

## KEY TO FRESHWATER ECOSYSTEM REVIEW SHEET

1. **What is an ecosystem?**

An **ecosystem** is a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving (abiotic), physical components

2. Is there any salt in freshwater?

Freshwater is defined as having a low salt concentration — usually less than 1%.

3. What are the different freshwater regions?

freshwater regions:

- a. Ponds and lakes
- b. Streams and rivers
- c. Wetlands

4. What are the different freshwater zones?

The topmost zone near the shore of a lake or pond is the *littoral zone*.

The near-surface open water surrounded by the littoral zone is the *limnetic zone*.

deep-water part of the lake/pond, the *profundal zone*.

5. What is the top most zone?

*littoral zone*

6. What type of animals can be found in the littoral zone?

several species of algae (like diatoms), rooted and floating aquatic plants, grazing snails, clams, insects, crustaceans, fishes, and amphibians

7. Which is the warmest zone? Littoral zone

8. Where are the eggs of many macroinvertebrates found? Littoral zone

9. Why are aquatic plankton important?

aquatic plankton, there would be few living organisms in the world, and certainly no humans. Plankton are small organisms that play a crucial role in the food chain.

10. What is the difference between the middle and mouth of a river?

Towards the middle part of the stream/river, the width increases, as does species diversity — numerous aquatic green plants and algae can be found. Toward the mouth of the river/stream, the water becomes murky from all the sediments that it has picked up upstream, decreasing the amount of light that can penetrate through the water. Since there is less light, there is less diversity of flora, and because of the lower oxygen levels, fish that require less oxygen, such as catfish and carp, can be found.

11. Define each: Riffle, Run, Pool, Edgewater

**Riffles** are shallow rocky sections of streams with fast flowing turbulent water.

**Runs** are generally deep and slow and the water surface is smooth. Smaller particles, like sand and gravel, tend to settle on the bottom.

**Pools** usually have sandy or muddy bottoms with fewer types of macro-invertebrates present than in riffles.

**Edgewater** habitats may have emergent plants, sheltered overhangs with suspended root mats and leaf packs in quiet back eddies.

12. What are macroinvertebrates?

A macro-invertebrate is an animal without a backbone. They are a diverse group of animals. Most freshwater macroinvertebrates are very small but many can still be seen with the naked eye.

13. List the physical characteristics that affect macroinvertebrates:

**habitats** vary in physical conditions which influence the type of macro-invertebrate communities that live there.

**Current velocity** refers to how fast the water is moving. Riffles with current velocities of about 0.5 metres per second support the most diverse communities. Occasional floods may disturb your site and flush away some macro-invertebrates and plants downstream.

**Bottom composition** - the river bottom is made up of different materials but cobbles (rocks of marble to basketball size) provide the best habitat for macroinvertebrates.

**Flow (discharge)** - the amount of water in the channel determines how much of the river bed is exposed to air.

**Depth and water clarity** of the stream affect whether light can penetrate through the water column to the bottom and allow plants to grow. Plants provide shelter and food for macro-invertebrates.

**Shading** provided by trees and other vegetation helps moderate extremes of water temperature in summer. Stream-side vegetation provides food (leaves, branches, bark) for aquatic animals. The growth rate of aquatic plants in heavily shaded streams tends to be slower.

**Temperature** - small creeks in the upper end of the catchment are typically colder than those downstream. Some macro-invertebrates cannot tolerate warm water or wide variations in water temperature. In addition, as water warms, the level of dissolved oxygen falls and eventually stresses aquatic animals.

14. What chemical properties of a river affect macroinvertebrates?

**pH.**

**Dissolved oxygen.**

**Nutrients**

15. What factors do you need to consider when terminating the health of a freshwater ecosystem?

**Abundance** refers to the number of macro-invertebrates present. Large numbers of macro-invertebrates tend to be found in water enriched with nutrients. Small numbers may indicate erosion, toxic pollution or scouring by floodwaters.

**Diversity** refers to the number of different types of macroinvertebrate present. Healthy streams usually have a greater diversity than degraded streams, although the diversity in headwaters can be naturally low due to a lack of different types of food. Communities with many different species appear to be more stable and healthy than less diverse ones.

**Composition** refers to the proportion of different types of animals living together. A sample from healthy streams tends to contain a good number of mayflies, stoneflies and caddis flies. If the sample contains a lot of worms and midge larvae (chironomids), the stream is probably degraded.

**Pollution tolerance** refers to the tolerance of animals to organic pollution from sewage, industrial effluent and heated water. For example, most stonefly families are intolerant of pollution

whilst worms are quite tolerant. Pollution tolerant animals do occur in natural streams where there is low dissolved oxygen, for example, in small clumps of leaves buried in sediment.

16. What are protists and are they animals?

No they are not animals they are in their own kingdom. They are Unicellular, colonial, or multicellular; Consumers or producers; Carry out aerobic cellular respiration in mitochondria; Most have flagella at some point in their life; Some are producers that carry out photosynthesis

17. Describe the members of Phylum Platyhelminthes?

Acoelomate (lack a body cavity), triploblasts (3 tissue layers)

Bilateral symmetry with **cephalization**

Anterior brain with ventral nerve cords

incomplete digestive system

Lack respiratory/circulatory systems.

Wastes – diffusion and protonephridia

18. Describe the members of Class Cestoda:

The Class Cestoda is divided into two subclasses, the Cestodaria and the Eucestoda. The Eucestoda contains all the animals we usually think of as tapeworms. The Cestodaria contains only a few species of unusual worms, their bodies are unsegmented and roughly oval in shape, they have only one set of reproductive organs and the larvae have 10 hooks for attachment.

19. Which freshwater animal was most likely the first “hunter”? and why..

Platyhelminthes, due to being the first with cephalization

20. Describe the members of phylum porifera:

Sponges; Multicellular organisms having less-specialized cells than in the Metazoa

Note: Metazoa are multicellular organisms that have cells organized into tissues and organs

21. What is the body of sponges like?

Surface of a sponge's body is covered by a skin, one cell thick and Sponges lack symmetry (asymmetrical)

22. Do sponges have true tissues?

Unlike all other marine invertebrates, they have no true tissues or organs.

23. Do sponges have a nervous system?

They do NOT have nerve or muscle cells.

24. How do sponges eat?

Sponges feed by drawing a current of seawater in through their entry pores, the oscia, filtering out food particles, then ejecting the water out through their exit pores, the oscula.

25. Why do sponges rely on the “flow of water” ?

flowing water provides both food and oxygen, as well as being a means for waste removal

26. Do sponges have a skeletal system?

Yes spicules

27. Give an example and describe a fish that lives in a freshwater ecosystem:

28. Give an example and describe a mammal that lives in a freshwater ecosystem:
29. Give an example and describe a rodent that lives in a freshwater ecosystem:
30. Give an example and describe an arthropod that lives in a freshwater ecosystem:
31. Give an example and describe a crustacean that lives in a freshwater ecosystem:

32. What are the defining characteristics of phylum arthropoda?

BILATERAL SYMMETRY; VERSATILE EXOSKELETON; SEGMENTATION OF HEAD  
THORAX ABDOMEN; SENSORY ORGANS; BEHAVIOR CHARACTERISTICS;  
METAMORPHOSIS;  
OPEN CIRCULATORY (AIR DIRECT TO CELLS)

33. List some modern arthropods:

insects, spiders, centipedes, shrimp, and crayfish

34. How do insects move?

Tripod movement

35. Give examples of how arthropods are harmful and helpful to humans:

36. What is a watershed?

Area that drains into the same stream, river system, or other body of water

37. Where is the Ipswich River Watershed?

Runs from Burlington/Wilmington → Ipswich

38. What did the Ipswich river used to look like compared to now?

There are no records but lots of clues about what life was like along the Ipswich River before Europeans arrived in the 1630s. The once-wild river would have been fuller 400 years ago, fed by pond run-off, underground springs, and tributaries along its 45-mile meander from marshy headlands, through red maple swamps, white pine forests and chestnut groves, until, swelled and teeming with life, it reached the ocean. For thousands of years, the river had hosted diverse ecosystems – lumbering black bear in the swamps to microscopic amoeba in the gentle backwaters. When, in 1638, John Winthrop bought the lands along the river and exclusive fishing rights from Chief Masconomet for 20 pounds sterling, a new history was about to be written for those free-flowing waters.

Hunting would have been rich for the Native Americans who called their shores “Pleasant Place By the Water.” Shell and fish bone heaps, arrowheads, fragments of clay dishes, stone pestles and blackened camp fire stones along the river tell us something of the centuries of nomadic life they lived, building bark-covered wigwams in the meadows next to ancient breeding fisheries. Doomed to starvation and disease when their chief bargained away the river and its bounty, Native Americans whose ancestors had lived in this area for generations all died off in fewer than 100 years.

A century later 450,000 yards of cotton, miles of lace, gallons of cider and thousands of woolen garments were being produced annually, along the river. The forests had been cut for lumber and fuel. The land was cleared for fanning and grazing animals. Dams and pollution were wreaking havoc on the freshwater fisheries and other wildlife. The once-green corridor had become an artery of frenetic commerce.

Today, despite the fact that non-point source pollution presents a serious threat to the river, there is hope that new regulations for river protection will ensure cleaner water, encourage threatened ecosystems, and

protect endangered species, for tomorrow. The river basin that provides household water for 335,000 people remains a haven, though an altered one, for recreation. The mosaic of once-pristine natural habitats has been disrupted forever but a patient enthusiast can still be rewarded by the sight of a slippery blue-spotted salamander, a golden-winged warbler or basking Blandings turtle. And, reminding us that the building blocks of life start small, there is the whole world of aquatic bugs to investigate, too.

39. What are some of the problems the river ecosystem faces?

Land use, development, draws, low fish count...

40. What are some species of animals that are of concern in the Ipswich river watershed?

Freshwater mussels, crayfish, stoneflies

## BEAVER

### ADAPTATIONS:

- A large bulky rodent
- very small head for it's size
- thick brown fur
- large dark orange incisors
- large scaly tail
- another adaptation is are how it swims. When a beaver goes underwater clear shields fall over its eye's, skin flaps fall over its mouth, and valves close off its nose and ears.

### LEARNED BEHAVIOR:

- Construction of dam and lodge is a learned behavior along with maintenance of the dam and lodge.
- Young beavers know to construct the dam and lodge but they don't know how. The father shows them how to build and take care of the dam and lodge.
- other learned behaviors are storing food, the young beaver knows how to get food, but not store it. The parents teach the young beavers how to bring food back to the lodge and push it into the mud under the lodge.

### HABITAT:

- slow flowing brooks, streams, ponds, marshes, and rivers.
- They pile mud 6-8 feet high to build a dam. There are underwater entrances. A vent in the lodge lets fresh air in. Temporary spillways may be constructed in times of flood. Repair is constant.
- Their range is most of Canada and U.S. except for Florida, most of Nevada, and south California.