Energy Transfer in an Ecosystem
Engage

Grade: 5	Implementation Practice: Whole Class
Subject Area: Science	Supporting Content:
Objective(s): Students will be able to access prior knowledge about food webs and communicate what they know.	

Standards Addressed

NGSS	Performance Expectation 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment		
	Disciplinary Core Idea(s)	Science and Engineering Practices	Crosscutting Concept(s)
	• LS2.A Interdependent relationships in ecosystems • LS2.B Cycles of matter and energy transfer in ecosystems	• Developing and using models	• Systems and system models
CCSS	ELA-Literacy CCSS.ELA-LITERACY.SL.5.5: Include multimedia components (e.g., graphics, sound) and visual displays in presentations, when appropriate, to enhance the development of main ideas or themes.		

Vocabulary and Skills

Key Terms		Key Skills
primary producer	secondary producer	observation
primary consumer	secondary consumer	inference
food web	consumer	
producer	food chain	

Essential Question(s):
How is energy transferred in a food web in a marine environment?

Guiding Question(s):
How is energy transferred in a food web?
What are the key components of a food web?
Who are producers and consumers in marine environments?

Teacher Background Information

5E Instructional Model - Engage

The 5E instructional model organizes learning experiences so that students have the opportunity to develop their own understanding of the concept over time by building what they know. There are five phases of learning including: Engage, Explore, Explain, Elaborate, and Evaluate. In the 5E instructional model, the purpose of the Engage phase is to activate student's prior knowledge and make connections to prior learning experiences. This is a time for students to unpack what they already know about a concept. The Engage phase should be characterized by a free flowing exchange of ideas. It is not necessary to judge responses as correct or incorrect. Although the teacher should keep a close watch for any potential misconceptions and make a mental note to clear them up in later lessons.

During the Engage phase students should feel free to let their minds wander and feel comfortable sharing thoughts and ideas. The teachers' role is to guide students and help them record and organize their ideas.

As the lesson is introduced, be sure that the students understand that this is an Engage lesson and exactly what that means. Students should know that they need not worry about being right, that this is a time to speak freely and share all of their thoughts.

One way to help students feel more comfortable with accepting all ideas is to use a technique called amplify. When a student shares a response, ask for another student to restate and praise what the first student said. When students know their ideas will be immediately validated, they will be more likely to share freely.

Content Background - Energy Transfer in an Ecosystem

Energy flow through an ecosystem starts with the sun. The sun provides energy for the producers, which convert sunlight into chemical energy or food. The consumers then get a portion of this energy when they eat the producer. The energy continues to be transferred throughout the ecosystem as organisms are consumed.

Content Background - Food Chains and Webs

A producer is the beginning of a food chain. Producers can include algae, plants and vegetables, and any organisms that get their energy from the sun. Through the process of photosynthesis, producers make their own food. Consumers are the next step in the food chain. Primary consumers are organisms that eat plants. These animals are herbivores. Secondary consumers, the next link in the food chain, eat primary consumers. These are carnivores, but can be omnivores, animals that eat

both plants and other animals. Some ecosystems also have tertiary consumers that could eat both primary and secondary consumers. Decomposers are the final link, and will eat decaying or dying material. The decomposers break down decaying material and return it to the environment.

An example of a simple food chain could be:
plant (producer) -> mouse (primary consumer) -> snake (secondary consumer) -> hawk (tertiary consumer)

When watching the 360° video, students will see coral and may see a sea snake. Teachers should discuss these two components of the ecosystem once all students have had the opportunity to view the video at least once.

Advance Preparation

- Teacher will need to review the 360° video and be familiar with how to manipulate the video using your device
- Teacher will ensure the video is preloaded for students to access
- Teacher will review background information about food webs and energy transfer

Potential Misconceptions

- Coral is a plant
- Coral isn't a living organism
- The needs of underwater animals are different than needs of land animals

Before Viewing

Discussion Question(s):
What are components of a food web? Who are key players in a food web?

Student Activity: (*Access student prior knowledge and build background knowledge.*)

1. Review the key terms with students: producer, consumer, primary producer, secondary producer, primary consumer, secondary consumer, decomposer
2. Write these key terms on the board or on chart paper with definitions and examples.
3. Review features of vertebrates and invertebrates and list several examples of each category.
4. Draw and label a simple food web with any combination of animals/plants students have learned about prior to this lesson.

While Viewing

Discussion Question(s):
What types of vertebrates and invertebrates are seen in the video?
What are various predators or prey animals seen?

Student Activity: (*How are students engaged? How are students recording their observations and processing what they are learning?*)

1. In science journals, students are recording the following information:
    a. list of vertebrates and invertebrates
    b. list of predators and prey animals
    c. inferences of what animals eat, and what might eat them (this can include animals not seen in the video as well)
    d. any additional observations

After Viewing

Discussion Question(s):
What animals seen in the video are primary producers? Primary consumers?
What vertebrates and invertebrates are seen? (list characteristics that show you know they are vertebrates and invertebrates)
Infer: What other animals could have been present but were not seen in the video?

Student Activity: (*How are students synthesizing and analyzing what they learned from the activity/video?*)
Students will create a food web that includes the animals seen in the video. Students will label the primary consumers and producers in their food web, and show the connections between producers and consumers.

Extension Ideas

1. Go out into schoolyard and identify primary producers. What are their needs? Where do they get their energy from? Identify any school yard consumers. Where do these animals get their energy? Note: Be sure to look for the invertebrates too, such as spiders, beetles, grasshoppers and dragonflies.

2. (Engineering) Create a device like Google Cardboard/goggles for viewing 360° videos with your own device.

