Area IV Envirothon 2016 - Aquatics

1. The Field Sheet for The Ohio Sediment Stick should be used to determine Total Suspended Solids in a water sample based on the chart on the back page. The sample in front of you has been read by a qualified stream quality monitoring volunteer. The volunteer has been able to view the black dot at the bottom of the tube at the current water level. Using the chart below, what is the TSS for the sample?

Estimating Total Suspended Solids: TSS

Use this table to convert Stick readings to an estimate of the weight of solids suspended in the water column. Table is based on research by Anderson and Davic, 2001, in preparation.

I. Total Suspended Solids: TSS
(Turbidity)

_____ mg/l

Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)
0.5	1750.5	10.0	33.7	24.0	10.6
1.0	702.1	11.0	29.7	25.0	10.0
1.5	411.4	12.0	26.5	26.0	9.5
2.0	281.6	13.0	23.8	27.0	9.1
2.5	209.8	14.0	21.6	28.0	8.6
3.0	165.0	15.0	19.7	29.0	8.2
3.5	134.6	16.0	18.1	30.0	7.9
4.0	112.9	17.0	16.7	31.0	7.6
4.5	96.7	18.0	15.5	32.0	7.2
5.0	84.1	19.0	14.4	33.0	6.9
6.0	66.1	20.0	13.5	34.0	6.7
7.0	54.0	21.0	12.6	35.0	6.4
8.0	45.3	22.0	11.9	≥ 36.0 =	< 6.2
9.0	38.7	23.0	11.2		

a. 18.1mg/l

b. 19.7mg/l

c. 16.0in

d. 134.6mg/l

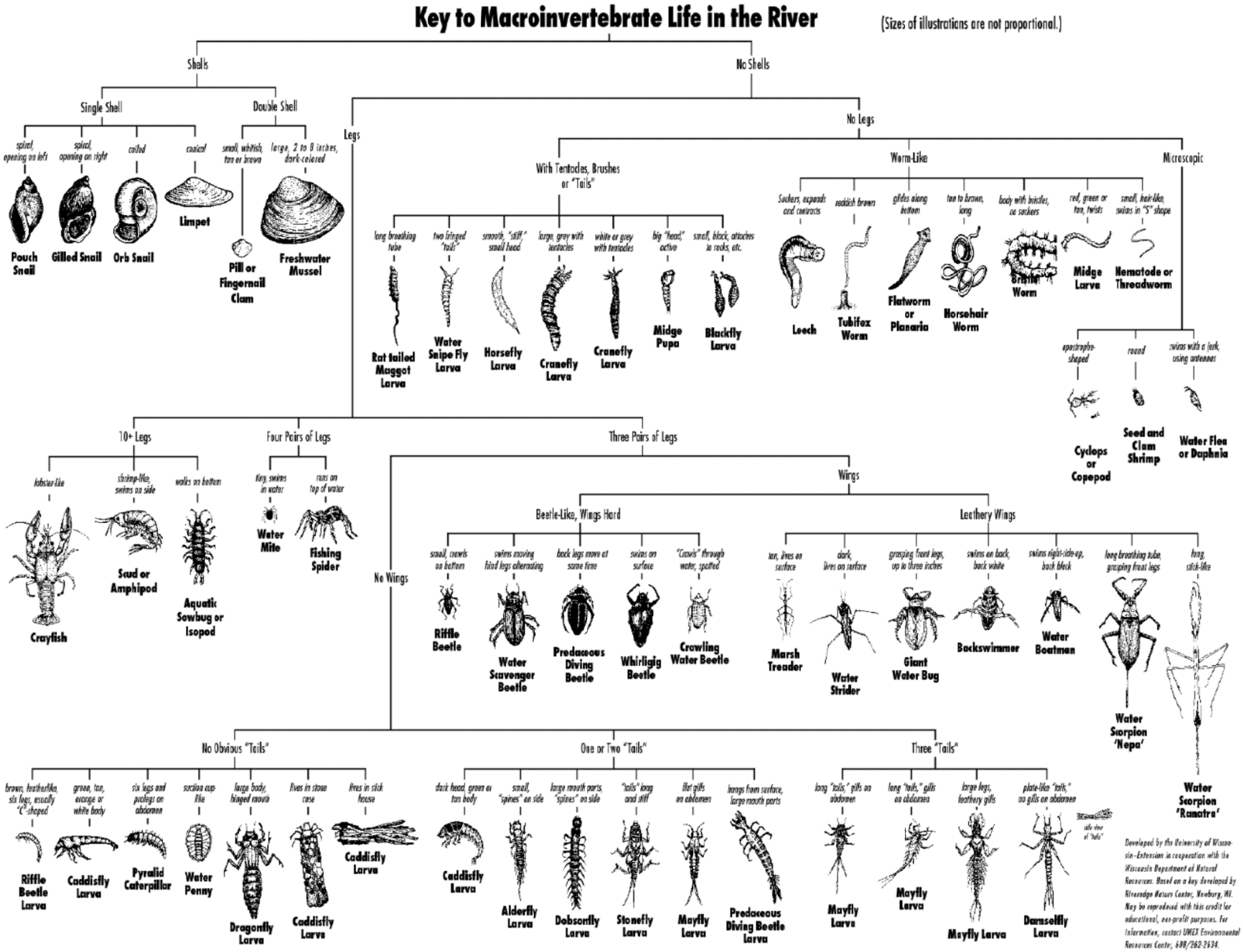
2. The macroinvertebrate in the viewing box is a pollution sensitive organism and is a predacious larva. The organism will undergo metamorphosis and will become a brightly colored flying insect. Using the dichotomous key titled: Key to Macroinvertebrate Life in the River please determine which organism you are viewing.

a. Mayfly larva

b. Rat tailed maggot

c. Crayfish

d. Damselfly Nymph


Key to Macroinvertebrate Life in the River
(Sizes of illustrations are not proportional.)
Shells
No Shells
Single Shell
Double Shell
spiral, opening on left
spiral, opening on right
coiled
conical
small, whitish, tan or brown
large, 2 to 8 inches, dark-colored
Pouch Snail
Gilled Snail
Orb Snail
Limpet
Pill or Fingernail Clam
Freshwater Mussel
Legs
No Legs
With Tentacles, Brushes or "Tails"
Worm-Like
Microscopic
long breathing tube
two fringed "tails"
smooth, "stiff," small head
large, grey with tentacles
white or grey with tentacles
big "head," active
small, black, attaches to rocks, etc.
Rat tailed Maggot Larva
Water Snipe Fly Larva
Horsefly Larva
Crunefly Larva
Cranefly Larva
Midge Pupa
Blackfly Larva
Suckers, expands and contracts
reddish brown
glides along bottom
tan to brown, long
body with bristles, no suckers
red, green or tan, twists
small, hair-like, swims in "S" shape
Leech
Tubifex Worm
Flatworm or Planaria
Horsehair Worm
Bristle Worm
Midge Larva
Nematode or Threadworm
apostrophe-shaped
round
swims with a jerk, using antennae
Cyclops or Copepod
Seed and Clam Shrimp
Water Flea or Daphnia
10+ Legs
Four Pairs of Legs
Three Pairs of Legs
lobster-like
shrimp-like, swims on side
walks on bottom
tiny, swims in water
runs on top of water
Crayfish
Scud or Amphipod
Aquatic Sowbug or Isopod
Water Mite
Fishing Spider
No Wings
Wings
Beetle-Like, Wings Hard
Leathery Wings
small, crawls on bottom
swims moving hind legs alternating
back legs move at same time
swims on surface
"Crawls" through water, spotted
Riffle Beetle
Water Scavenger Beetle
Predaceous Diving Beetle
Whirligig Beetle
Crawling Water Beetle
tan, lives on surface
dark, lives on surface
grasping front legs, up to three inches
swims on back, back white
swims right-side-up, back black
long breathing tube, grasping front legs
long, stick-like
Marsh Treader
Water Strider
Giant Water Bug
Backswimmer
Water Boatman
Water Scorpion 'Nepa'
Water Scorpion 'Ranatra'
No Obvious "Tails"
One or Two "Tails"
Three "Tails"
brown, featherlike, six legs, usually "C"-shaped
green, tan, orange or white body
six legs and prolegs on abdomen
saclike cap like
large body, hinged mouth
lives in stone case
lives in stick house
dark head, green or tan body
small, "spines" on side
large mouth parts, "spines" on side
"tails" long and stiff
filet gills on abdomen
lunges from surface, large mouth parts
long "tails," gills on abdomen
long "tails," gills on abdomen
large legs, feathery gills
plate-like "tails," no gills on abdomen
side view of "tails"
Riffle Beetle Larva
Caddisfly Larva
Pyralid Caterpillar
Water Penny
Dragonfly Larva
Caddisfly Larva
Caddisfly Larva
Caddisfly Larva
Alderfly Larva
Dobsonfly Larva
Stonefly Larva
Mayfly Larva
Predaceous Diving Beetle Larva
Mayfly Larva
Mayfly Larva
Mayfly Larva
Damselfly Larva
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3. Why do county SWCD's work tirelessly to prevent sediment from entering rivers and streams in their watersheds?

a. Murky water is clearer and is therefore better for human consumption

b. Sedimentation decreases the cost of treating drinking water in a river system due to fewer coagulants being used

c. Water with a higher sediment concentration causes more natural vegetation to grown in the water providing shelter for fish and other aquatic species

d. Sediment in stream beds disrupts the natural food chain by destroying habitat where the smallest stream organisms (macroinvertebrates) live and can cause a decline in fish populations

4. Using the dichotomous key: Key to Macroinvertebrate Life in the River please identify the organism in the viewing box marked question 4.

a. Crane Fly Larva

b. Hellgrammite (Dobsonfly Larva)

c. Gilled Snail

d. Pouch Snail

5. A group of SQM (Steam Quality Monitoring) volunteers sampled a riffle area on Greenville Creek in Darke County. Doing 3 separate dips using a kick seine they were able to collect the following macroinvertebrate organisms: Adult Riffle Beetle, Mayfly Nymph, Caddisfly Larva, Stonefly Nymph, Cranefly Larva, Crayfish, Scud, Sowbugs, Water Penny Beetle Larva and Gilled Snails. Which of the following statements best describes this portion of Greenville Creek?

a. Poor water quality due to the presence of Cranefly Larva and Sowbugs

b. Excellent water quality based on the diversity of organisms found and the high number of pollution sensitive organisms

c. Poor water quality based on low diversity and too many pollution tolerant organisms found

d. Not enough data to make a determination regarding water quality

6. Temperature of the water is an important factor in the health of an aquatic ecosystem. The trees in the riparian buffer shade the stream which has a cooling effect on the water. Which statement is true?

a. Warmer water allows for larger spaces between water molecules where oxygen can readily escape

b. Colder water allows for smaller spaces between water molecules where oxygen can readily escape

c. Cold water is bad for a stream

d. Warm water feels more comfortable for humans and is therefore preferred for a healthy stream ecosystem.

7. Reestablishing a forested riparian buffer is one of the most important factors in bringing a river system back to a healthy state. Which of the following is a benefit that the riparian corridor provides?

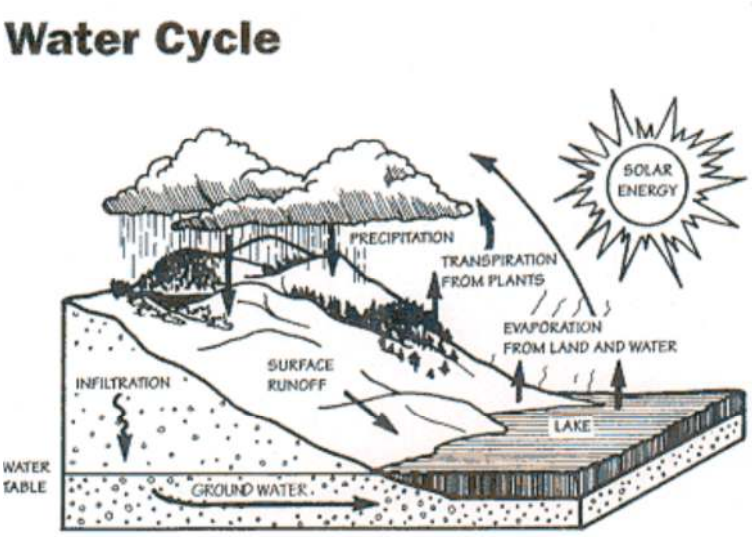
a. Provides detritus which is food for many macro-invertebrate organisms

b. Allows water temperatures to spike in the summer months

c. Allows more water to flow into the stream

d. Creates sloping banks and wide, shallow streams

8. Observe the diagram of the water cycle:



One significant factor in ecology today is that developed land is more impervious than natural land. Instead of percolating into the ground, rain hits the hard surfaces of buildings, pavement, and compacted ground and is moved quickly away from developed areas and into a natural watercourse via such things as storm drains. As a result of this which of the following is true?

a. Surface runoff increases and groundwater recharge decreases

b. Less water is diverted to a natural watercourse

c. There is less water

d. Surface runoff decreases and groundwater recharge increases

9. What percentage of earth's total fresh water is liquid and available for humans to utilize for everyday activities?

a. 1.2%

b. 30.1%

c. 68.7%

d. 96.5%

10. This type of aquatic habitat acts as a sponge to slow down flood water as it heads to the ocean. It is can also release water into the ground during dry periods and protect crops from freezing temperatures. Which aquatic habitat is it?

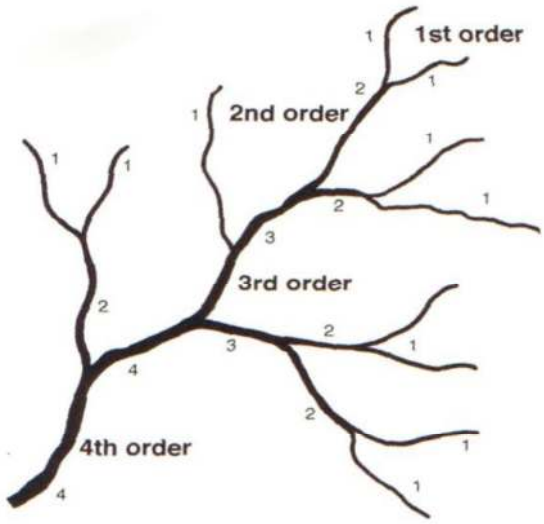
a. Lakes

b. Rivers

c. Ponds

d. Wetlands

11. Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams, while the largest river in the world, the Amazon, is a 12thorder waterway. Observe the diagram of stream order below and reflect on your research. Determine which stream orders would be considered headwater streams.



a. 1st-3rd

b. 1st-4th

c. 4th-2nd

d. 1st, 3rd and 4th

12. Nonpoint source pollution problems can be difficult to resolve because they often cannot be traced to one specific location. Which of the following would not be an example of nonpoint source pollution

a. Sewage treatment plant discharge with a higher ammonia concentration

b. Sediment from construction runoff

c. Fertilizer runoff from farm fields resulting in an algae bloom

d. Oil and grease from roads and parking lots

13. One would be surprised to learn that the most common aquatic pollutant is:

a. Ammonia

b. Nitrogen

c. Soil

d. Water

14. The riffle area of a stream occurs with fast current velocity and shallow depth. The water surface of the riffle area is visibly broken and is referred to as “whitewater”. One important benefit of the riffle area in a stream ecosystem is:

a. Providing a decrease in pH

b. Providing an increase in pH

c. Providing a decrease in dissolved oxygen

d. Providing an increase in dissolve oxygen

15. Plankton forms the base of the food web for nearly all large aquatic ecosystems, such as rivers, lakes and ponds. There are two broad classes of plankton. Which of the following accurately describe these two classes?

a. Cyclops and daphnia

b. Phytoplankton and Zooplankton

c. Aquatic plants and submerged plants

d. Flagellates and ciliates

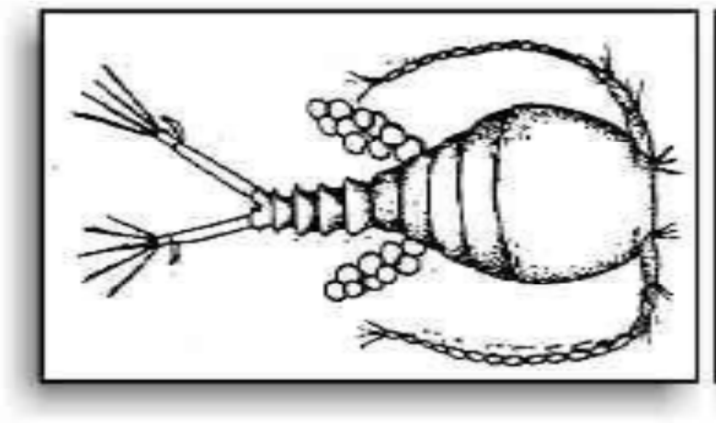
16. The picture below represents one type of plankton. This type of plankton feeds on microscopic plants and enables the energy in an ecosystem to flow to higher trophic levels. What is the name given to this living thing?

a. Daphnia

b. Copepod (cyclops)

c. Duckweed

d. diatom



17. Phytoplankton is extremely diverse in form and is critically important to overall ecosystem function. They are often used as the first indicators of ecosystem degradation due to pollutants (especially excess nutrients). Which of the following describes the critical role phytoplankton play in an aquatic ecosystem such as a pond?

a. They consume large colonial forms of microscopic organisms

b. They provide shelter for larger fish species

c. They are filter feeders and keep the pond clean

d. They convert light energy to chemical energy through photosynthesis

18. The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. The Act does not:

a. Protect fish, shellfish, and wildlife in and on the nations waters

b. Govern the safe transport of drinking water to the home

c. Employ a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways.

d. Protect the chemical, physical, and biological integrity of the nation's waters

19. One aquatic nuisance species (ANS), the round goby was introduced via ballast water into the great lakes in 1990. Scientists are concerned about all of the potentially harmful effects below except one. Which is it?

a. The Goby congregates around municipalities' water intake/discharge pipes in great numbers and large sums of money need to be spent to keep them away

b. The Goby is very aggressive

c. The Goby is rapidly expanding its range

d. The Goby feeds voraciously on bottom dwelling fishes, snails, mussels, and aquatic insects

20. Best Management Practices (BMP's) are effective practices that act to reduce the non-point pollution load in water systems and decrease the velocity of runoff after a storm event. Which of the following BMP's would be used to control the runoff of water from a local subdivision?

a. No-till farming

b. Livestock husbandry

c. Contour strip cropping

d. Storm water retention basins

21. Similar to phosphates, nitrates are essential nutrients for plant growth and a main ingredient in fertilizers. If they are able to enter an inland lake in Ohio they could cause increased plant growth and eutrophication. Which of the following describe how nitrates can enter and aquatic ecosystem?

a. Nitrates can come from treatment lagoons and over fertilized fields

b. Nitrates can enter a lake as runoff from agriculture, golf courses, and lawns

c. Nitrates can enter a lake from a sewage treatment plant

d. All of the above

22. Observe the picture of the aquatic plants provided and identify the Nuisance Species. This plant prefers moist soils and shallow waters where it competes with native wetland plants. It will adjust to varying light conditions and water levels.

a. Currlyleaf pondweed

b. Arrowhead

c. Garlic mustard

d. Purple Loosestrife

23. This plant was once planted to control erosion and as a hedgerow. It can cause a mono-culture due to the shading of more desirable native shrubs, young trees and wildflowers. The Ohio Department of Natural Resources works to remove this plant from natural areas by cutting, burning and the application of herbicide.

a. Autumn Olive

b. Kudzu

c. Multi-Flora Rose

d. Honeysuckle.

24. A healthy riparian zone provides many benefits to a healthy stream environment. No stream ecosystem in the United States is pristine or unaffected by human activity. Observe the riparian zone before you. What signs do you see that would indicate this riparian zone is unhealthy or is experiencing some degradation?

a. Limited biodiversity of fish, aquatic life, mammals, or birds

b. Excessive sedimentation on the stream bottom which dominates the substrate

c. Vegetation dominated by upland plants and noxious weeds

d. Heavy development along the stream bank.

25. The tree in front of you is a native tree and prefers growing in moist soils and can often be found growing in riparian zones. It is known as one of the Eastern United States most massive trees with trunks reaching 10 feet in diameter. Its roots are important in stabilizing the banks of rivers and streams.

a. Boxelder

b. Autumn Olive

c. Sycamore

d. Cottonwood