Water Quality
Freshwater Ecology – Station 1

Multiple-Choice Questions (multiple answers are possible: a & c or a, c, and d) or Fill-in the Blank, and Short Answers

1. The hydrologic cycle is a term which describes
    a. the eventual loss of all water from the earth
    b. why three-fourths of the earth's surface is covered by water
    c. when we can expect heavy rains and floods
    d. the continuous natural recycling of water on the earth

2. In which form is water the purest?
    a. solid ice
    b. clear liquid
    c. steam vapor
    d. combination of ice and water

3. What does the term, "potable," refer to with regard to water? _____

4. What do we call the accumulation of heavy metals and pesticides in the food chain?
    a. biomagnification
    b. predation
    c. biogenesis
    d. necrosis

For a freshwater ecosystem, decide if each of the following factors is a biotic or an abiotic factor. Put a "B" if it is a biotic and an "A" if it is an abiotic.

5. _____ sunlight
6. _____ dragonfly nymph
7. _____ water

8. _____ rain
9. _____ bacteria
10. _____ rocks

11 Using standard water sampling techniques, how would you verify the origin of point-source pollution in a stream?
    a. Test for O_2
    b. Test downstream
    c. Test upstream
    d. Test above and below the suspected source

12. Explain why you chose the above answer

_____
_____
_____

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   a. the eventual loss of all water from the earth
   b. why three-fourths of the earth's surface is covered by water
   c. when we can expect heavy rains and floods
   d. the continuous natural recycling of water on the earth

2. In which form is water the purest?
   a. solid ice
   b. clear liquid
   c. steam vapor
   d. combination of ice and water

3. What does the term, "potable," refer to with regard to water? ___drinkable_____

4. What do we call the accumulation of heavy metals and pesticides in the food chain?
   a. biomagnification
   b. predation
   c. biogenesis
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For a freshwater ecosystem, decide if each of the following factors is a biotic or an abiotic factor.
Put a "B" if it is a biotic and an "A" if it is an abiotic.

5. _____a_____ sunlight
6. _____b_____ dragonfly nymph
7. _____a_____ water

8. _____a_____ rain
9. _____b_____ bacteria
10. _____a_____ rocks

11. Using standard water sampling techniques, how would you verify the origin of point-source pollution in a stream?
    e. Test for O2
    f. Test downstream
    g. Test upstream
    h. Test above and below the suspected source

12. Explain why you chose the above answer _____

13. As the water quality index (WQI) of a stream increases, the biodiversity
    a. increases
    b. deceases
    c. remains the same
    d. is static

14. Name two types of fish that live in poor water quality?

    _____ & _____

15. What is this fish's common name?
    (Hint: Species include rainbow,
    brook, lake and steelhead)

16. What type of water would you expect
    to find the fish from question no. 15?
    a. warm temperature and high DO
    b. warm temperature and low DO
    c. cold temperature and high DO
    d. cold temperature and low DO

17. Diatoms are a major group of algae.
    As a result, diatoms are considered
    a. zooplankton
    b. microplankton
    c. phytoplankon
    d. photoplankton
    e. none of the above

18. If you were to construct a food chain,
    diatoms would be considered
    a. primary consumers
    b. producers
    c. decomposers
    d. producers and decomposers

19. What do most water treatment plants in the United States
    use as a disinfectant? _____

20. True or false, the picture is of a sanitary sewer.

13. As the water quality index (WQI) of a stream increases, the biodiversity
    e. increases
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    h. is static

14. Name two types of fish that live in poor water quality?

    _____catfish_____ & _____carp_____

15. What is this fish's common name? trout
    (Hint: Species include rainbow,
    brook, lake and steelhead)

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    to find the fish from question no. 15?
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18. If you were to construct a food chain,
    diatoms would be considered
    j. primary consumers
    k. producers
    l. decomposers
    m. producers and decomposers

19. What do most water treatment plants in the United
    States use as a disinfectant? _chlorine_____

20. True or false, the picture is of a sanitary sewer. False

Water Quality
Freshwater Ecology – Station 2

Multiple-Choice Questions (multiple answers are possible: a & c or a, c, and d) or Fill-in the Blank, and Short Answers

1. Benthic invertebrates can be a very informative group to study because they are sensitive to _____ and _____ changes.
   a. chemical and physical
   b. turbidity and oxygen
   c. chemical and oxygen
   d. viruses/bacteria and turbidity

2. Name the benthic invertebrates equipment (that the arrow is pointing at).

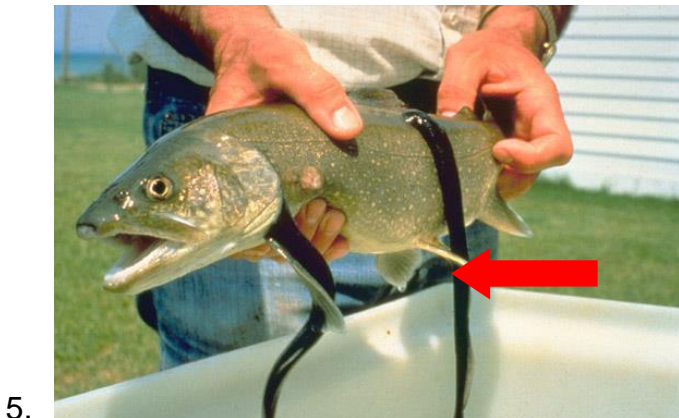3. Mayflies are important indicators of WQI. How long does an adult live?
   a. A week
   b. A month
   c. A day
   d. It is unknown how long it lives.

4. What is the ecological importance of benthic macro invertebrates?
   _____
   _____

For the following pictures, name the invasive species.

5.

6.

Water Quality
Freshwater Ecology – Station 2

Multiple-Choice Questions (multiple answers are possible: a & c or a, c, and d) or Fill-in the Blank, and Short Answers

1. Benthic invertebrates can be a very informative group to study because they are sensitive to _____ and _____ changes.
    - e. chemical and physical
    - f. turbidity and oxygen
    - g. chemical and oxygen
    - h. viruses/bacteria and turbidity

2. Name the benthic invertebrates equipment (that the arrow is pointing at). D-net

3. Mayflies are important indicators of WQI. How long does an adult live?
    - a. A week
    - b. A month
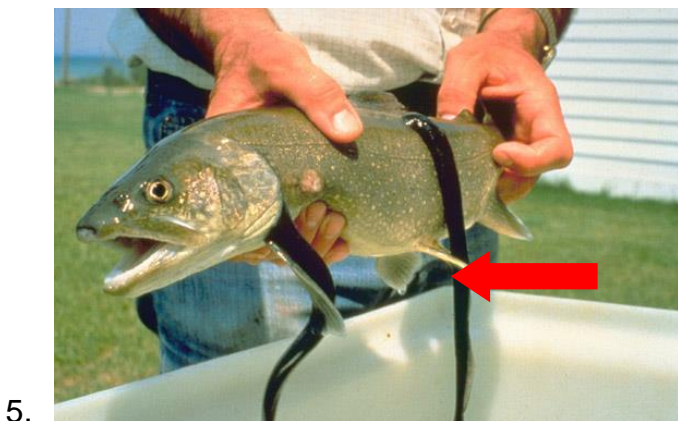   - c. A day
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_____

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For the following pictures, name the invasive species.

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6.

On May 22, 2011, Clinton River Watershed conducted their spring sampling for the north branch of the river. They collected the following macroinvertebrates. Identify the macroinvertebrates.

7.

2

8.

1

9.

3

10.

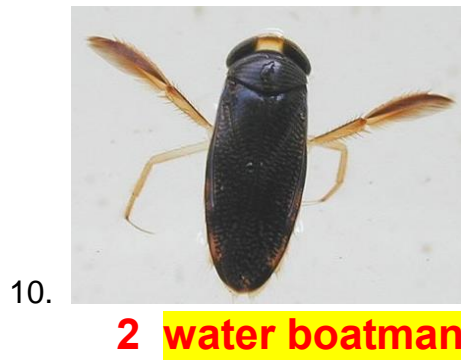**2**

11.

3

12.

4

13.

2

14.

1

15.

2

On May 22, 2011, Clinton River Watershed conducted their spring sampling for the north branch of the river. They collected the following macroinvertebrates. Identify the macroinvertebrates.

7.
2 dragonfly

8.
1 stonefly

9.
3 black fly

10.
2 water boatman

11.
3 gilled

12.
4 mosquito

13.
2 damselfly

14.
1 giant water bug

15.
2 water strider

Water Quality
Freshwater Ecology – Station 3

**Multiple-Choice Questions (multiple answers are possible: a & c or a, c, and d),
True or False, and Short Answers**

1. The water quality index (WQI) is used by man to evaluate and compare waters the world over. Which of the nine tests is weighted the highest?
    - a. nitrates
    - b. O_2
    - c. pH
    - d. phosphates

2. The two major purposes of sampling in the water environment are:
    - a. To establish a baseline
    - b. To determine the pollution
    - c. To test for acid
    - d. To decide whether or not you can drink it

3. Name the testing equipment

4. The testing equipment in question no. 3 is used to measure
    - a. the dissolved material in the water
    - b. light penetration of a lake or pond
    - c. flow of a stream or river
    - d. the depth of silt on the bottom of a lake

5. The test for turbidity describes what characteristics of water?
    - a. odor
    - b. mineral concentration of the water
    - c. suspended material in the water
    - d. metal concentration of the water

6. True or false, the greater the turbidity is, the warmer the water is.

7. The largest source of O_2 in freshwater streams is the _____.

Water Quality - Key
Freshwater Ecology – Station 3

**Multiple-Choice Questions (multiple answers are possible: a & c or a, c, and d),
True or False, and Short Answers**

1. The water quality index (WQI) is used by man to evaluate and compare waters the world over. Which of the nine tests is weighted the highest?
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   a. To establish a baseline
   b. To determine the pollution
   c. To test for acid
   d. To decide whether or not you can drink it

3. Name the testing equipment   secchi disk

4. The testing equipment in question no. 3 is used to measure
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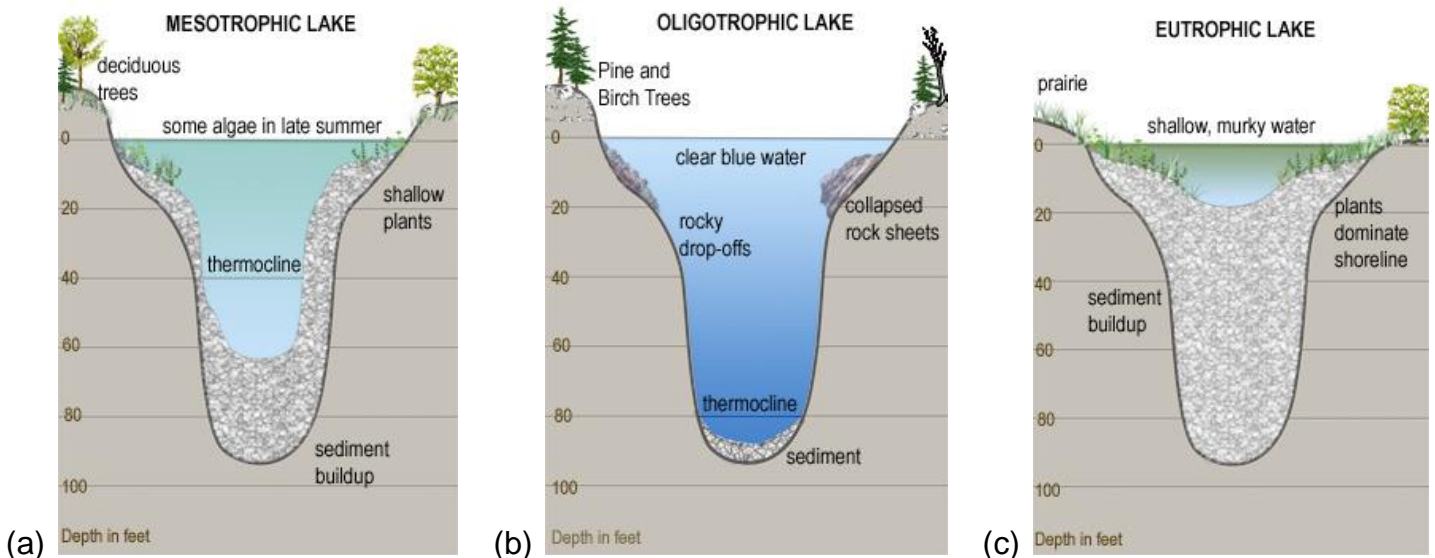   c. suspended material in the water
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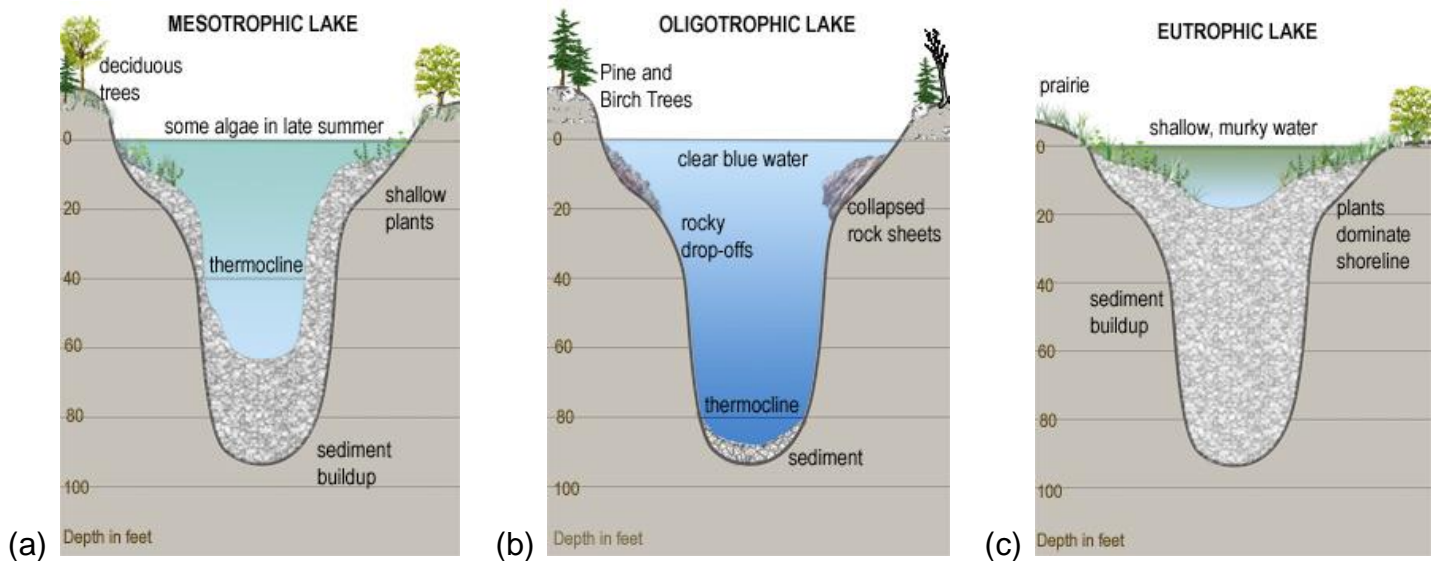6. True or false, the greater the turbidity is, the warmer the water is. True

7. The largest source of O_2 in freshwater streams is the _____sunlight_____.

8. Which holds more DO (Dissolved Oxygen)?
   a. water at 20⁰ C
   b. water at 10⁰ C
   c. water at 5⁰ C
   d. water at 25⁰ C
   e. The temperature does not have any effect on the dissolved oxygen levels.

8. Fecal coliform levels are monitored because
   a. they cause diseases in humans
   b. pathogens are relatively scarce in water, making them difficult to monitor directly.
   c. there is a correlation between fecal coliform counts and the probability of contracting a disease from water
   d. there is a correlation between fecal coliform counts and the level of nitrites in the water.

9. Which of the following represents the amount of oxygen required for the microbial decomposition of the organic matter in water?
   a. Total suspended solids (TSS)
   b. Biological oxygen demand (BOD)
   c. Chemical oxygen demand (COD)
   d. Total Kjelhahl nitrogen (TKN)

10. A best management practice is to limit livestock access to streams . why is this done?
   a. reduce stream bank erosion
   b. reduce nutrient enrichment
   c. reduce the temperature of the water
   d. reduce turbidity

11. Which of the bottom pictures represents a lake that is "truly nutrient rich" from phosphorus and nitrogen?

(a) MESOTROPHIC LAKE (b) OLIGOTROPHIC LAKE (c) EUTROPHIC LAKE

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(a) MESOTROPHIC LAKE

(b) OLIGOTROPHIC LAKE

(c) EUTROPHIC LAKE

12. The water temperature of a river is very important for water quality. Many of the physical, biological, and chemical characteristics of a river are directly affected by temperature. For example, temperature influences
    a. the amount of oxygen that can be dissolved in water
    b. the metabolic rates of aquatic organisms
    c. the results of biological oxygen test
    d. the rate of photosynthesis by algae and larger aquatic plants

13. You are serving as a research scientist with the Environmental Protection Agency. You are monitoring the temperature of rivers in an area. Because of poor management in the past, five of the major rivers in your area were in danger. Your team designed and executed five different projects (one per river). You compared current information with temperatures from the same time last year. The results are summarized in the table below. Of the five different measures you took, which river benefited most from the actions you took?

River	Treatment	Last year's Temp (°C)	This year's temp (°C)
Clinton	Plant trees along the banks	17°C	16.5°C
Grand	Plant vines along the banks to prevent erosion	18°C	14°C
Chattanooga	Add aquatic plants to the river	16°C	16°C
Ohio	Limit dumping of wastewater from an electric plant	13°C	10°C
East	Dam the river to limit its flooding	16°C	18°C

        a. The Clinton
        b. The Grand
        c. The Chattanooga
        d. The Ohio
        e. The East

14. Water hardness is used to describe the concentrations of _____ and _____.

15. Hard water is a term commonly used to describe
        a. groundwater found arid areas
        b. water with many dissolved ions
        c. water distilled from acid rain
        d. water from polluted water

16. Which of the following is not a result of cultural eutrophication of a lake?
        a. increased algal blooms
        b. increased sedimentation
        c. increased transparency
        d. decreased species diversity
        e. decreased DO concentrations

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14. Water hardness is used to describe the concentrations of __calcium__ and _magnesium___.

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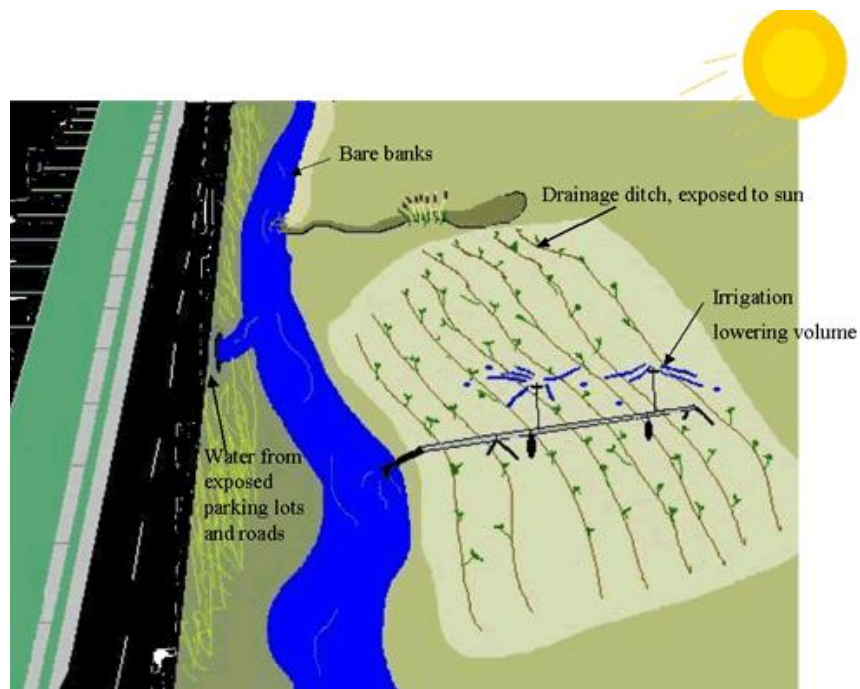   d. water from polluted water

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17. The addition of additional nitrogen and phosphorus to aquatic systems will
    a. increase algae and decrease O_2
    b. increase O_2 and decrease algae
    c. increase the number of fish
    d. decrease productivity

18. Which of the following can affect the pH of a body of water?
    a. minerals in the water
    b. algae that live in the water
    c. chemicals that you pour into the water

19. Waters color is often used in water quality monitoring. Each fall when dead leaves collect in a stream, acids are released from decaying plants causing the color of the stream to change. What color indicates this naturally occurring event?
    a. orange to red water
    b. yellow-brown to dark brown water
    c. greenish water
    d. no change in the color of the water

20. _____is the most important variable in the success of a water quality monitoring program.
    a. Fecal coliform
    b. Dissolved oxygen
    c. Community involvement
    d. Phosphorous

Tiebreaker
Using the picture below, explain all of the possible human caused problems that can occur. In addition, what types of chemical testing would you perform to confirm your suspicions?

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18. Which of the following can affect the pH of a body of water?
   d. minerals in the water
   e. algae that live in the water
   f. chemicals that you pour into the water

19. Water's color is often used in water quality monitoring. Each fall when dead leaves collect in a stream, acids are released from decaying plants causing the color of the stream to change. What color indicates this naturally occurring event?
   e. orange to red water
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