

Name: _____

Date: _____

Feeding Time: How Nutrients Drive Phytoplankton Growth

Part 1: Nutrient Limitation

Using the data table, and your group answers, work individually to answer the following questions about nutrient limitation in several water samples.

Thinking About the Data

1. Looking at the data, which sample had the most phytoplankton? Why do you think the sample you picked had such a high cell count?

2. One of the concepts used to understand biological and nutrient processes in coastal waters is the Redfield Ratio. To grow, many phytoplankton need nutrients to be available in the Redfield Ratio of 16 units nitrogen: 1 unit phosphorus. Calculating the Redfield Ratio for water samples allows researchers to determine if nitrogen or phosphorus is the nutrient limiting phytoplankton growth. Such that when:

Measured ratio > 16:1 phosphorus is limiting

Measured ratio < 16:1 nitrogen is limiting

Measured ratio = 16:1 neither nitrogen nor phosphorus are limiting

- a. Using your data, calculate the Redfield Ratios to determine what nutrient conditions are available to the phytoplankton in each of your water samples.

Sample 1

Nitrogen : Phosphorus

Sample 2

Nitrogen : Phosphorus

Sample 3

Nitrogen : Phosphorus

Sample 4

Nitrogen : Phosphorus

- b. For each of your water samples, indicate if your calculated ratio is greater than or less than 16:1.
 - c. For each of your water samples, indicate which nutrient is limiting, if any.
 3. In Question 1, you found one water sample had more phytoplankton. Now that you have identified your limiting nutrients, write why you think *each* of your other three water samples did not have as many phytoplankton as your choice in Question 1.
4. Answer the following questions about nutrients.
 - a. Based on your water samples which nutrient is needed for phytoplankton growth? Nitrogen? Phosphorus? Both?
 - b. Does the quantity of nutrients matter? Explain your answer using the concept of Redfield Ratios.

Expansion Question:

Nutrients are just one of many environmental factors that are required for phytoplankton to grow. What are some other environmental factors that may act as a limiting factor for phytoplankton growth?

Hint: Remember that many phytoplankton are similar to plants.