Module #6

Calculating Water Quality Index

Adapted and excerpted from Field Manual for Water Quality Monitoring: An Environmental Education Program for Schools by Mark M. Mitchell and William B. Stapp

Materials

thermometer
gloves (optional)
small water sample bottle and rod sampler if needed *(constructed from a series of metal rods that can be extended and rubber tubing that holds a sample bottle)*

BACKGROUND INFORMATION

from http://www.h2ou.com/h2wtrqual.htm a subsite of hach.com

Fish and most aquatic organisms are cold-blooded. Consequently, their metabolism increases as the water warms and decreases as it cools. Each species of aquatic organism has its own optimum (best) water temperature. If the water temperature shifts too far from the optimum, the organism suffers. Cold-blooded animals can't survive temperatures below 0°C (32°F), and only rough fish like carp can tolerate temperatures much warmer than about 36°C (97°F).

Fish can regulate their environment somewhat by swimming into water where temperatures are close to their requirements. Fish usually are attracted to warm water during the fall, winter and spring and to cool water in the summer. Did you ever notice how fish swim down to the cooler parts of the lake to escape the heat of the noonday sun? Fish can sense very slight temperature differences. When temperatures exceed what they prefer by 1-3°C, they move elsewhere!

Fish migration often is linked to water temperature. In early spring, rising water temperatures may cue fish to migrate to a new location or to begin their spawning runs. The autumn drop in temperature spurs baby marine fish and shrimp to move from their nursery grounds in the estuaries out into the ocean, or into rivers, as the case may be. As you can see, all sorts of physiological changes take place in aquatic organisms when water temperatures change.

A. TEMPERATURE Sampling Procedure

The temperature test measures the change in water temperature between two points, the test site and a site one mile upstream. By detecting significant temperature changes along a section of the river, we can begin to uncover the sources of thermal pollution.

Because the temperature test compares the difference in water temperature at two different stream sites, it is important to match as closely as possible the physical conditions at these sites - current speed, amount of sunlight reaching the water, and the depth of the stream. To reduce errors, the same thermometer should be used at both sites. Rubber gloves should be worn if there is any chance that hands might come in contact with the water.

B. TEMPERATURE Testing Procedure

1. At the site where the other water quality tests are being performed, lower the thermometer four inches below the water surface.
2. Keep the thermometer in the water until a constant reading is attained (approximately two minutes).
3. Record your measurement in Celsius.
4. Repeat the test approximately one mile upstream as soon as possible.
5. Subtract the upstream temperature from the temperature downstream using the following equation: temp. downstream - temp. upstream = temp. change
6. Record the change in temperature.

C. TEMPERATURE Calculating the Results

To compute the Q-value for the temperature test, follow these steps:

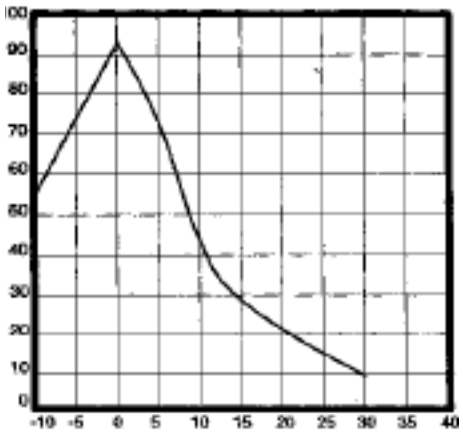
1. Find the weighting curve chart (back);
2. Locate your test result on the bottom (horizontal or "x" axis) of the chart;
3. Interpolate the Q-value for your test result using the following steps;
4. From your test result value on the horizontal ("x") axis of the chart, draw a vertical line up until it intersects the weighting curve line;
5. From this point of intersection, draw a horizontal line

to the left hand side (the vertical or "y" axis) of the chart;

6. Where this horizontal line intersects the vertical ("y") axis of the chart, read off the value. This is the Q-value for this test; it should be recorded in Column B on the WQI chart on the Calculating Water Quality Index (Module 10).

The Q-value for each test should then be multiplied by the weighting factor listed in the chart on the Water Quality Index page. Record the product of this calculation in Column D of the chart.

Temperature Weighting Curve Chart



Change in Temperature: 'C