Name _____   Date _____

Oxygen, Plants, and the Hudson River
Read "Dissolved Oxygen" to help you answer the questions below.

Part 1: Developing Your Hypotheses
1. How does oxygen **naturally** enter the water?

   _____   _____

   _____   _____

2. How is oxygen **naturally** removed from the water?

   _____   _____

   _____   _____

3. During this activity, you will have to remember what process occurs in plants during the day. What is this process called? _____

4. What is the equation that describes this process?

5. Look at the two plants below. Draw an arrow to demonstrate where oxygen goes when it is released from the plant.

Water celery, submerged

Water chestnut, floating

6. In this activity, you will be investigating the dissolved oxygen levels in three different ecosystems of the Hudson River:

Esopus Meadows   Norrie Point   Tivoli Bay Marsh

At Esopus Meadows, there is a lot of water celery growing beneath the water's surface. Water celery is a submerged aquatic plant.

The dissolved oxygen measurements at Norrie Point, on the other hand, were taken in the main channel of the river, where there are fewer producers.

Tivoli Bay Marsh is a wetland ecosystem, where there are a lot of plants that have their roots in the water but their leaves above the surface of the water.

Based on this information, circle higher OR lower to complete the following hypotheses:
a. Dissolved oxygen at Tivoli Bay Marsh will be higher/lower than the dissolved oxygen at Esopus Meadows or Norrie Point.
b. Dissolved oxygen at Esopus Meadows will be higher/lower than the dissolved oxygen at Norrie Point or Tivoli Bay Marsh.

Part 2: Testing Your Hypotheses
1. Go to www.hrecos.org.
2. You are on the main HRECOS website. The map in the left of the page shows the location of all the HRECOS stations. You will be using two HRECOS stations, Norrie Point and Tivoli Bay North.
3. Now that you have identified your station, select the "Current Conditions" box to go to the live HRECOS data page.
4. Now test your hypothesis using HRECOS data. On the Current Conditions page, set the following parameters:
    a. Station1: Norrie Point (hydro)
    b. Parameter1: Dissolved Oxygen
    c. We will not be using Station2 and Parameter2.
    d. Units: English   AND Continuous
    e. Start Date: July 1, 2010
    f. End Date: September 1, 2010
    g. Time Zone: Eastern Time (EST/EDT)

Hit Plot1 to observe dissolved oxygen changes at Norrie Point.

Current Conditions
Going Paddling? Striper Fishing? Check here to find out what conditions are like right now . . . Read More

5. What does the X axis represent?_____ Yaxis?_____

6. Explain the dissolved oxygen changes that you see over the 24 hour period at Norrie Point.

7. Now compare the Norrie Point data with that from Tivoli North Bay. On the Current Conditions page, set the following parameters:
   a. Station1: Norrie Point (hydro)
   b. Parameter1: Dissolved Oxygen
   c. Station2: Tivoli North Bay
   d. Parameter2: Dissolved Oxygen
   e. Units: English **AND** **Daily Average**
   f. Start Date: 7/15/2010
   g. End Date: 7/16/2010
   h. Time Zone: Eastern Time (EST/EDT)
   i. Hit Plot1 vs Plot 2 to observe dissolved oxygen changes in the river.

8. 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:

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

Experimental	Control

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.
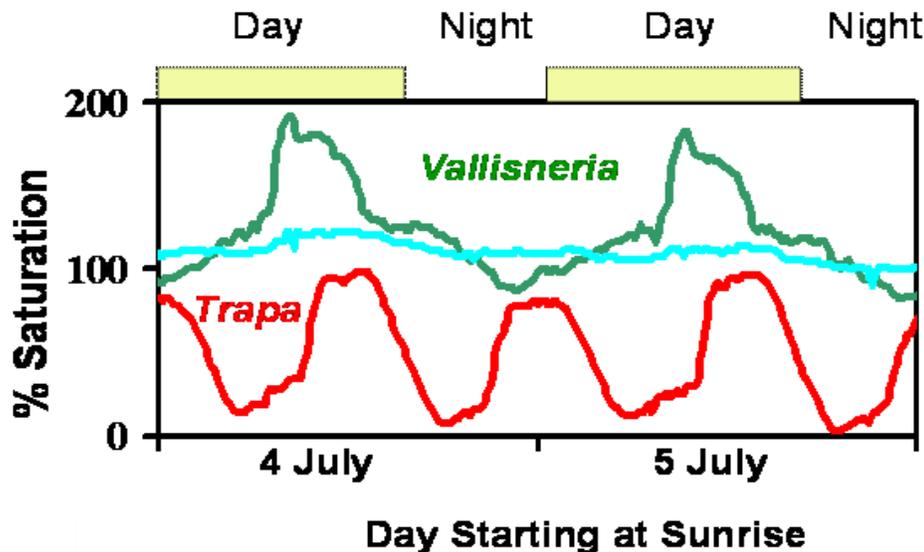
You should be able to answer the following questions:

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?