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. You will be given a curated dataset of hydrological data from Norrie Point and Tivoli Bay North. Your hypothesis from Part 1 can be tested by creating graphs of the data.
2. First you will examine the changes in DO over time at Norrie Point. Create a graph of the dataset in the tab '*Norrie Point Hydro*'.

3. What does the X axis represent?_____Yaxis?_____

4. Explain the dissolved oxygen changes that you see over the three months period at Norrie Point.

5. Now you will compare the Norrie Point data with that from Tivoli North Bay. Notice this comparison is over a 24-hour period.

6. In the '*NP v Tivoli Hydro July 15-16*' tab of the dataset, create a graph of the daily average DO at each site.

7. 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

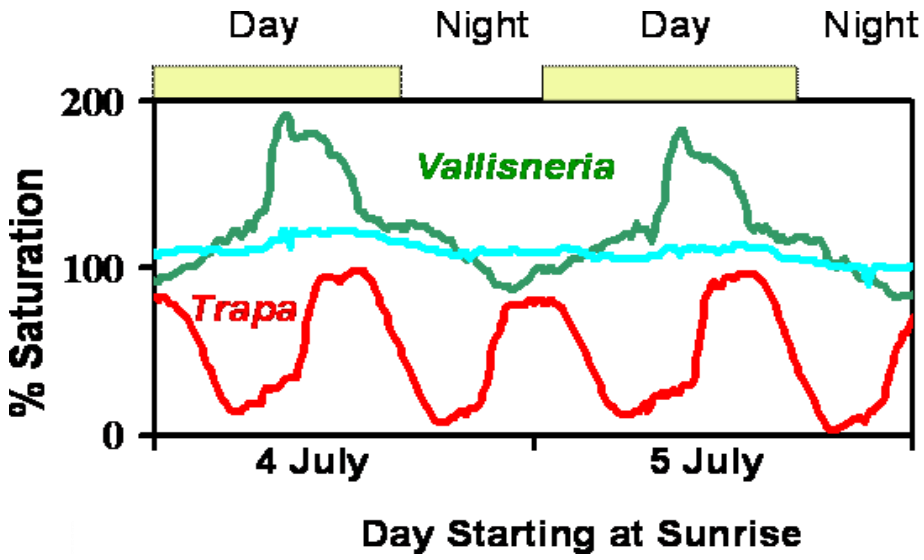
Control

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?