Water Quality Test Procedures and Purposes

Macroinvertebrate Diversity: Indicator of Water Quality

Greater diversity of organisms in a community indicates a healthier, more stable environment. Organisms that have a high sensitivity to water quality will die off in polluted water.

Collecting Macroinvertebrates

There are many ways to collect macroinvertebrates. You may use a variety of nets (kick net, dip net).

Test One

Collect 50 macroinvertebrates and sort them into like Taxa groups. Use the formula below to determine the quality of the water. Note that the Taxa groups will indicate their tolerance to pollution. The Taxa group with the most organisms is most tolerable to pollution. The Taxa group with the least organisms is the least tolerable to pollution.

Group 1 - Two different Taxa found,	2 x 1 = 2 (score)	Formula:
Group 2 - Five different Taxa found,	5 x 2 = 10 (score)	{Total Group Score (32) }/{Number of different Taxa(13)} = 2.46 (Pollution Index)
Group 3 - Four different Taxa found,	4 x 3 = 12 (score)	
Group 4 - Two different Taxa found,	2 x 4 = 8 (score)	
Different Taxa = 13	Total Group Score = 32	

Water Quality Rating

1.0 - 2.0 Excellent Water Quality

2.1 - 2.5	Good Water Quality
2.6 - 3.5	Fair Water Quality
Over 3.5 Poor Water Quality	

Test Two

The Sequential Comparison Index (SCI) is based on the theory of runs. A new run begins each time an organism picked from the sample looks different than the one picked just before it.

SCI = (number of runs)/ (total number of organisms picked)

Water Quality Rating	
0.0 - 0.3	Poor
0.3 - 0.6	Fair
0.6 - 1.0	Good

What is a run? Pick the organisms randomly from your sample and place them in a separate container. Your partner should compare each organism with the previous organism and record either an x or o. If the organism is the same as the previous, record the same symbol. If different, use a different symbol. Even if you have two different mayflies, they could be different mayflies and should have different symbols.

Keep your samples for your next test.

Example: Total Runs = 8

Total Organisms = 17

SCI = 8/17 = .47

Water Quality = Fair

Test Three

Diversity Index (DI)

You need to determine the Taxa Richness of your sample population. To do this you must count the number of different Taxa. Multiply the Taxa Richness by the SCI value.

Formula:

DI = SCI x Taxa Richness

Water Quality Rating

0-8	Poor
9-12	Fair
12-24	Good

Test Four

pH

pH measures the H+ ion concentration of liquids and substances. The pH scale ranges from 0-14. Pure deionized water contains equal numbers of H+ and OH- ions and has a pH value of 7. If the sample has more OH- ions it is considered basic and has a higher value than 7. If the sample has more H+ ions than the sample it is considered acidic and has a lower value than 7. A change in the pH of a river may result in the death of species in that river.

Example pH levels of household supplies

Household Supplies	pH
Battery Acid	1
Lemon Juice	2
Vinegar	3
Cola	4
Normal Rain	5.6
Distilled Water	7
Baking Soda	8.2
Ammonia	11
Bleach	12

PH Testing Procedure

1. Use gloves to prevent touching your samples. Rinse out your test tube with your sample water.

2. Fill your test tube with 5 ml of your sample water.

3. Add 10 drops of Wide Range Indicator Solution.

4. Cap and invert several times to mix.

5. Insert the tube into the Wide Range pH Comparator. Hold the comparator up to a light source. Match the sample color to a color standard.

6. Record the pH value.

7. Wash you hands.

8. Do this three times and average your pH. Do this by adding up your three pH values and dividing by three.