Lesson 4: Organisms and Tools Web

Materials

- Set of organism and tool cards for each group
- Organism and tools worksheet
- Markers

Overview

In the Antarctic food web, different populations of organisms depend on one another as sources of food. This lesson provides a basic analysis of important Antarctic wildlife at the Palmer Deep Canyon. It also introduces different tools that scientists use to measure these biotic and abiotic factors in Antarctica.

Motivating Questions: **Which organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors?**

Which tools can move through the water and collect data on a biological hotspot, such as Palmer Deep Canyon?

How might high frequency radar be used by ocean researchers to measure surface current velocity fields near the coast?

Take Home Message

- Students will be able to create a food web of the Antarctic ecosystem.
- Students will be able to identify the difference between carnivores and herbivores (consumers) and plants and phytoplankton (producers).
- Students will be able to identify how any two organisms in the ecosystem could affect each other.
- Students will be able to identify tools that are used to collect data.

Engage: **Living Organisms in Antarctica** • Revisit the small food web from the previous lesson's activity, ask students what other organisms they know of that live in Antarctica (dispel any misconceptions of polar bears) • Could show some videos here of Antarctic wildlife if desired	10 minutes
Explore: **Building an Antarctic Food Web** • Arrange students in small groups and give each group the provided organism cards • Have students work in pairs to arrange the cards into a food web based upon the information provided on the back of the cards ○ Do this on a white board so students can draw arrows between the organisms (put magnets on cards or use tape)	25 minutes

• Add the “tools” cards onto the web to determine how you would measure each organism	
Make Sense: **Assembling a Larger Concept Map around the Food Web** • Assemble students into larger groups and ask them to come up with one large food web with tools • Ask them to add Post-It notes to the web to address the abiotic factors we addressed previously • Have students do a short gallery walk to examine the concept maps that other groups made	15 minutes
Total:	**40 minutes**

Audience

Middle school and early high school students

Preparation

- Teachers should create their own Antarctic food web to determine who eats who
- Teachers should familiarize themselves with the tools scientists use to add those to the web
- Teachers should add abiotic factors to their web to create one large concept map

Engage (15 minutes)

- Revisit the food web from earlier to see what other organisms students are familiar with in Antarctica
- Dispel any misconceptions about organisms that live in the Arctic instead of the Antarctic
- Show videos of these organisms if desired

Explore (20 minutes)

- Put students in pairs or small groups and have them assemble an Antarctic food web based on the provided cards
- Add the “tools” cards to determine how these organisms are measured

Make Sense (20 minutes)

- Have students get together in large groups and combine their food web/tool cards
- Add sticky notes to add the abiotic factors into the web to create one concept map that examines two key questions: “What controls biological hotspots?” and “How do you identify biological hotspots?”
- This activity allows students to share their initial understandings of The Palmer Deep with the class. The students then can begin to consider possible explanations for this important biological hotspot and how various abiotic factors are impacting the system.

Additional Information

Disciplinary Core Ideas

MS-ETS1-2 Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Performance Expectation Grade: Middle School (6-8)

Crosscutting Concepts
Patterns
Cause and effect
Systems and system models
Energy and matter

Science and Engineering Practices
Developing and using models
Asking questions and defining problems

Polar Literacy Principles Addressed
Principle #4: The Polar Regions have productive food webs.
Principle #7: New technologies, sensors and tools — as well as new applications of existing technologies — are expanding scientists' abilities to study the land, ice, ocean, atmosphere and living creatures of the Polar Regions.

Ocean Literacy Principles Addressed
Ocean Literacy Principle #5: The ocean supports a great diversity of life.

Climate Literacy Principles Addressed
Climate Literacy Principle #3: Life on Earth depends on, is shaped by, and affects climate.