. Instructions follow for the construction of six pieces of equipment to permit sampling of a variety of aquatic organisms.

SECCHI DISC: used to determine water visibility and light penetration.

Materials: an end from a 3-pound coffee can or the bottom of an aluminum pie plate; white and black water-proof paint; paint brush; hammer and nail or drill; empty pen housing or metal casing; rock or other weight; nylon rope or cord; ruler; file

Directions: File burrs off the metal disc cut from a can or pie plate. Divide disc into four equal parts. Paint the quadrants, alternating black and white paint. Use the hammer and nail or drill to make a hole at the center of the disc. Insert the pen housing or metal casing. The fit should be snug. Draw the nylon cord through the pen housing or metal casing. Tie a weight to the bottom of the cord. Mark the cord with waterproof ink or tape at one foot intervals from the base of the painted side.



Procedure: Lower the Secchi disc into the water just until it can no longer be seen. Note the water mark on the line at the surface and count the increments to obtain the measurement. Record the measurement for water visibility and light penetration.

D-NET: used to collect aquatic invertebrates and fish.

Materials: two, 10" by 12" by 12" pieces of nylon netting; 1-inch bias tape or equivalent fabric scrap (40 inches long); thread; scissors; sewing machine; wire coat hanger; wire cutters; drill with 1/4 inch wood bit; 4-foot long broom handle or wooden dowel; pliers; duct tape

Directions: Place netting pieces together and sew together along long sides, forming a funnel. Cut a 40-inch strip of bias tape or fabric to make casing and sew around net opening, leaving ends open to insert wire frame. Untwist the wire coat hanger and slip it into the casing, and retwist. Cut twisted stem of hanger to 2 inches with wire cutters. Drill hole in end of a broom handle or dowel and insert the end of the wire hanger. Bend the hanger hook into a U shape with ends bent toward the center. Place this piece through the net just below the twist of the hanger. Mark where the bent ends of the U touch the handle. Drill two shallow holes in handle at this point. Put U-shaped piece into position. Push into holes and wrap with tape to secure the handle.

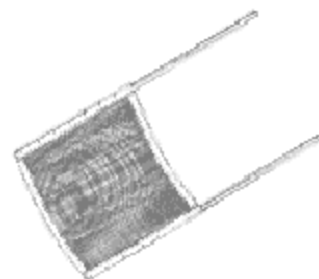


Procedure: Use the net to dip macroinvertebrates at or below the surface. The flat side of the net allows pressure on the substrate so that organisms do not escape under the net.

KICK NET: used to collect aquatic invertebrates and fish.

Materials: 3' by 6' piece of nylon screening; four 6" by 36" strips of heavy canvas; 2 broom handles or wooden dowels (6 feet long); finishing nails; thread; sewing machine; hammer; iron and ironing board

Directions: Fold nylon screen in half (3' by 3'). Fold edges of canvas strips under, 1/2 inch, and press with iron. Sew a strip along the top and bottom of screen. Make casings from remaining strips of fabric and sew on right and left sides of screen. Sew bottom of casings shut. Insert broom handles or dowels into casings and nail into place with finishing nails.



Procedure: Two students hold onto the handles and submerge the net until the bottom edge is on the substrate. They should hold the net in place. A few other students enter the water upstream of the net and walk downstream, kicking the substrate to dislodge organisms which the current carries into the net.

STREAM PLANKTON SAMPLER: used to collect plankton.

Materials: wire kitchen strainer with handle (any size); pantyhose (no holes); test tube, baby food jar or empty film canister; heavy-duty rubber band; electrical or duct tape; scissors; broom handle or wooden dowel

Directions: Cut off one leg of pantyhose with scissors. Attach open end of pantyhose around rounded outside section of kitchen strainer. If strainer has metal loops, cut small slits in pantyhose and slide over the loops. Secure in place with tape. Insert test tube, baby food jar or film canister to "foot" end of pantyhose and secure with rubber band. Attach broom handle or wooden dowel to sieve handle and secure with tape.

Procedure: Pull through water several times. Plankton will concentrate in tube.



DIP NET: used to collect aquatic invertebrates and fishes.

Materials: wire kitchen strainer with handle (any size); broom handle or wooden dowel (4' long); electrical or duct tape; scissors

Directions: Mount wire kitchen strainer on broom handle and secure with tape.

Procedure: Dip in water to collect organisms.



BOTTOM DREDGE: used to collect mud and debris samples from the bottom of a body of water.

Materials: a 1- to 3-pound coffee can with one end removed and filed to remove burrs; medium-weight wire; large brass fishing swivel; 8-ounce lead sinker; 25-foot length of heavy cord; hammer; nail; wire cutters

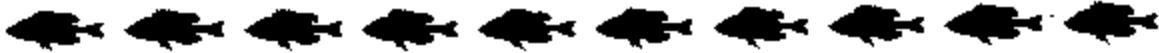
Directions: With the hammer and nail make several holes in the closed end of the can and three equally spaced holes in the edge of the can along the open end. Cut three, 8- to 10-inch lengths of medium-weight wire. Attach one piece of wire to each hole at the top of the can. Bring the three pieces of wire together above the can and attach the fishing swivel where they converge. Attach the heavy cord to the swivel. Attach the lead sinker to one side of the can.

Procedure: Toss the dredge into the water and allow it to settle to the bottom. Hold the free end of the cord to avoid losing the dredge. Pull the dredge along the bottom of the pond or stream to scrape mud and debris samples from the bottom. Excess water will drain through the holes. Examine mud and debris samples carefully with a hand lens, looking for aquatic life.



REFERENCES

- Green, R. J. 1988. *Aquatic field and classroom activities*. Missouri Department of Conservation, Jefferson City, Missouri. 49 pp.
- Tennessee Valley Authority. 1989. *Homemade sampling equipment: water-quality series booklet 2*. Tennessee Valley Authority, Oak Ridge, Tennessee. 15 pp.



UNIT 4, LESSON 1

ACTIVITY 1

CAREERS WITH AN AQUATIC EMPHASIS

SUGGESTED GRADE LEVELS: 5-9

SUBJECTS: English language arts, fine arts

SKILLS: analysis, evaluation, writing

CORRELATION TO ILLINOIS LEARNING STANDARDS: English language arts 3C, 4A; fine arts 26B

OBJECTIVE

Students become aware of career inclinations they may have.

METHOD

Students complete a self-assessment test.

BACKGROUND

A variety of resource professionals are responsible for managing the state's natural resources. Fisheries management is the total effort to maintain healthy populations of fishes and other aquatic life in Illinois waters. A fisheries biologist might deal with a problem of overpopulation of certain fish species in a particular body of water, design and implement aquatic habitat improvements and/or raise eggs and young fish in a hatchery for later release into the wild. A fisheries biologist also conducts inventories of aquatic life and is responsible for protecting rare and endangered aquatic species. He or she works closely with state and federal agencies along with private citizens to manage aquatic ecosystems. Fisheries staff members also work to educate the public regarding the value of Illinois' aquatic resources as well as promoting fishing and its benefits.

Conservation Police Officers enforce the laws that protect our wetlands and other natural resources. They talk to school and community groups about the laws that protect wetlands. They ticket people who violate those laws and explain why their actions have harmed the wetland areas.

Resource managers develop and use Geographic Information Systems (GIS) to store data and generate land use maps electronically. Although the process of collecting data is tedious, the benefits are worth it as managers utilize the data in a number of ways.

Water managers carefully assess land use changes and set development policy accordingly. For example, in areas that are susceptible to erosion, the incorporation of soil conservation measures (planting cover crops on farmland and establishing grassed waterways) can significantly reduce erosion and stream sediment load. Managers may designate lands so susceptible to erosion that landowners are required to plant vegetation on them.

Research positions utilize trained professionals to study renewable and nonrenewable resources. Some researchers dive in rivers to determine the numbers and health of mussels. Others study the quality of rivers and streams. After collecting and analyzing the data, they prepare reports for publication and presentation. Resource managers use that information to learn how to best manage or utilize the resource.

The Potential is Great.

Many different people work in the field of natural resource management throughout the world. Some of the many other types of careers available include:

air quality control
animal behavior
aquatic biology
entomology
environmental chemistry
environmental economics
environmental health
environmental lobbying

environmental restoration
hazardous waste management
limnology
mammalogy
museum curator
nature interpretation
soil conservation
solid waste management

water conservation
water quality control.

Education

Education requirements for these types of positions vary. However, most specify at least a four-year college degree in the specific field or related ones. Experience is a valuable asset when attempting to obtain a natural resource-related position and in some cases can be substituted for education. Other positions may require successful completion of performance tests.

Who Would You Work For?

Potential employers for aquatic-related careers include: U.S. Fish and Wildlife Service; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; Illinois Department of Natural Resources; Illinois Environmental Protection Agency; Illinois Department of Agriculture; local Soil and Water Conservation Districts; nature centers; park districts; land use planning or surveying firms; nursery or landscape companies; and power companies.

MATERIALS

paper; pencils

PROCEDURE

1. Have students do a self-assessment on what kind of career path they might want to follow. To help determine that path, have students answer these self-evaluation questions.

- A) Which school subjects do I enjoy and why?
- B) What are my hobbies, and why do I like them?
- C) Do I relate better to a few people than to a crowd?
- D) Do I prefer to work with people or by myself?
- E) Do I prefer a diversity of job tasks, or am I more comfortable with an established routine?
- F) Do I like new people and new situations, or do I prefer to stay in familiar surroundings?

2. Discuss how their responses could relate to a career choice.

EXTENSIONS

1. Invite people who have aquatic careers to talk with students about their jobs. Arrange time at the end of the presentation for a question and answer segment.
2. Read about people who have used a range of careers to allow them to make a difference in the environment. Look for books such as *Environmental portraits* by Kim Sakamoto Steidl (1993, published by Good Apple, 1204 Buchanan St., Box 299, Carthage, IL 62321-0299. 106 pp.).
3. Develop a list of people in your community who are making a difference for the environment. Interview these people and prepare a "Local Environmental Heroes" book that includes interviews, illustrations and photographs.
4. Ask the guidance counselor to speak to the class about which universities offer aquatic-related careers and how to begin career planning now.

EVALUATIONS

1. Students write an essay about what career they would like to pursue, and why they chose that particular career.
2. Students create a mural showing aquatic resource workers as they perform their duties.