Comprehensive Survey of an Aquatic Ecosystem
By Tom Briggs

Objective: For students to engage in field research and analyze their findings.

Materials: Paper, pencil, poster board, markers, long pole or stick.

Part 1: Field

Students seem to always enjoy getting their feet wet. Going to a pond or stream to do a survey will be a hugely memorable experience for your class. Selecting a site for fieldwork might be quite simple if there is a pond on your school grounds. If not, the project could become more challenging. First, search for a publicly accessible, small body of shallow water. A state, county or local park might be a good place to start. If a public park is not an option, private landowners might be willing to allow a visit to their property, however, they may make certain restrictions on how the site can be used. Make sure that you have permission to use any land that is not clearly marked as publicly accessible. On public land, be sure to contact the park manager or supervisor, and ask if there are any restrictions on how the land can be used. Rangers or managers may be willing to help with the project, and meet with the students, or assist with equipment or resources. Find out what your school's policy on students entering the water is. If students are permitted to, for example, wade knee to waist deep in the water, they would still require close adult supervision at all times. Students should never swim, or be in water more than waist deep without a certified lifeguard present. If the students are not permitted to enter the water, the survey could be conducted from the edge of the pond, and samples taken from shore. Be sure to inform the students before the day of the field trip to wear old sneakers that tie, and that can get wet, and to bring a change of clothes and a towel. Plan your trip for early fall or late spring, so that water temperatures will not be too cold for the students comfort. If an aquatic ecosystem is not a possibility, this activity could be conducted in a forest, field, or other area.

Students divide into four teams. At the pond, survey stakes are installed around the edge of the pond in five or ten foot increments, gridding the site (see figure). The work is then divided among the four teams. First team is responsible for recording information. Second team measures the depth of the pond at the intersections of the grid lines. Third team performs a physical survey of the site, recording features of the bottom (ie: sandy, rocky, muddy, etc.). Fourth team performs a biological survey of the site, recording the type and variety of plant and animal life discovered.

The physical and biological aspects of the survey can be as ambitious as time and equipment permit. With more accurate sampling equipment, students could more accurately determine water quality. Also, consider collecting organisms by seine net and plankton net. If funds are limited, students could design their own collection gear from improvised material (window screen stretched between two sticks to make a seine net, for example). Once the first quadrant is surveyed, teams meet to share their findings and

suggest improvements. Then, teams switch roles, rotating through all four jobs. Upon completion of the survey, students meet as a group to discuss their findings.

Part 2: Classroom

In the classroom, students tabulate the data they recorded during the "secretarial" phase of the survey and develop a working chart of the data.

Then, they develop a final presentation style chart that can be integrated with the other groups' charts to form a complete image.

The charts can be as detailed as time and equipment permit. The scope of the chart could be expanded to show the surrounding 50-100 yards of land. It could indicate such factors as erosion, sources of chemical or natural pollution, and water quality. Students should be encouraged to suggest other data that can be incorporated into the chart.

Along with the chart, each group is responsible for submitting a report to the class that deals with one or more of the following factors:

- The process by which the group completed the project.
- The biological, physical, and aesthetic properties of the site.
- A brief history of the site derived from primary sources.
- Conclusions drawn from the information gathered.
- Suggestions to future researchers from lessons learned during the survey.

Components of the activity:

- Teamwork—share information, cooperatively create chart and survey.
- Mathematics—tabulate and interpret findings.
- Learn and practice survey techniques.
- Note-taking with careful attention to detail.
- Use and improvisation of survey equipment.
- Biology/life studies—interdependence of life.
- Language skills—create a detailed report of methodology and survey results.

Other possible components:

- Photography—students photograph or videotape project.
- Laboratory microscopy—using plankton net and microscope, inventory as many microorganisms as possible.
- Water quality tests—pH, dissolved oxygen, phosphorous, salinity, turbidity.
- Leadership skills—students return next year to act as project mentors.
- Historical research, journalism, library skills—students interview sources knowledgeable about the site and conduct primary source research (ie: farm records, county survey documents, narrative accounts, etc.)

- Computer skills—Use Google Earth or a similar program to obtain satellite and other images of the site. Compare the satellite and other images to the group work. Use the satellite images to enhance the final product. Use GPS or GIS technology, if available, to increase the accuracy of the survey. Generate a web page to post electronic versions of group work, and allow students to compare their results from year to year. Include a photo gallery of students at work at the site. Use simple spreadsheets to compare data, and measure changes over time.