

Lesson 3: Penguins Foraging Activity



- Materials**
- Pie pans
 - 2 different colored beads
 - Penguin Habitat maps
 - Projector
 - Computer
 - Marker board

Overview

In addition to the abiotic factors discussed in the two previous lessons, biological features are also a key component of ecological hotspots. In this lesson, students will examine a few of the organisms present at the Palmer Deep hotspot and become familiar with the concept of convergent zones.

Motivating Question: Why are biological hotspots convergent zones for living organisms?

Take Home Message

- Students will define the term “convergent zone” and determine how biological hotspots contribute to the formation of these zones
- Students will be introduced to some of the living organisms present in Antarctica and begin to think about which organisms provide food for the others present

<p>Engage: Introduction to the Organisms in Antarctica</p> <ul style="list-style-type: none"> • Show students the Penguins of Palmer fact sheets • Ask them what they think penguins eat, what their food eats; draw a very simple 3-organism food web on the board to address which organisms will be <ul style="list-style-type: none"> ◦ Discuss some background information about phytoplankton and zooplankton if students do not know what they are • Pose the motivating question in a way they will understand, ask students to make a prediction: “Do you think these hotspots are more like farms or convenience stores? Why?” • Show SWARM video clip 	<p>10 minutes</p>
<p>Explore: Penguin Foraging Activity</p> <ul style="list-style-type: none"> • Set up the pie pans with colored beads in a grid, as shown in the provided diagram 	<p>30 minutes</p>
<p>Make Sense: Defining Convergent Zones</p> <ul style="list-style-type: none"> • In a student discussion, ask them to reflect on which region was the best area for feeding • Ask them to consider what this region might represent, based on the previous lesson (bio. hotspot) <ul style="list-style-type: none"> ◦ Introduce the additional term “convergent zones” • Answer the original question: do you think this hotspot more like a convenience store or a farm? What abiotic factors would influence this? 	<p>10 minutes</p>

Total:	50 minutes
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Audience

Middle school and high school

Preparation

- Set up the pie pans with colored beads in a grid, as shown in the provided diagram
- Make a starting line for the penguins (students) to start at
- Make copies of the Penguin foraging worksheet for each student
- Read through provided background information on the organisms to be examined, watch any videos you plan to show

Engage (10 minutes)

- Show the provided Penguins of Palmer
- Ask students what penguins eat, what their food source eats to create a simple food web
 - Show the provided slides on phytoplankton and zooplankton if needed
- Ask them the motivating question about these hotspots being convenience stores or farms and ask them to make a prediction about what these hotspots are like

Explore (30 minutes)

- Complete the foraging activity using provided teacher guides, student handout

Make Sense (10 minutes)

- Group discussion based on the data--which area was best for feeding?
 - Define the term “convergent zone”

Additional Information

NGSS Standards

MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Performance Expectation

Grade: Middle School (6-8)

MS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. Performance Expectation Grade: Middle School (6-8)

MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. Performance Expectation Grade: Middle School (6-8)

MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. Performance Expectation Grade: Middle School (6-8)

MS-LS2-5 Ecosystems: Interactions, Energy, and Dynamics

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*
Performance Expectation Grade: Middle School (6-8)

HS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. Performance Expectation Grade: High School (9-12)

Science and Engineering Practices

Developing and using models
Using mathematics and computational thinking
Analyzing and interpreting data
Engaging in argument from evidence

Crosscutting Concepts

Patterns
Cause and effect
Scale, proportion and quantity
Energy and matter
Stability and change

Polar Literacy Principles Addressed

Polar Literacy Principle #4 The Polar Regions have productive food web

Ocean Literacy Principles Addressed

Ocean Literacy Principle #5: The ocean supports a great diversity of life and ecosystems.

Climate Literacy Principles Addressed

Climate Literacy Principle #3: The Sun is the Primary Source of Energy for Earth's Climate System