Name _____ Date _____

Aquatic Plant Invasion

Before you begin: During this lab activity, you will have to remember what processes occur in plants during the day, and at night. Write a hypothesis about what will happen to the level of dissolved oxygen when a plant is left in the dark overnight:

_____

_____

Procedure:

1. Your teacher will give you two jars with aged tap water and elodea plants, and two jars without plants.
2. Using the dissolved oxygen kit, test the level of DO in the water before you decide where to place your jars.
3. Choose two locations: one with more light than the second. Seal the jars. Place your jars carefully and leave them alone overnight. Make sure that you aren't putting your jar in direct sunlight or by an open window, because you don't want to make temperature another variable.
4. The next day, test the DO levels in both of your jars. Record your results here:

	Initial DO	Final DO	Difference
Plants in high light			
Plants in low light			
No plants in high light			
No plants in low light			

Discussion:

1. Based on your results, did the light act on the water or on the plants?
2. Is light important to aquatic plants? Why or why not?
3. If you were an aquatic plant, what kind of light would you want to live in?
4. What do you think would happen to an animal if you left it in the dark?

(Modified with permission from: "A light snack" 1997. Living in Water, National Aquarium in Baltimore, Kendall Hunt Publishing, Iowa.)

Lab

Now that you have completed the initial investigation, you have a larger challenge! Read the background information to learn more:

The Eurasian Water Chestnut (*Trapa natans*) was introduced to North America in the late 19th century by a well-meaning botanist, who thought the plant was beautiful and useful as a producer of nuts (Kiviat, 1993). The chestnut quickly escaped the lakes where it was introduced, and became a nuisance in the Hudson in the 1950s. Water chestnut is an annual plant that consists of floating leaves, buoyed by air bladders, which is attached to the sediment by a long, tough stem. The plant produces an edible nut that is hard and spiny on the outside, and can remain viable for a decade or more (Kiviat, 1993). It enjoys living in quiet waters up to 5m deep, and often forms dense, impenetrable stands roots that even a kayak or canoe can't get through. Beds of water chestnut cover about 6% of the tidal Hudson River, and it competes with a native species called water celery (*Vallisneria americana*). Water celery is completely submerged in the water column, and covers about 10% of the tidal river (Caraco and Cole, 2002).

Your job is to find out what happens to the levels of dissolved oxygen when a body of water is covered by a floating aquatic plant instead of a submerged aquatic plant. Write a hypothesis that you would like to test below:

_____

_____

With your group, decide how you want to set up your experiment. The following materials are available for you to use:

-jars or 2-liter soda bottles
-elodea plants
-water
-dissolved oxygen kits
-styrofoam
-aluminum foil
-plastic wrap
-thermometers
-algal culture
-fertilizer
-floating plant such as duckweed

Decide what kind of experiment you will set up. You don't need to use all of the materials.

Use the boxes below to draw your experimental setup and your control:

Experimental	Control

Add a written explanation if necessary:

_____
_____
_____

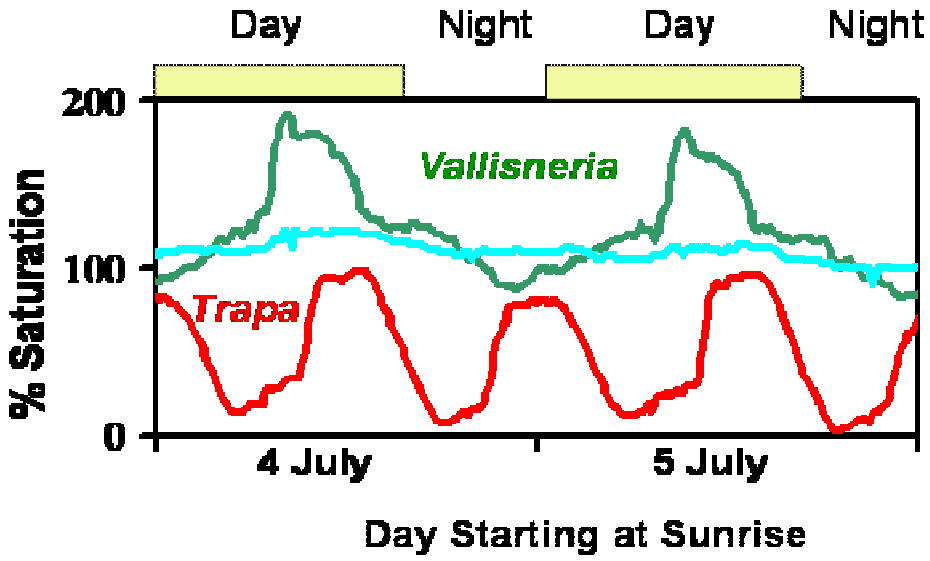
Your experiment may take several days or up to two weeks. You should be prepared to submit a full lab report and make a short presentation to the class with your data. In the discussion of your lab report, please complete an analysis of the data that follows.

Results

Keep track of your results in the space below, or in your lab notebook.

Discussion

These data show the amount of DO over a two-day period for two different areas in the Hudson: one that is dominated by *Vallisneria americana*, the native, submerged aquatic plant, and one that is mostly *Trapa natans*, the invasive, floating water chestnut plant. The line in the middle shows the DO in the middle of the Hudson River, where neither *Vallisneria* nor *Trapa* is present. Modified from Caraco, 2006, "Water chestnut impacts" in Aquatic Invaders.



You should be able to answer the following questions:

1. Describe what happened to the level of dissolved oxygen in the *Vallisneria* bed vs. the *Trapa* bed.
2. When is the lowest level of DO in the *Vallisneria* bed? What do you think causes this? When is the highest level of DO? What do you think causes this?
3. When does the lowest level of DO occur during a normal day in the *Trapa* bed? What do you think causes this?
4. What do you think is the main cause of the DO changes in the *Vallisneria* bed?
5. What do you think is the main cause of the DO changes in the *Trapa* bed?
6. If you were a small fish or aquatic larvae, would you enjoy hiding in the *Trapa* beds? Why or why not?
7. What happened in the results of your experiment?
8. How are the results of your experiment similar to the results of the experiment above?
9. If you were in charge of managing the Hudson River estuary, what would you do with the *Trapa?* What else would you like to know before making the decision?