The Producers of Florida Bay

Goals

Students learn about the importance of producers to other organisms in an ecosystem.

Video Overview and Background

Florida Bay is located at the southern tip of Florida. It is home to one of the largest and richest seagrass beds in the world. These seagrass beds are often referred to as the "prairies of the ocean." Though a number of animals, such as manatees and sea turtles, are found here, not many top predators call this ecosystem home.

Photosynthesis is a process in which plants capture light energy from the sun and change it to chemical energy in sugars. Plants capture sunlight with the help of **chlorophyll**, a light-absorbing molecule that gives plants their green color.

In this video, Dr. Mike Heithaus, seagrass expert Dr. Jim Fourqurean, graduate student Justin Campbell, and Jim's daughter Virginia Fourqurean examine the importance of producers in the Florida Bay ecosystem.

Prerequisite Concepts

Before viewing the video, students should have a basic understanding of photosynthesis, food webs, and trophic levels.

Teaching Tips

Preview the video and identify time codes where you wish to pause and give students the chance to record information or answer questions.

Activity 1—Identifying Conditions that Help Seagrass Grow

Video segment: 00:00–01:59

Preparation Prepare copies of the worksheet pages for students to use. In this portion of the video, Dr. Mike Heithaus introduces the Florida Bay ecosystem and outlines the importance of photosynthesis.

Discussion Questions

- **Why do you think the Florida Bay is called the "prairie of the ocean"?**
- **Why is it important to know the number of producers in an ecosystem?**
- **Where does the energy in an ecosystem originate?**
- **What is photosynthesis?**

Completing the Student Page

Students determine what factors are required to help seagrasses grow.

Activity 2—Determining If Sunlight Affects Seagrass Growth

Video segment: 02:04–04:53

Preparation In this portion of the video, Dr. Mike Heithaus and Dr. Jim Fourqurean gather data to determine how light impacts photosynthesis.

Discussion Questions

- **What two measurements do the scientists plan to take in their investigation?**
- **What is necessary for seagrass survival?**
- **How do the scientists measure the density of growth?**

Completing the Student Page

Students determine what factors are required to help seagrasses grow.

Activity 3—Determining If Nutrients Affect Seagrass Growth

Video segment: 04:58–06:34

Preparation In this portion of the video, Dr. Mike Heithaus and graduate student Justin Campbell investigate if nutrients affect seagrass growth.

Discussion Questions

- **How do the scientists plan to measure the impact of nutrients on seagrass growth?**
- **What is community structure?**

Completing the Student Page

Students graph data provided by the scientists to determine if nutrients affect the growth of seagrasses.

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

Video segment: 06:39–07:59

Preparation In this portion of the video, Dr. Mike Heithaus and Virginia Fourqurean use a transect to count the number of animals in the Florida Bay study area. Students may need a refresher on how energy is utilized at different trophic levels in a food web. Remind students that only 10 percent of the energy at any trophic level is transferred to the level above it. The majority of energy (90 percent) is released to the environment as heat.

Discussion Questions

- **What is a transect?**
- **What is the difference between primary, secondary, and tertiary consumers?**

Completing the Student Page

Students use the given data to determine how the Florida Bay food web is structured and why top predators are so rare.

Student Page Answers

Activity 1

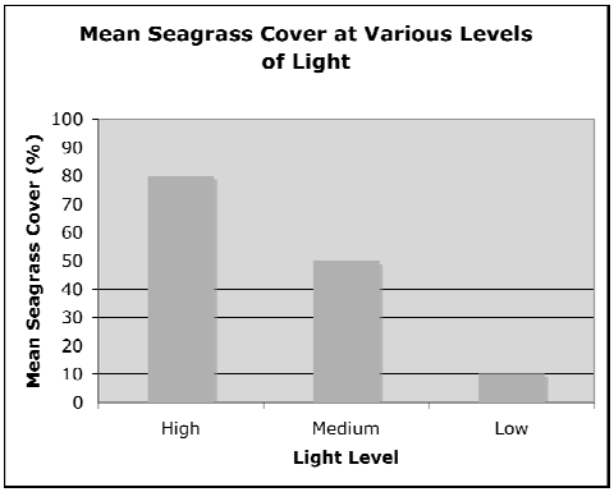
1–3. Carbon dioxide, sunlight, and nutrients should be identified as the important factors. Carbon dioxide and sunlight are required for photosynthesis to occur; nutrients are required for plant growth.

4. Sample answer: Water—there is plenty available for seagrasses but not as much for land plants.

5. Sample answer: The importance of sunlight to the growth of seagrasses could be tested by growing seagrass under different light intensities and seeing how these different intensities of light affect seagrass growth.

Activity 2

1.



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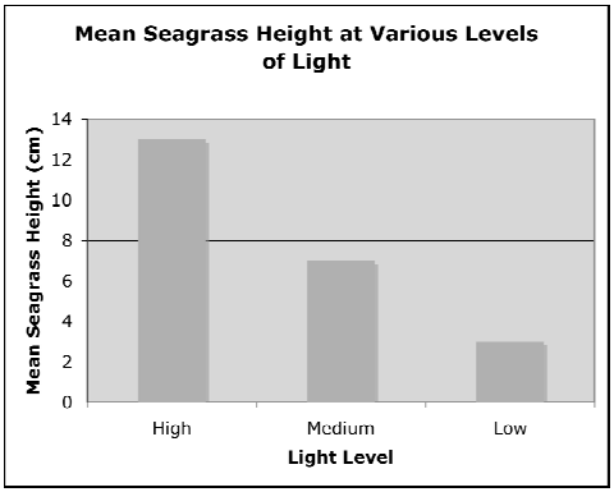

3. Sample answer: More seagrass will be in the shallow water because there is more light available.

4. Sample answer: The amount of seagrass would go down because there would be less light able to penetrate the bottom where the seagrass lives.

Activity 3

1. Sample answer: Yes, but only phosphorus caused more growth of the seagrasses. You can tell because the added phosphorus causes more growth than occurred in the control, but added nitrogen had no effect.
2. Sample answer: Yes, both nitrogen and phosphorus are important nutrients because they cause increased growth. The most growth occurred when both nutrients were added.
3. Sample answer: The algae would grow more.
4. Sample answer: Seagrass growth will increase due to the nutrients in decomposing bodies and in waste products.

Activity 4

1. 90%
2. Sample answer: growth, reproduction, running their bodies (metabolism), moving around
3. Sample answer: There are so few top predators because there is not enough energy in an ecosystem to support them.
4. Sample answer: It takes a lot of energy to support predators that feed high in the food chain. This means they have to have big ranges that have plenty of primary producers to support the primary and secondary consumers that the predators feed on.