

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Lab 4.1.7A Pond Exploration

**QUESTION:** How does the surrounding land contribute to the health of a pond-water system?

**HYPOTHESIS:** \_\_\_\_\_

### EXPERIMENT:

<b>You will need:</b>	• 2 water hardness test strips	• tweezers
• tape measure	• 2 litmus paper strips	• ice cube tray
• jar	• 2 ammonia test strips	• hand lenses
• thermometer	• 2 nitrate test strips	• pipette
• vial	• sieve	• D-frame aquatic dip net
• dissolved oxygen test kit	• bucket	

Steps:

### Site Description

1. Topography surrounding the pond: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Current latitude/longitude: \_\_\_\_\_

3. Site length (meters): \_\_\_\_\_

4. Minimum pond width (meters): \_\_\_\_\_

5. Maximum pond width (meters), if measurable: \_\_\_\_\_

6. Number of transects: \_\_\_\_\_

7. What is the dominant vegetation type in the area (none, cultivated, meadow, scrub, or forest)? Is the vegetation located on both sides of the pond? \_\_\_\_\_

\_\_\_\_\_

8. Is the dominant substrate silt/sand (<2 mm), pebbles (2–8 mm), gravel (8–64 mm), cobblestone (64–256 mm), or boulders (>256 mm)? \_\_\_\_\_

\_\_\_\_\_

9. What is the estimated overhead forest cover (none, 1%–25%, 26%–50%, 51%–75%, or 76%–100%)? \_\_\_\_\_

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## **Lab 4.1.7A Pond Exploration**

10. Describe the weather conditions, any notable or unusual site conditions, sampling problems, and sightings or observations—including plants, animals, invasive species, and human activities.

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11. Identify and describe any potential sources of pollution seen on or near the site.

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12. Sketch all pond features, transects, vegetation, and nearby permanent features, including roads, buildings, paths, and bridges. Label features according to a map legend and indicate directions.

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## **Lab 4.1.7A Pond Exploration continued**

### **Turbidity**

Turbidity measures the cloudiness of water. The greater the turbidity of the water, the less life it can support. Water becomes turbid, or cloudy, when the suspended solids in the water increase. Soil erosion, urban runoff, waste discharge, algal blooms, and pond substrate disturbance all contribute to increased turbidity.

1. Place the jar with a sticker horizontally in the water and gently sweep the jar from side to side for 15 seconds.
2. Once the jar is full of water, remove it from the pond, and look through the top to observe the sticker on the bottom of the jar. Is the sticker 100% visible, 50% visible, or 0% visible? \_\_\_\_\_

### **Temperature**

Different species thrive at different water temperatures. If the temperature changes in a short amount of time, animals can experience stress, and decreased oxygen levels may be present. A temperature of 13°C is ideal during the fall and spring months.

1. Place a jar in the pond water at least 10 cm below the surface.
2. After 1 minute has elapsed, remove the jar and use a thermometer to record the temperature of the water in the jar. \_\_\_\_\_ °C

### **Dissolved Oxygen**

Ponds with higher amounts of dissolved oxygen support more life. Oxygen levels are reduced when water becomes polluted with fertilizers, sewage, animal feces, and garden waste, which use oxygen to decompose.

1. Submerge a jar in the pond water for 20 seconds.
2. Withdraw the jar from the pond and use it to completely fill a small vial.
3. Take 2 oxygen tablets from the dissolved oxygen test kit, drop them into the vial, and place the lid on the vial. Water should overflow out of the vial.
4. Invert the vial for about 5 minutes until the oxygen tablets are fully dissolved.
5. The water color should change 5 minutes after the tablets have fully dissolved.
6. Follow the directions in the oxygen test kit to record the amount of oxygen dissolved in the water sample. \_\_\_\_\_ ppm

### **Water Hardness**

A water hardness test measures the amount of calcium and magnesium present. If the level is high, this indicates there is too much algae. If the level is low, very little algae is present. To raise the calcium and magnesium levels, different salt solutions (not table salt) can be added to the water. A normal water hardness level ranges between 150 and 330 ppm.

1. Fill a vial with pond water.
2. Dip a water hardness test strip in the water and observe the color change.
3. Compare the strip's color to the key on the water hardness test strip container and record the value. \_\_\_\_\_ ppm

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### pH

Most aquatic animals thrive in a water pH range of 6.5–8.0. Acid rain and waste water discharge can affect the natural pH of a water source.

1. Fill a vial with pond water.
2. Dip a litmus test strip in the water and observe the color change.
3. Compare the strip's color to the pH key on the litmus test strip container and record the pH level. \_\_\_\_\_

### Ammonia

Decaying organic material and excess amounts of fish waste can contribute to a high ammonia level in pond water. If the ammonia level is too high, different types of bacteria can be added to the water. An ideal ammonia reading is <0.1 ppm.

1. Fill a vial with pond water.
2. Dip an ammonia test strip in the water and observe the color change.
3. Compare the strip's color to the ammonia key on the ammonia test strip container and record the value. \_\_\_\_\_ ppm

### Nitrates

High levels of nitrates can be observed in water that contains a large quantity of plant life or algae. If the nitrate level is too high, buffers can be created between the water source and the pollution source, along with limiting the use of fertilizers. An ideal nitrate level is <20 ppm.

1. Fill a vial with pond water.
2. Dip a nitrate test strip in the water and observe the color change.
3. Compare the strip's color to the nitrate key on the nitrate test strip container and record the value. \_\_\_\_\_ ppm

### Organisms

1. Use the jar to collect a water sample from just below the water surface.
2. Pour the water through a sieve and into a bucket.
3. Use tweezers to place any organisms into compartments in an ice cube tray. Use a pipette to add a little water to each compartment to keep the organisms moist.
4. Use a pipette to gather small organisms from the bucket that passed through the sieve and add them to the ice cube tray.
5. Examine the organisms with a hand lens and draw them in the space provided.
6. Return the organisms to the pond.
7. Repeat Steps 1–6 with water drawn from halfway between the surface of the pond and the bottom of the pond.
8. Repeat Steps 1–6 with water drawn from near the bottom of the pond.
9. Using a D-frame aquatic dip net, make several slow back-and-forth sweeps through the pond.
10. Use the space provided to draw and label the organisms in the net.

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## ***Lab 4.1.7A Pond Exploration continued***

**Surface Organisms Drawings**

**Middle Organisms Drawings**

**Bottom Organisms Drawings**

## **Lab 4.1.7A Pond Exploration**

### **ANALYZE AND CONCLUDE:**

**1.** Using the data, is the overall health of the pond good, fair, or poor? Explain.

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**2.** What factors contributed to the health of the pond? \_\_\_\_\_

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**3.** How could the health of the pond be improved? \_\_\_\_\_

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**4.** What kind of impact would high turbidity have on the animals and plants in the pond habitat? \_\_\_\_\_

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**5.** What kind of impact would the removal of vegetation around the water have on the pond habitat? \_\_\_\_\_

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