HABITAT QUALITY ASSESSMENT

Instruction Booklet for Students

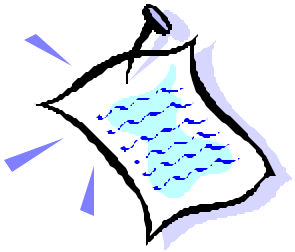
for Stream Monitoring and Education Program

UPPER THAMES RIVER

CONSERVATION AUTHORITY

1999

ACTIVITIES AND INFORMATION ADAPTED FROM



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Fishways - Intermediate/Senior: A Manual of Curriculum -based Lessons for Intermediate and Senior Level Teachers and Group Leaders on Fishes and Fisheries Management. 1991. Ontario Ministry of Natural Resources. Activities: Habi-Trout, The Acid Test, Testing the Waters

Hands On Save Our Streams: The Save Our Streams Teachers Manual. 1995. Izaak Walton League of America.

DISSOLVED OXYGEN

Most aquatic organisms require oxygen to survive. Some can take dissolved oxygen from the water that they live in, and others breathe at the surface.

Low dissolved oxygen can be caused by an overabundance of bacteria. Bacteria decompose dead animals and plants in the water and are also found in sewage, manure or other organic material in the water. When bacteria grow too much, they use up most of the dissolved oxygen and other aquatic organisms may suffer or die.

The term dissolved oxygen is sometimes shortened to DO or dO_2.

Dissolved Oxygen Method:

1. As a class and following the instructions of the group leader, measure dissolved oxygen using the Dissolved Oxygen Meter.
2. On your data sheet, record the oxygen level in milligrams per litre (mg/l), temperature in degrees Celsius, and the percent oxygen saturation.
3. Repeat above steps 2 more times and record values on your datasheet.
4. Determine the average from the three trials.
5. Find your average in the chart below and record the grade on your datasheet.

Dissolved Oxygen

Greater than 4.6 mg/l	A
2.0 mg/l to 4.6 mg/l	C
Less than 2.0 mg/l	F

pH

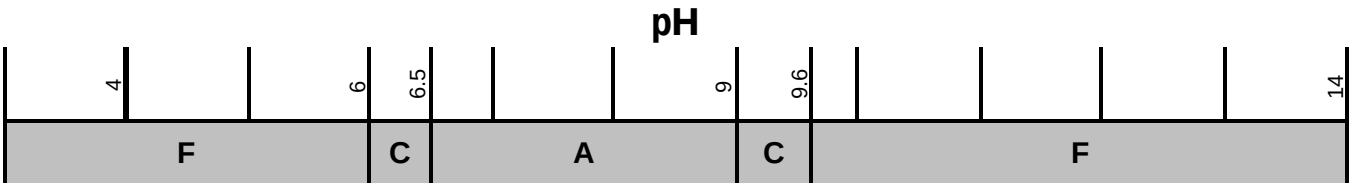
pH measures whether the water is acidic or basic.

NEUTRAL	pH = 7
ACIDIC	pH < 7
BASIC	pH > 7

Acid rain is the main cause of pH change in streams. However, pH can also be affected by rocks and minerals found in the stream and some industrial pollution.

pH Method:

1. As a class and following the instructions of the group leader, measure pH using the pH Meter.
2. On your data sheet record the pH.
3. Repeat above steps 2 more times and record values on your datasheet.
4. Determine the average from the three trials.
5. Find your average in the chart below and record the grade on your datasheet.



TURBIDITY

Water mixed with soil, sewage, or other solids is not clear and less healthy for aquatic organisms. The water is "darker" so it absorbs more sunlight and becomes warmer. Warm water holds less oxygen. If light cannot pass through the water, aquatic plants cannot survive. The solids mixed in the water can settle out on the bottom of the stream, changing important habitat for invertebrates and fish.

Turbidity Method:

1. Looking at several locations along the stream, determine if the water is mostly clear, turbid, or opaque.

   CLEAR: can see to the bottom of the stream

   TURBID: can see some things in the stream (such as rocks, fish) but cannot see to the bottom

   OPAQUE: cannot see anything in the stream

2. Check the box next to your result and record the grade on your datasheet, using the following chart.

Turbidity

Clear	A
Turbid	C
Opaque	F

3. Record any notes about the stream related to turbidity in the "Notes" section. What colour is the water? Can you tell what solids are in the water?

WILDLIFE

Streams provide habitat for many aquatic animals, such as fish. However, they are also an important part of the habitat of land animals. All animals need water to survive and streams provide a water source.

Wildlife sometimes hide when people are in the area, but they sometimes leave evidence that they have been in an area. Birds may drop feathers or mammals may lose some fur. Tracks can often be found on wet or bare ground. Be careful not to step in scat (animal droppings). Birds build nests in trees but also on the ground. Look for nests or eggs of other animals, such as turtles or frogs, but do not touch. Chewed trees or leaves indicates that wildlife may need the area for food or are used branches to build a home. And of course, some animals do not hide and can be seen flying or walking in the area.

Wildlife Method:

1. Look for evidence that other animals use the stream area. If you see the animal, record it on your datasheet, but also remember to look for things, such as fur or feathers, scat, footprints or chewed leaves or branches. Record only wild animals. (Do not add cats, dogs or livestock to your list.)
2. Place a checkmark next to the animals on your datasheet and estimate the number that you see. If you see an animal not on the datasheet, add it to the list and place a checkmark and number next to its name.
3. Add up the checkmarks and write the value in the "Total" section.
4. Determine the grade using the chart below and record the grade on your datasheet.

Wildlife

5 or more checkmarks	A
3 or 4 checkmarks	C
2 or less checkmarks	F

5. Record any notes related to wildlife in the "Notes" section. Where along the stream bank or in the stream did you see different types of wildlife? Are any animals nesting in the area?

POTENTIAL POLLUTION

Stream pollution can come from many sources and can affect stream life in many ways.

Manure and fertilizers can increase the amount of bacteria growing in the water. Bacteria use up most of the dissolved oxygen in the water causing aquatic animals to suffer or die.

Chemicals, such as pesticides, road salt, or household chemicals dumped into storm drains, can poison animals and plants. Animals can take the chemicals into their bodies through their mouths, gills, or body surfaces. Carnivores who eat these animals are also poisoned.

Garbage in the stream creates hazards to wildlife. Animals can be trapped in cans, six-pack rings, and fishing line. Food or chemicals in the garbage can poison animals.

Soil washing into the stream from eroding banks makes the water turbid or murky.

Potential Pollution Method:

1. Looking in and near the stream, note any possible sources of pollution.
2. On your datasheet check off any of the possible sources listed and add any other potential sources you may see. If you are unsure whether you should add something to your list or if you do not understand why one of the possible sources is on the list, ask the leader.
3. Count up the number of potential sources and write the number in the "total" section.
4. Record the grade on the datasheet using the following chart.

Potential Pollution

No checkmarks	A
1 to 4 checkmarks	C
5 or more checkmarks	F

5. Record any notes related to potential pollution in the "Notes" section. What is planted in the field? What kind of livestock are in the stream? How big is the stormwater drain or tile outlet?

CHANNEL FEATURES

The features in a stream channel are riffles, pools, and runs. Each feature provides a different type of habitat for different species. A healthy stream contains all of these features.

Riffle: A shallow section where the water is flowing quickly. The water bubbles or waves on the surface, mixing air (and oxygen!) into the water. The bottom of the stream is usually rock or gravel.

Pool: A deeper section where the water barely moves. They are usually the deepest areas of the stream and the bottom can be a variety of materials, including gravel or silt.

Run: A deeper section of the stream where the water is moving. The bottom is usually rock or boulders.

Channel Features Method:

1. Walking along the streambank, determine what features (riffle, run, or pool) the stream has.

   If it is difficult to see how fast the water is flowing, put a ball in the water upstream and compare how fast it moves through each section of the stream.

2. Put a check mark on the datasheet for each feature found and estimate the number of times each feature was found in the stream.

3. Add up the checkmarks and write the value in the "Total" section of the datasheet.

4. Determine the grade by using the chart below and record the grade on your datasheet.

Channel Features

3 features	A
2 features	C
1 feature	F

5. Record any notes related to the channel in the "Notes" section. What material is on the bottom of the stream in each of the sections?

STREAM BOTTOM

Boulders, cobble, and gravel provide better habitat for invertebrates than sand or silt. Invertebrates hang onto the rocks so they will not be swept away in the current. Larger rocks are more stable and provide more area than small sand granules. Many fish lay eggs in gravel beds as well.

The particles on the bottom of the stream can be placed into the following classes according to their size:

Silt	<0.3 cm, slimy
Sand	<0.3 cm, gritty
Gravel	0.3 to 5 cm
Cobble	>5 cm and <25 cm
Boulder	25 cm and larger

Stream Bottom Method

1. Choose a spot along the stream bank. One person in your group goes into the water at the bank.
2. Walk heel to toe across the stream in a straight line. At each step reach down and pick up the first particle you feel in front of your toe. No peeking!
3. Measure the size of the particle using the ruler and determine whether the particle is silt, sand, gravel, cobble, or boulder. On your datasheet, check the size class in the column for trial 1.
4. Repeat for 9 more trials, checking the size class in the column for each trial.
5. Add up the total number of particles measured in gravel, cobble and boulder size classes.
6. As a group calculate the total percentage of gravel, cobble, and boulder and grade the site using the following chart:

Stream Bottom

GRAVEL, COBBLE AND BOULDER	Greater than 75%	A
	50% to 75%	C
	Less than 50%	F

SHELTER IN STREAM

Structures in the stream can block the current and provide protection for predators, shelter, and resting places for aquatic animals. Boulders, tree stumps and large plants growing in the stream can provide shelter. Undercut banks are also good habitat for fish. Structures that completely block the flow of water can provide shelter but they can also cause flooding and a buildup of garbage, silt, or debris in the stream. While some shelter is good, too much can cause problems.

Shelter in Stream Method:

1. Walking along the streambank, look for boulders, tree stumps and other structures in the stream that would provide shelter for fish and other animals. If a structure completely blocks the flow of water (from bank to bank) do not count it. Also look for undercut banks. On your datasheet, check off the features you found and how many times that feature was seen.
2. If you find other structures not on the list, add them. If you are unsure if a structure would provide shelter, ask the group leader.
3. Add up the checkmarks and record the number in the "Total" section of the datasheet.
4. Determine the grade using the following chart and write the grade on your datasheet.

Shelter in Stream

3 or more checkmarks	A
2 checkmarks	C
1 or no checkmarks	F

5. Record any notes related to shelter in the stream in the "Notes" section. How large are the structures? How big is the undercut bank? Do you see fish in these areas?

SHADING

Bank vegetation, especially trees and shrubs, shades the stream helping to keep the water cool. With little or no bank vegetation, direct sunlight on bright summer days will heat up the water. Cool water holds more oxygen and high temperatures can reduce oxygen available in the water for invertebrates and fish.

Shading Method:

1. Standing in the stream, facing upstream or downstream.
2. Join your thumbs and forefingers to form a circle. Raise your arms so your thumbs look like they are on top of the water. Look through the circle and estimate what percentage of your view is blocked by vegetation. Record this value next to Trial 1 on your datasheet.
3. Repeat Steps 1 and 2 for 3 more trials.
4. Add up the values for all three trials and write the total on the datasheet. Divide this value by 4 to get an average.
5. Determine the grade using the chart below and record it on your datasheet:

Shading

Greater than 75%	A
50% to 75%	C
Less than 50%	F

6. Record any notes related to shading in the “Notes” section.

BANK VEGETATION

A healthy stream has trees, grass, and other plants growing along the bank. Plants can block or hold back soil that may run off a nearby field when it rains or when the snows melts in the spring. The plants also take up excess nutrients in the water before it reaches the stream. The roots of plants, especially trees and shrubs, hold the soil in place on the banks and prevent erosion. Leaves, branches, and insects that fall off of plants into the water provide food and shelter to fish and invertebrates.

Bank Vegetation Method:

1. Pick two spots on the streambank, one on each side of the stream bank.
2. At one of your locations, stand on the edge of the stream with your back to the water. **Walking normally** in a straight line away from the water, count the number of steps you take until you come to bare ground, mown grass, pavement, or gravel.
3. Record the number of steps in the chart on your datasheet.
4. Repeat steps 2 and 3 at your other locations on the streambank.
5. As a group calculate the average number of steps on each bank.
6. Record the grade on your datasheet by finding your average in the following chart:

Bank Vegetation

more than 12 steps	A
7 to 12 steps	C
less than 7 steps	F

7. Record any notes related to bank vegetation in the "Notes" section. What type of vegetation was on the streambank (grass, wildflowers, trees, shrubs)?