

# OREGON ENVIROTHON 2016

## AQUATIC ECOLOGY TEST

TEAM: # \_\_\_\_\_

*Note to Teams:* If you notice that the kits and specimens are being used by other teams, continue on to the next question and return to the problem later. If you notice that a kit is missing pieces, please notify one of the test administrators.

**1. Collect a water sample and analyze it with the test kits. Record the values you find for the following parameters: (5 points)**

- a) Temperature: \_\_\_\_\_
- b) pH: \_\_\_\_\_
- c) Dissolved Oxygen: \_\_\_\_\_
- d) Phosphate: \_\_\_\_\_
- e) Nitrate: \_\_\_\_\_

**What is the water quality classification for this sample according to the Oregon Water Quality Standards for Salmon and Steelhead? (1 point)**

Class AA \_\_\_\_\_ Class A \_\_\_\_\_ Class B \_\_\_\_\_

**2. Identify one macroinvertebrate in each of the sample dishes marked “A”, “B”, and “C”. You can use common names. For example, “mosquito larvae.” (3 points)**

Dish A: \_\_\_\_\_

Dish B: \_\_\_\_\_

Dish C: \_\_\_\_\_

**3. Based on the macroinvertebrates in your sample dishes, what is the HBI pollution index of the stream water? (1 point)**

\_\_\_\_/10 pts

**4. List two reasons a non-native species might be intentionally introduced to an aquatic habitat. (2 points)**

Stocked as food or recreational sources;  
Release as biological control of existing invader;  
Release of unwanted pets or lab animals;  
Introduced as bait  
(half credit for unintentional: ballast/bilge water, on hulls/gear, escape from aquaculture or commercial facilities; escape from water gardens, decorative ponds)

**5. A landowner has a nice buffer of native riparian vegetation that she completely removes. Two water quality parameters, temperature and turbidity, are likely to be increased. Explain one reason for the increase for each water quality parameter. (2 points)**

**Temperature:** decreased shade increases temperature

**Turbidity:** increased turbidity, because erosion increases, because vegetation no longer holds soil in place or buffer acted as a filter strip that removed pollutants before they enter water  
(Answer must show that turbidity is caused by sediment in the water in order to get 1 point)

**6. Which of the following is NOT true? (Choose one answer.) (1 point) (d)**

- a) Moving organisms from one habitat to another may kill them.
- b) Organisms could become invasive if they are too successful in a foreign environment.
- c) Introducing non-native organisms can affect the food-web relationships.
- d) Organisms that are released into a new habitat always adapt to survive, benefiting their new environment.

**7. What three characteristics are most likely to allow a non-native species to successfully invade a habitat? (Circle three answers.) (3 points) (a, f, g)**

- a) able to live in a wide range of temperatures
- b) eat a lot of only one type of food
- c) have a diversity of predators
- d) have only one offspring per year
- e) live in a narrow, focused range of habitats
- f) eat many types of food
- g) have no predators

\_\_\_\_/ 8 pts

**8. What does the presence of an aquatic biological indicator tell us? (1 point) (b)**

- a) This species is a nuisance and must be removed from this ecosystem as soon as possible.
- b) This species needs certain conditions to survive, so if the species is here, then we can make assumptions about the quality of the water.**
- c) An indicator species is always protected under the Endangered Species Act.
- d) If there are too many biological indicators, we know that we need to use biological controls.

**9. How do harmful concentrations of lead generally get into drinking water? (1 point) (d)**

- a) Lead occurs naturally in high concentrations in certain areas of the world.
- b) Lead is added to water to remove the chlorine after chlorine has been added.
- c) Lead is a byproduct of the natural decaying of organic materials that often cannot be filtered out at drinking water facilities.
- d) Lead is leached from the pipes delivering water to the faucet.**

**10. Name two ways that E. coli and other bacteria can enter a waterway. (2 points)**

Untreated sewage; storm drains; Combined Sewer Overflows (CSO's); wastewater treatment facilities; naturally in the environment; wildlife, domestic animals, and birds; farmland and road runoff; human sewage from recreational boats and septic systems; land application of animal waste

**11. In our current energy situation, many people are interested in investing in renewable sources. Name three reasons why installing new dams might be harmful to the aquatic environment (3 points).**

Dams change the cycle of water flow; alter flooding, erosion, and deposition patterns; change seasonal temperature patterns, chemical dynamics (oxygen deprived water in reservoir); change riparian habitat composition; loss of fish habitat, blockage of passage for spawning cycle; turbines injure and kill fish

\_\_\_\_ / 7 pts

**12. If you are building a GIS for your watershed, list four layers you would want to include to investigate watershed health. (4 points)**

streams/lakes/waterways, wetlands, topography, land use, canopy cover, any water quality parameters, habitat types, roads, impervious surface, population density (as long as they answer with something that can be measured and indexed spatially, they get the points)

**13. Which of the following is NOT a likely use for GIS? (1 point) (c)**

- a) Proximity analysis to determine where to site a shopping mall
- b) Mapping a riparian buffer zone
- c) Determining food consumption rates for endangered species
- d) Urban land use planning

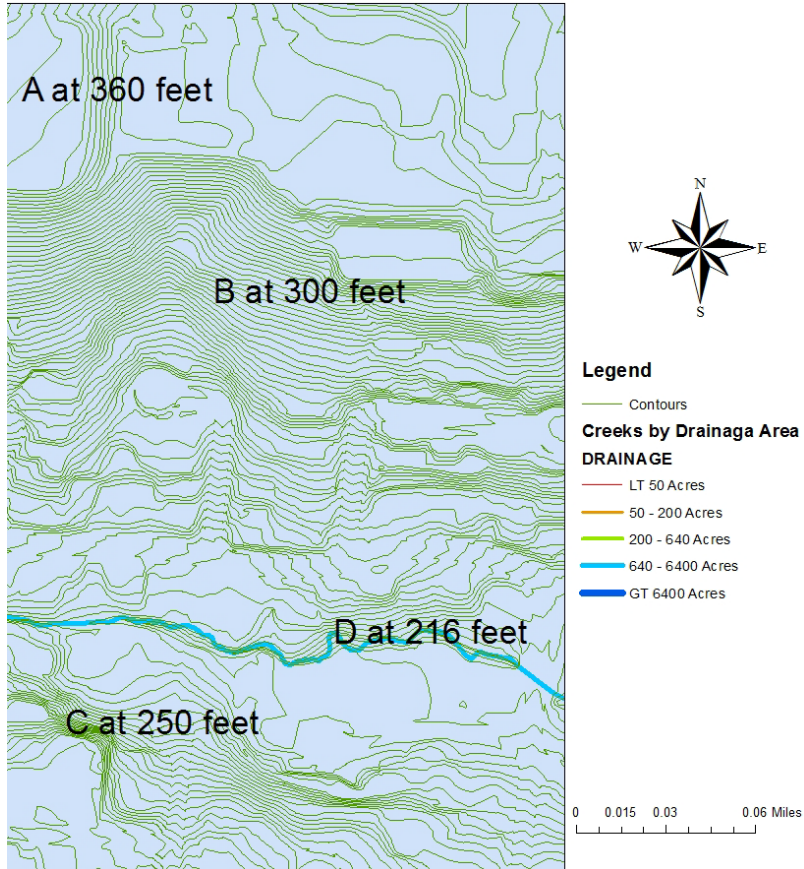
**14. Water has a very high surface tension, meaning that it tends to group together in drops rather than spread out in a thin film. Surface tension is responsible for capillary action. In which process is capillary action occurring? (1 point) (a)**

- a) Water moving through tree roots
- b) Water flowing through a stream
- c) Cloud formation through condensation
- d) Water evaporating off the surface of a lake

**15. List five water pollutants that can enter the waterways through storm water runoff. (5 points)**

Fertilizers, herbicides and insecticides; Oil, grease and toxic chemicals; Sediment, silt, soil or dirt; Salts; Bacteria and nutrients; Heavy metals; Pathogens; Phosphorous; Phosphate; Nitrogen; Nitrate; PCB; DDT, Acids; Lead, mercury, zinc, cadmium

\_\_\_\_ / 11 pts



16. Which point in the watershed notes the creek (circle one)? (1 point)

A                      B                      C                      **D**

17. Which point is located in the flattest area (circle one)? (1 point)

**A**                      B                      C                      D

18. Which point in the watershed is located on the steepest slope (circle one)? (1 point)

A                      B                      **C**                      D

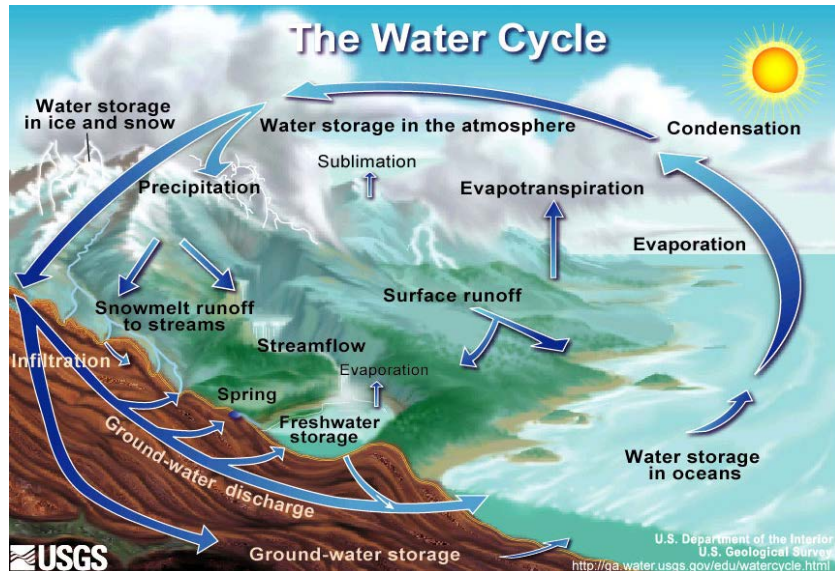
19. How many feet above the creek is point C? (1 point)

  34   feet

20. Rain that falls on point C most likely flows which direction? (1 point)

- a) South
- b) Northeast
- c) Southwest
- d) West

\_\_\_\_ /5 pts



21. In what process of the water cycle do trees move water? (1 point) (a)
- a) **evapotranspiration**                      c) precipitation  
 b) groundwater storage                      d) sublimation
22. Which water cycle process best indicates that precipitation is not infiltrating?(1 pt) (d)
- a) evaporation                                      c) sublimation  
 b) groundwater storage                      **d) surface runoff**
23. Which process needs to occur to replenish aquifers? (1 point) (c)
- a) condensation                                      **c) infiltration**  
 b) groundwater discharge                      d) surface runoff
24. Impervious surfaces do which of the following? (1 point) (b)
- a) reduce condensation                      c) reduce evapotranspiration  
**b) reduce infiltration**                      d) reduce runoff
25. What type of land use is most associated with increased impervious surfaces? (1 pt) (a)
- a) urban development**                      c) timber harvesting  
 b) grazing livestock                              d) parks and green space

\_\_\_\_ / 5 pts

**26. How does the water cycle relate to the process of soil salinization? (1 point) (a)**

- a) Evaporation of water from the surface of poorly drained soil leaves salts behind.
- b) Infiltration of irrigation water causes groundwater to deposit salts within the soil.
- c) Groundwater storage in areas near a desert concentrates salts in the soil.
- d) Condensation and precipitation of sea water deposits salt on agricultural lands.

**Stream order is a method of classifying stream size that gives hydrologists an idea of the size and strength of specific waterways within stream networks. A first order stream is the smallest and has no tributaries. The world's largest river, the Amazon in South America, is considered a 12th order stream. The Columbia River is a 9th order stream.**

**27. Which statement about streams is true? (1 point) (b)**

- a) The headwaters of a stream are usually made up of 5<sup>th</sup> order and higher streams.
- b) As stream order goes up, the drainage area of the stream also goes up.
- c) First order streams are often important transportation and shipping corridors.
- d) The top end of a stream, where its flow begins, is called its mouth. The bottom end is called its source.

**28. Stream order is often associated with certain physical characteristics. Which statement is most correct? (1 point) (b)**

- a) First and second order streams are usually less steep and flow more slowly than larger order streams,.
- b) Biologists can use stream order to help determine the types of habitats that might be present in a section of a stream network.
- c) As the slope of a stream increases, a stream generally widens
- d) A first order stream always has a greater volume of water flowing in it than a second order stream.

\_\_\_\_ / 3 pts

**29. What is the link between nutrients and low dissolved oxygen? (1 point) (a)**

- a) Excess nutrients can cause algal blooms. When the blooms decompose, they reduce the dissolved oxygen.
- b) If not dissolved properly, nutrients can decrease the temperature of water, thereby decreasing the amount of dissolved oxygen.
- c) Nutrients break down and neutralize the water's pH. If the pH is neutral, then the dissolved oxygen is depleted.
- d) There is no link between nutrients and dissolved oxygen.

\_\_\_\_\_ / 1 pts

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_____	<b>Page 3/ 7 Points Possible</b>
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_____	<b>Page 5/ 5 Points Possible</b>
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<b>Total Points:</b>	<b>_____ /50</b>