The Producers of Florida Bay

Activity 1. Identifying Conditions that Help Seagrass Grow

Producers, such as plants, form the base of an ecosystem's food web. They can transform energy from the sun into sugars through the process of *photosynthesis*. Producers use these sugars, along with nutrients such as nitrogen and phosphorus, to build their bodies. Photosynthesis can be shown in the form of a chemical reaction:

$$6CO_2 + 6H_2O \xrightarrow{\text{sunlight}} 6O_2 + C_6H_{12}O_6$$

Seagrasses are at the base of the food web in Florida Bay. We need to find out what influences the amount of seagrass in this ecosystem if we are going to learn about the animals it supports.

Use what you learned from the video and the information above to think of three factors that might influence how much seagrass the scientists will find in Florida Bay.

1. Factor 1: _____

Reason it is important:

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2. Factor 2: _____

Reason it is important:

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3. Factor 3: _____

Reason it is important:

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4. Are any factors in the equation for photosynthesis more critical for plants that live on land than for plants that live underwater? Explain your answer.

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5. Choose one of the factors you identified in questions 1–3 and suggest a way you would test whether it is important for the growth of seagrasses.

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Activity 2. Determining If Sunlight Affects Seagrass Growth

Use the data in the following table to make several graphs and answer the questions below.

Table 1. Seagrass Cover and Heights in Areas of High, Medium, and Low Light.

Light level	Mean seagrass cover (%)	Mean seagrass height (cm)
High	80	13
Medium	50	7
Low	10	3

1. Make a bar graph of the effect of light level on the amount of the seafloor covered by seagrasses. Give the graph a title and label each axis.

2. Make a bar graph of the effect of light level on the height of seagrass leaves. Give the graph a title and label each axis.

3. Do you think you would find more seagrass in deep or shallow waters? Why?

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4. What do you think would happen to the amount of seagrass in a bay if more mud started to flow into it from a river? Explain your answer.

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Activity 3. Determining If Nutrients Affect Seagrass Growth

Use the data in the table below to make several graphs and answer the questions.

Table 2. Effects of Nutrients on Seagrass Growth in Eastern Florida Bay.

Treatment	Mean seagrass cover (%)
Control (no nutrients added)	30
Nitrogen added	30
Phosphorus added	60
Nitrogen and phosphorus added	60

1. Do nutrients cause seagrass to grow more in this area? If so, are both nitrogen and phosphorus equally important? Explain your answer.

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Table 3. Effects of Nutrients on Seagrass Growth in Western Florida Bay.

Treatment	Mean seagrass cover (%)
Control (no nutrients added)	30
Nitrogen added	50
Phosphorus added	50
Nitrogen and phosphorus added	70

2. Do nutrients cause seagrass to grow more in this area? If so, are both nitrogen and phosphorus equally important? Explain your answer.

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3. What do you think would happen to algae, which are also producers that photosynthesize, if extra nutrients were added to the water?

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Dead organisms that are not eaten fall to the bottom of Florida Bay and are broken down by decomposers. Waste products from consumers and the *detritivores* that eat dead materials also fall to the bottom of the bay.

4. What effect do you think these decomposed and decomposing materials would have on seagrasses? Why?

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Activity 4. Determining the Structure of the Florida Bay Food Web

The table below contains the *average* amount of biomass (the total mass of all organisms) at each trophic level in the Florida Bay. Use these data to answer the questions below.

Table 4. Average Biomass of Different Types of Organisms Found Along 10 Transects.

Type of organism	Trophic level	Average biomass (kg)
Primary producers	1	1,500
Primary consumers	2	150
Secondary consumers	3	15
Tertiary consumers	4	1.5

1. By what percentage does the amount of biomass decrease from one trophic level to another?

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2. What are some ways in which organisms that can move, such as turtles and sharks, use energy and nutrients in their food?

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3. Why do you think there are so few top predators in an ecosystem?

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4. Most top predators need large areas of habitat in order to survive. For example, the territory of a Florida panther may range in size from 150-200 square miles. Why do you think such a large territory is needed?

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