Part A: Aquatic Ecology & Resource Management (60 pts)

1. Look at the following watershed and answer the following questions.

    a. If you cleared all of the tree in the river at point Z, what "letters" would be affected by it?
    b. Explain how would those letters be affected?
    c. The dotted line between the two rivers is a watershed boundary. What must be true of the elevation of that line compared to the rivers?
    d. If you dumped pollution at point B, what river would be affected?

Potter River   Cullen River

Y

B

Z

A

W

X
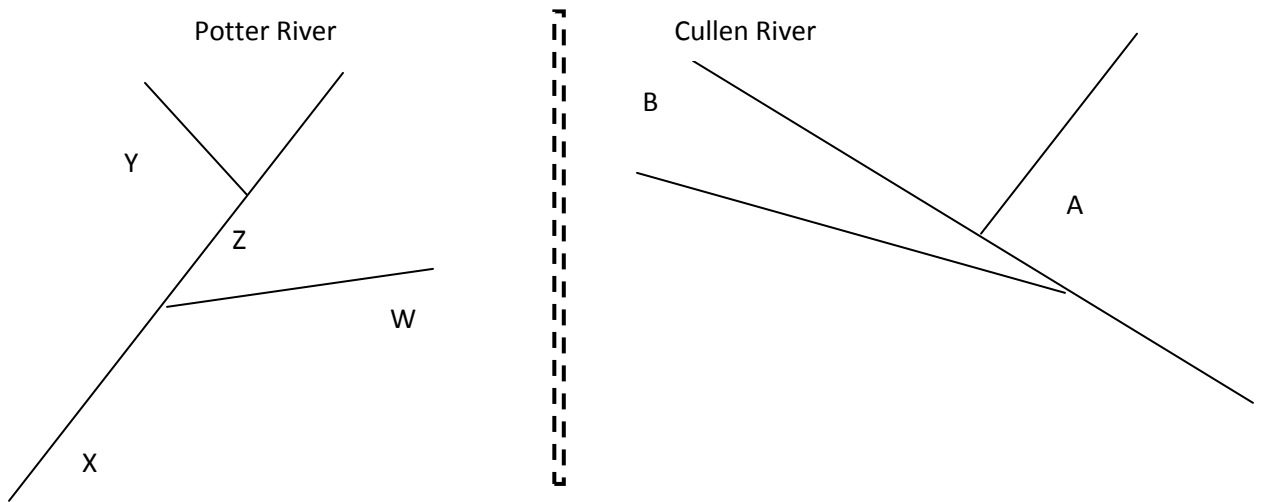
2. What is the main producer in the river food web?

3. What eats that producer (primary consumer)?

4. Trees are essential to the river. Name 3 things do trees do to help rivers?

Look at the following food chain:

Walleye

↑

Bluegill

↑

Zooplankton

↑
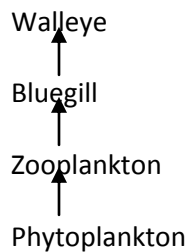
Phytoplankton

5. Which creature will have the most toxins?
    a. walleye
    b. bluegill
    c. zooplankton
    d. phytoplankton

6. In the above food chain, what would happen if all of the zooplankton died?
    a. The bluegill population would go up, and the phytoplankton population would go down.
    b. The bluegill population would go up, and the phytoplankton population would go up.
    c. The bluegill population would go down, and the phytoplankton population would go down.
    d. The bluegill population would go down, and the phytoplankton would go up.

7. Acid rain is rain with a pH

    a. Less than 5.0
    b. Equal to 5.0
    c. Less than 7
    d. Equal to 7.

8. Which of the following pH scores represent an acid?
    a. 5
    b. 7
    c. 9
    d. 10

9. There are three main substances that are needed as fertilizer. Which of the following is NOT one of them?
    a. potassium
    b. phosphates
    c. nitrates
    d. carbon

10. If you have a substance with a pH of 6 and one with a pH of 4 which one is the stronger acid?
    a. 6
    b. 4
    c. neither: they are equal

11. Why is erosion bad for rivers?
    a. It causes eutrophication.
    b. It causes biomagnification.
    c. It causes dirt to cover rocks.
    d. It causes acid rain.

12. Why do all of the rivers in Michigan flow into the Great Lakes?

    a. The Great Lakes are bigger.
    b. The Great Lakes are watersheds.
    c. The Great Lakes are lower in elevation.
    d. The Great Lakes empty into the ocean.

13. Lake turnover happens in the **spring** because

    a. when ice melts, it gets warmer and more dense.
    b. when ice melts, it gets warmer and less dense.
    c. when ice melts, it gets cooler and more dense.
   d. When ice melts, it gets cooler and less dense.

14. Large predatory fish often have lots of toxins. What other type of fish is known to have high toxin levels?

    a.   small insect-eating fish
    b.   plankton-eating fish
    c.   fish with high amounts of protein
    d.   bottom-feeding fish.

15. If the phosphates or nitrates level is too high, what would you expect to see?

    a.   biomagnification
    b.   eutrophication
    c.   stagnation
    d.   trophic flagellation

16. When plants start to grow out of control in a lake, why does it lead to low dissolved oxygen levels?
    a.   Plants use up all of the oxygen.
    b.   Plants kill the fish, which causes less oxygen.
    c.   Plants block the sunlight, which kills the fish, which causes less oxygen.
    d.   Plants will eventually die, and the bacterium that eats them uses oxygen.

17. Why are roads, parking lots, and houses covering the ground bad for a river?

    a.   encourage more people to go to the river.
    b.   cause more pollution to run into the river.
    c.   increase runoff after rains and cause flooding.
    d.   prevent animals from reaching the river.

Use the food web to the right to answer the question.

18. What will happen to the tertiary consumers if the phytoplankton is eliminated?
    a.   Increase
    b.   Decrease
    c.   Stay the same

19. What percent of the energy in an organism is passed onto the next trophic level?
    a.   1%
    b.   5%
    c.   10%
    d.   50%

True or False

20. Human's activity alters watershed functions.
21. Clean Water Act of 1972 & Safe Drinking Water Act of 1974 reduced pollutants in rivers and lakes from non-point sources.
22. Watershed management roles aim to control, enhance, and restore watershed functions.
23. Point sources are places like parking lots, roads, and lawns.
24. Community-based watershed management practices are defined, implemented, and revised by community members and local authorities/experts.
25. Waste water treatment facilities utilize multiple methods to remove about 90% of suspended solids from waste water.
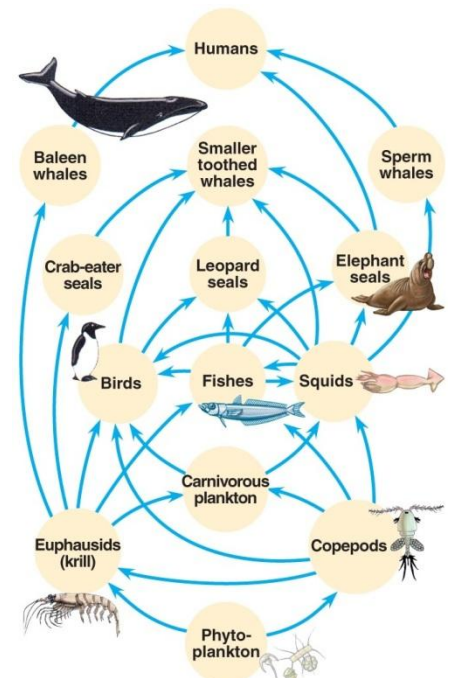
26. Ultraviolet light is not used to treat waste water.
27. Sedimentation pollution is comprised of two components: Physical pollution and Chemical pollution.
28. Speed of the water, type of sediment, and presence of vegetation affect the rate of erosion in rivers.
29. The order in which sediment is deposited (settles out of the water) is: Gravel, Silt, Sand, Clay.
30. Estuaries do not filter water and provide nutrients to surrounding ecosystems.

Matching

A. Estuary	B. Nitrogen Cycle	C. Carbon Cycle	D. Water cycle	E. Fjord
F. Mangroves	G. Peat	H. Stenohaline	I. Coastal Plain	J. Bar-built K. Tectonic
	L. Euryhaline	M. Delta		

31. Water filtration and habitat protection

32. Tolerates a limited range of salinity

33. Tolerates a large range of salinity

34. Spongy matrix of live roots, decaying organic matter, and soil

35. Stabilize shorelines and protect coastal areas from floods and hurricanes

36. Utilize propagation

37. Drowned river valley

38. Barrier beaches or islands parallel to coastline

39. Flat, fan-shaped sediment deposits

40. Tectonic plates formed

41. Glacier created flooded, steep-walled river valleys

Identify the following organisms **AND** identify what class it belongs in:

1.

2.
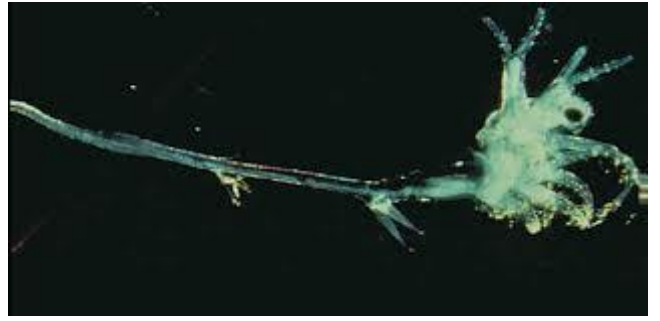

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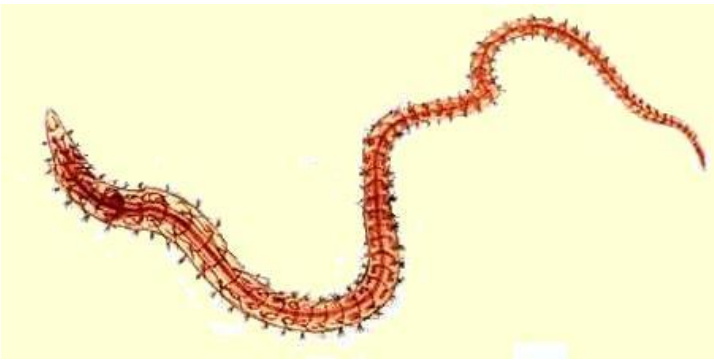7.

8.

9.

10.

11.

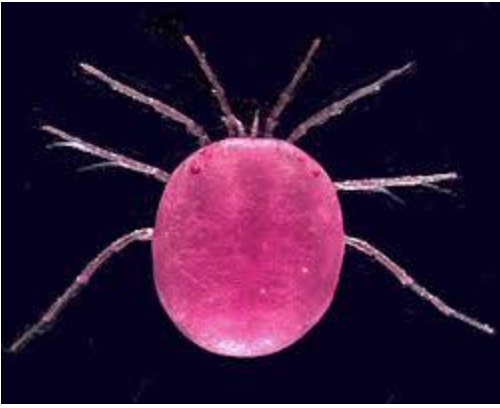
12.

13.

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22.

23.

24. Draw the life cycle of a caddisfly. (8 points)

25. Explain the main concern with Asian Carp entering the Great Lakes ecosystem? (8 points)

26. Name the main food source(s) for the following organisms: (1 point each)

    a. Stonefly

    b. Aquatic Sowbug

    c. Scuds

    d. Midge

    e. Leech

    f. Back Swimmer

    g. Zebra Mussel

    h. Spiny Water Flea

Part C: Water Monitoring & Analysis (70 pts)

Testing your salinometer can be done at any point during this rotation. It is your responsibility to keep track of time and to test your device.

1. Explain the steps involved to perform the Biological Oxygen Demand (BOD) test.

2.   a. Dissolved oxygen is important for creatures in a lake or pond. Name two things (living and/or non-living) that can decrease the amount of dissolved oxygen in a lake.

        b. Why must the dissolved oxygen test be done at the lake or pond?

3. For the following questions (a-g), write the test(s) you would perform.

a. If you wanted to test the water for overall quality of water and what type of fish would live in the water, what test is best?
b. If you wanted to test for sewage, what test would you use?
c. If you wanted to test to see if there is runoff of fertilizer?
d. If you wanted to test for alkalinity?
e. If you wanted to test how clear the water is?
f. If you wanted to know the type of material suspended in the water?
g. If you wanted to test the amount of decomposing matter in the water?
h. If you wanted to test the sodium chloride content?
i. If you wanted to test how warm the water is?

4. We decided to check two rivers, The Tiny River and Scary Creek. The Scary Creek is a very large, fast flowing river through a dense forest with a rocky bottom and rapids. Tiny River is a slow moving that runs through a neighborhood of expensive homes. It has a muddy bottom.

a. Which river would have higher dO ratings?
b. Give two reasons why.
c. Which river would have more insect life? WHY?

5. Look at the following data taken from the Grand River.

Check point of River	Phosphate Reading
A	0.01 g/ml
B	0.05 g/ml
C	0.08 g/ml
D	3.2 g/ml
E	1.6 g/ml
F	0.02 g/ml

Direction River Flows

A   B   C   D   E   F
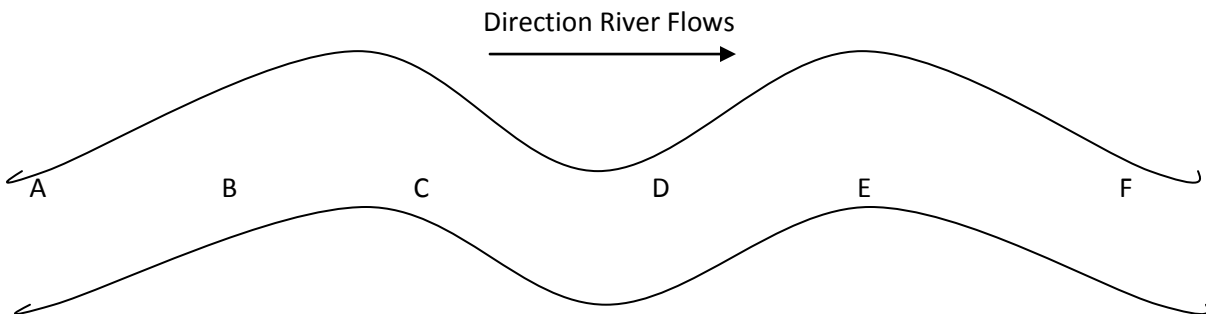
a. A large amount of phosphates got into the river between two of the checkpoints. What two checkpoints?
b. Name 2 sources of the phosphate pollution?
c. Give one reason why the amount of phosphates would go down as you go down the river.

6. You collect insects in a stretch of river and you examine your results. You find the following:

10 stonefly larva	2 dragonfly larva	5 Giant water bugs
5 caddisfly larva	1 damselfly larva	17 Water boatmen
2 mayfly larva	30 black fly larva	24 water striders
10 Leeches	15 tubifex	5 sowbugs

a. Is this river good, medium, or poor quality?
b. Explain why.

7. Use the data table and answer the following questions.

Effect of dissolved oxygen level on fish		
Fish Species	**Lowest DO level at which fish survive for:**	
	24 hours (summer)	**48 hours (winter)**
Northern Pike	6.0 mg/L	3.1
Black Bass	5.5	4.7
Common Sunfish	4.2	1.4
Yellow Perch	4.2	4.7
Black Bullhead	3.3	1.1

a. Which fish can survive during the winter in water with a DO level of 2.1?

b. Why do fish need less DO to survive in the winter than in summer?

c. Does warm or cold water hold more dissolved oxygen?

d. Explain the relationship between dissolved oxygen and percent saturation.

8. Use the data table and answer the following questions.

Effects of pH on fish and aquatic life		
pH value		**Effects observed under research**
Min	**Max**	
3.8	10.0	Fish eggs could be hatched, but deformed young were often produced.
4.0	10.1	Limits for the most resistant fish species.
4.1	9.5	Range tolerated by trout.
4.3	--	Carp died in five days.
4.5	9.0	Trout eggs and larvae develop normally.
4.6	9.5	Limits for perch.

5.0	--	Limits for stickleback fish.
5.0	9.0	Tolerable range for most fish.
--	8.7	Upper limit for good fishing waters.
5.4	11.4	Fish avoided waters beyond these limits.
6.0	7.2	Optimum (best) range for fish eggs.
1.0	--	Mosquito larvae were destroyed at this pH value.
3.3	4.7	Mosquito larva lived within this range.
7.5	8.4	Best range for the growth of algae.

a. Describe what would happen to the species in a lake where the pH is 3.0.

b. Why is performing a pH test a good indicator for an aquatic ecosystem?

9. Explain why having a turbidity reading above 1500 NTUs does to an aquatic ecosystem.