



Module #12

Calculating Water Quality: Aquatic Organisms Diversity Index

Adapted from Central Colorado Water Conservancy District Educational Materials and www.indiana.edu/~bradwood/eagles/critters1.htm from the University of Indiana Eagles to the Nest Curriculum

One way to determine the quality of lake, river or creek water is to observe what type of animals live there. The Aquatic Organisms Diversity Index consists of a scorecard (located on the next page) and an identification guide (below). Go to a body of water and start hunting. You might want to take a net, something to use as a scope, a bucket and a magnifying lens. Use the scorecard to judge the quality of the water. Remember you may not find all the critters listed. When you are done hunting, make sure you return all the critters (unharmmed) back to the water. *Be certain to wash your hands thoroughly after the activity is completed.*

Pollution-tolerant organisms can be in any quality of water - One point each

Aquatic Earthworms and other Worms
1/4" - 2", can be very tiny; thin worm-like body.



nwnature.net

Pouch Snail and Pond Snail
No operculum (hard end cover). Breathe air; shell usually opens on left.



British Marine Life Study Society

Midge Fly Larva
Up to 1/4", dark head, worm-like segmented body, 2 tiny legs on each side. Bright red or green body. Red ones also called bloodworms.



nwnature.net

Mosquito Larva and Pupa
Fused segments makes the thorax thicker than the rest of body. They feed on algae and other bits of organic debris. Larva (above) pupa (below).



nwnature.net



Rat-tailed Maggot
1/4" to 1"; the body is covered with fine hairs and is wrinkled. The long tube is used to breathe.



University of Minnesota Extension

Other Snails
No operculum (hard end cover), breathe air; snail shell coils in one plane.



NOAA

Leech
1/4" - 2", brown, slimy body, ends with suction pads.



nswgov.au

Blackfly Larva
Up to 1/4", one end of body wider; black head, suction pad on end.



nwnature.net

Somewhat pollution tolerant organisms can be in good to fair quality water - Two points each

Crayfish
Up to 6", 2 large claws, 8 legs, resembles small lobster.



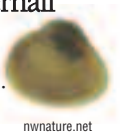
nwnature.net

Sowbug
1/4"-3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.



nwnature.net

Fingernail Clam
Small.



nwnature.net

Crane Fly Larva
1/3" -2", milky green or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.



nwnature.net

Alderfly larva
1" long; looks like small hellgrammite but has 1 long, thin, beached tail at back end (no hooks). No gill tufts underneath.



nwnature.net

Damselfly Larva
1/2" - 1", large eyes, 6 thin hooked legs, 3 broad oar-shaped tails, positioned like a tripod. Smooth (no gills) on sides of lower half of body.



nwnature.net

Fishfly larva
Up to 1 1/2" long; looks like small hellgrammite, but often a lighter reddish-tan color, or with yellowish streaks. No gill tufts underneath.



nwnature.net

Scud
1/4", white to gray, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp.



nwnature.net

Dragon Fly Larva
1/2" -2", large eyes, 6 hooked legs; wide oval to round abdomen.



nwnature.net



Pollution sensitive organisms found in good quality water
- Three points each

Stonefly Larva

1/2" - 1 1/2", 6 legs with hooked tips, antennae, 2 hair-like tails. Smooth (no gills) on lower half of body.



nwnature.net

Mayfly Larva

1/4" - 1", brown, moving, plate-like or feathery gills on sides of lower body, 6 large hooked legs, antennae, 2 or 3 long, hair-like tails. Tails may be webbed together.



nwnature.net

Water Penny

1/4" flat saucer-shaped body with a raised bump on one side and 6 tiny legs on the other side. Immature beetle.



nwnature.net

Riffle Beetle

1/4" oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underwater, does not swim on surface.



nwnature.net

Dobsonfly Larva (Hellgrammite)

3/4" - 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails and 2 pairs of hooks at back end.



nwnature.net

Caddisfly Larva

Up to 1"; 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock or leaf case with its head sticking out. May have fluffy gills tufts.



nwnature.net

Gilled Snail

Shell opening covered by thin plate called operculum. Shell opens on right.



nwnature.net

A fresh water ecosystem may vary from a static system to a dynamic system. It is the product of biotic and abiotic factors. A high quality water system has relatively neutral pH range (6.5 to 7.5), middle temperature range (12°C - 20° C), fairly high Dissolved Oxygen content (6ppm) a Diversity Index of 06-1.0 and a balance between producer and consumer organisms.



Poor water quality occurs as the pH range moves away from neutral, the temperature range becomes warmer, the Dissolved Oxygen content decreases, the Diversity Index is less than 06 and the producer and consumer organisms become unbalanced.

Some indicators of poor water quality are the presence of sunfish, carp, and catfish. Algae blooms occur as nitrogen and phosphate pollution appear in the water system. Invertebrate organisms indicating poor water quality are the presence of sludge worms (Tubifex), leeches, sow bugs, blood worms and sewage fly. Microscopic evidence of poor water quality are blue-green algae. The foliform bacteria, Euglena and Chlamydomonas are also tolerant of polluted water rich in organic matter and with a limited Dissolved Oxygen content (5ppm or less).

Aquatic Organisms Scorecard

On the last page, circle the name of each of the types of creek organisms in your sample. For each of the circled types, put the points indicated in the blank.

Compare the total to the following to rate the stream site.

23 or higher	Excellent
17-22	Good
11-16	Fair
10 or less	Poor



Aquatic Organisms Scorecard

Three points	Stonefly Larva	_____
	Caddisfly	_____
	Water Penny	_____
	Riffle Beetle	_____
	Mayfly	_____
	Gilled Snail	_____
	Dobsonfly (Hellgrammite)	_____
Two points	Crayfish	_____
	Sowbug	_____
	Scud	_____
	Alderfly Larva	_____
	Fishfly Larva	_____
	Damselfly	_____
	Watersnipe Fly Larva	_____
	Crane Fly	_____
	Beetle Larva	_____
	Dragonfly	_____
	Clam	_____
One point	Aquatic Worms	_____
	Rat-tailed Maggot	_____
	Midge Fly Larva	_____
	Mosquito Larva	_____
	Blackfly Larva	_____
	Leech	_____
	Pouch Snail or Pond Snail	_____
	Other Snails	_____

TOTAL		_____

Test Results:

What was the Aquatic Organism Diversity Index for your river/stream?
