

Section 2 Aquatic Macroinvertebrates

Your team of biologists are surveying two streams. Identify the macroinvertebrates in each stream and answer questions about them. Calculate the Biotic Index Score for each stream and determine the health of each stream. The number of each type of organisms that was collected by your team is indicated after the organism.

Stream A Macroinvertebrate Identification

| Organism ID | No. of organisms collected | Class |
|---|----------------------------|-----------|
| Organism A1 _____ Water Strider _____ | (3 organism found) | ____5____ |
| Organism A2 ____Pred. Diving Beetle _____ | (1 organisms found) | ____5____ |
| Is this organism an herbivore, carnivore, or omnivore? __Carnivore _____ | | |
| Organism A3 ____Blood Worm _____ | (4 organisms found) | ____4____ |
| Organism A4 ____tubifex _____ | (2 organisms found) | ____4____ |
| Organism A5 ____Dragonfly Larvae _____ | (1 organisms found) | ____2____ |
| Is this organism an herbivore, carnivore, or omnivore? ____Carnivore_____ | | |
| Organism A6 ____Black Fly _____ | (4 organism found) | ____3____ |
| Organism A7____Mosquito _____ | (3 organism found) | ____5____ |
| Organism A8____Damsel Fly _____ | (1 organism found) | ____2____ |

Stream A Biotic Index Score: How Healthy is Stream A?

Calculate the Biotic Index Score for each stream and determine the health of each stream. Multiply the number of organisms found in each class (1-4) by their class number. Divide the total value by the total number of organisms in classes 1-4 to determine the Biotic Index score for Stream A. (Class 5 are air breathing macroinvertebrates and will not be included in this particular index score.)

| <u>Total Organisms</u> | <u>Total Value</u> |
|---|--------------------|
| No. of organisms from class 1 ____0__ x 4 = ____0__ | |
| No. of organisms from class 2 ____2__ x 3 = ____6__ | |
| No. of organisms from class 3 ____4__ x 2 = ____8__ | |

No. of organisms from class 4 6 x 1 = 6

TOTAL ORGANISMS (a) 12 TOTAL VALUE(b) 20

Divide totaled value (b) 20 by total no. of organisms (a) 12 for index score: 1.67

| |
|---------------------------|
| How Healthy is the Steam? |
| Excellent 3.60+ |
| Good 2.60 – 3.59 |
| Fair..... 2.10 – 2.59 |
| Poor 1.0 - 2.09 |

How Healthy is Stream A? _____ Poor _____

| |
|---|
| Correct points earned for Stream A = _____ /32 points |
|---|

Stream B Macroinvertebrate Identification

| Organism ID | No. of organisms collected | Class |
|---|-----------------------------|----------|
| Organism B1 <u>Dragon Fly</u> | <u>(1 organism found)</u> | <u>2</u> |
| Organism B2 <u>Dobson Fly</u> | <u>(1 organisms found)</u> | <u>1</u> |
| Organism B3 <u>Stonefly</u> | <u>(3 organisms found)</u> | <u>1</u> |
| Organism B4 <u>Mayfly</u> | <u>(3 organisms found)</u> | <u>1</u> |
| Complete or incomplete metamorphosis? <u>Incomplete</u> | | |
| Organism B5 <u>Giant Water Beetle</u> | <u>(1 organisms found)</u> | <u>5</u> |
| Organism B6 <u>Planaria or Flat Worm</u> | <u>(3 organisms found)</u> | <u>3</u> |
| Organism B7 <u>Caddisfly</u> | <u>(2 organisms found)</u> | <u>1</u> |
| Organism B8 <u>Stonefly</u> | <u>(2 organisms found)</u> | <u>1</u> |

Which organism found in Stream B belongs to the life cycle of Organism B8? Organism B3

Does organism B8 have a complete or incomplete life cycle? Incomplete

Circle the correct food chain:

Diatoms → Mayfly larvae → Damsel fly larvae → Brook Trout

Caddis fly larvae → Mayfly larvae → Damsel fly larvae → Bluegill

Dinoflagellates → Damsel fly larvae → Mayfly larvae → Brook Trout

Which organism in Stream B requires has external gills and requires the most dissolved oxygen? Stonefly

Stream B Biotic Index Score: How Healthy is Stream B?

Calculate the Biotic Index Score for each stream and determine the health of each stream. Multiply the number of organisms found in each class (1-4) by their class number. Divide the total value by the total number of organisms in classes 1-4 to determine the Biotic Index score for Stream B. (Class 5 are air breathing macroinvertebrates and will not be included in this particular index score.)

Total Organisms Total Value

No. of organisms from class 1 11 x 4 = 44

No. of organisms from class 2 1 x 3 = 3

No. of organisms from class 3 3 x 2 = 6

No. of organisms from class 4 0 x 1 = 0

TOTAL ORGANISMS (a) 15 TOTAL VALUE(b) 53

Divide totaled value (b) 53 by total no. of organisms (a) 15 for index score: 3.53

| | |
|---------------------------|-------------|
| How Healthy is the Steam? | |
| Excellent | 3.60+ |
| Good | 2.60 – 3.59 |
| Fair..... | 2.10 – 2.59 |
| Poor | 1.0 - 2.09 |

How Healthy is Stream B ? _____ Good _____

Points earned for Stream B = _____ / 35 points

Tie Breaker: Why can Blood Midge survive in low oxygen environments? _____
The iron containing compound haemoglobin allows larvae to respire in low oxygen.

Section 3 Water Analysis

Part A Salinometer

Using the Hydrometer or Salinometer that your team constructed, measure the salt concentrations. List the order from lowest salt concentration to the greatest salt solution and state the percent salt concentration.

| | Lowest | | | Highest |
|---------------------------|--------|---|---|---------|
| Salt Solution Order (A-D) | D | B | A | C |
| % Concentration | 0 | 2 | 6 | 9 |

(Salt solution order scores: 2 points for correct order, 1 point for 1 difference)

(% concentration scores: 2 points for the exact percent salt solution, 1 point for 1 percent low or high, 0 points for more than 1 point difference)

Part A Points _____/16

Part B Section 3

- 3.5 ___1. An ocean typically has a percent salinity of _____.
- C ___2. Which of the water samples above is most likely to have the least amount of oxygen?
(A, B, C, or D)
- A ___3. Which is saltiest?
a. Ocean water
b. River water
c. Estuary water
d. Great Lakes
- d ___4. The percent salinity in an estuary is:
a. 1%
b. 5%
c. 10%
d. depends on the rise and fall of the tide.
- b ___5. Scientists measure the amount of salt in the water (salinity) in:
a. ppt = parts per ton
b. ppt = parts per thousand
c. ppm = parts per million
d. gpb = grains per bucket
- d ___6. Which of the following is not a measure of water clarity?
a. algae populations
b. turbidity
c. secchi disk measurements
d. alkalinity

Part B Points _____/6

Total points earned for Section 3 Part A and B = _____/22 points

Tie Breaker Questions (only scored if needed for breaking a tie):

Describe the effect on the pH of nearby water from:

a farm applying lime to an alfalfa field. _____

a coal burning factory. _____

a pine forest. _____

Name the three ways oxygen gas is dissolved in a stream: