

## Details



**Completion Time:** Less than a week

**Permission:** Download, Share, and Remix

## Arctic Adventures Game

### Overview

In this introductory lesson, students read an article about Arctic Ocean ecosystems and then play a board game in which they take on the role of researchers.

### Objectives

The purpose of this introductory activity is to:

- Identify the main components of complex arctic ecosystem and describe predator/prey relationships between phytoplankton, ice algae, zooplankton, bowhead whales, polar bears, seals, walruses and humans.
- To describe some of the challenges of conducting scientific research in the harsh environmental conditions of the Arctic.

### Lesson Preparation

Before playing this game, students should be provided with access and time to explore this website, which has an interactive Arctic marine ecosystem diagram:

<http://polardiscovery.who.edu/arctic/ecosystem.html>

Additionally, students should listen to this NPR program about "The Arctic's Hidden Ocean" at: <http://www.npr.org/templates/story/story.php?storyId=4865870>

It describes some of the research scientists working in the Arctic ecosystem.

These two resources should provide all necessary background information for the game to be played successfully! Furthermore, these resources could lend themselves to further discussion of the challenges of researching in the Arctic, the Arctic food web and climate change.

### Procedure

1. Break up into "research teams" of four or five students each. Get a copy of the Arctic Adventures Game Board for each team. Your team's assignment is to ex-

## Materials

- Copy of the game board
- Copy of the Fact or Fiction cards
- Calculator
- Die
- Natural objects for playing pieces (small stones, shells, seeds)
- Pencil and paper to keep score

plore the areas between the Beaufort Sea and the Chukchi Sea for information about what species are found during which times of the year.

2. Roll the die. The team member with the highest roll starts your expedition. Take turns, moving counter-clockwise around the board. When you land on a Fact or Fiction space, have another team member turn over the card and ask you the question. For every Fact or Fiction question answered correctly, you earn 500 points. When you land on the Event spaces (not the Fact or Fiction spaces), add or subtract points according to the instructions.

3. Add the points for all team members together as you play. Keep going around the board until time is up and your team earns 10,000 points. With each set of points earned, we grow closer to understanding more about this exciting and interesting ecosystem.

### **Extension**

This introductory lesson could serve as starting point for a variety of different topics, such as:

1. Comparing and contrasting Arctic and Antarctic ecosystems.
2. Learning more about the Arctic marine systems by learning about Lisa Seff's PolarTREC expedition "Oceanographic Conditions of the Bowhead Whale", including watching some of the excellent videos from that expedition.
3. Students could do a "jigsaw" style lesson whereby each group researches one part of the food web introduced in this game and then teaches the class about it.
4. Students could progress to a depth lesson about food webs using an article like "Circumpolar World- Biological Features and Processes" (<http://www.polartrec.com/resources/article/circumpolar-world-biological-features-and-processes>) and compare/contrast marine and terrestrial Arctic systems, identifying producers, consumers and decomposers in each ecosystem.

### **Resources**

n/a

### **Assessment**

The following assessment strategies are recommended:

1. The teacher can informally assess student discussions both before and after games, as well as monitor conversations during the game.
2. The teacher can direct the students to reflect in a journal writing or discussion after the game:
  - a. What did you learn about the Arctic food web that you didn't know before you began this activity?
  - b. What do you think would be especially challenging and/or interesting about being a scientific researcher in the Arctic?
  - c. What would you like to learn more about?

### **Credits**

Lucy Coleman, [lcoleman@natomascharter.org](mailto:lcoleman@natomascharter.org). This lesson was adapted from one titled "Bioprospector's Game" by the 2003 JASON XV Project: Rainforests at the Crossroads and is



based largely on information found on the website “Polar Discovery: Arctic Ocean Ecosystem” by Carin Ashjian from Wood’s Hole Oceanographic Institute (link provided in Introduction to this lesson).



**National Science Education Standards (NSES):**

**Content Standards, Grades 5-8**

Content Standard C: Life Science

- d. Populations and ecosystems
- e. Diversity and adaptations of organisms

Content Standard F: Science In Personal and Social Perspectives

- b. Populations, resources, and environments

**Content Standards, Grades 9-12**

Content Standard C: Life Science

- d. Interdependence of organisms

**Other Standards**

N/A

<p>Fact or Fiction!</p> <p><b>Start!</b></p>	<p>Invite teacher to join research team!</p> <p>Gain 100 points</p>	<p>Fact or Fiction!</p>	<p>Inupiat records of hunting leads you to new spot for bowhead whales.</p> <p>Gain 200 points</p>	<p>Fact or Fiction!</p> <p>NASA offers you funding to research ecosystems.</p> <p>Gain 200 points!</p>
<p>Collaborate with researchers from Norway! Gain 100 points</p>	<p style="text-align: center;"><i>Arctic Adventures</i> <i>Game</i></p> <p style="text-align: center;">----Place Fact or Fiction Cards here---</p>			<p>Fact or Fiction!</p>
<p>Fact or Fiction!</p>				<p>Invent new way to capture salinity data!</p> <p>Gain 100 Points</p>
<p>Forget to take seasickness pills. Lose 100 points</p>				<p>Fact or Fiction!</p>
<p>Fact or Fiction!</p>				<p>\$45,000 equipment anchored to seafloor can't be recovered. Lose 200 points.</p>
<p>Extreme weather comes later in the fall, allowing longer field season. Roll Again. Fact or Fiction!</p>	<p>Easily recover data from seafloor monitoring device.</p> <p>Gain 100 points</p>	<p>Fact or Fiction!</p>	<p>Government puts hold on funding for your research.</p> <p>Lose 100 points</p>	<p>Fact or Fiction!</p> <p>Get Grounded By bad weather. Skip Next turn.</p>

## Fact or Fiction Cards- cut out one set per game.

<p>Arctic jellyfish are more likely to be found in the depths of the ocean.  <b>Fiction:</b> <i>they are more likely to be found near the surface.</i></p>	<p>Krill are a type of phytoplankton that use photosynthesis to make their own energy.  <b>Fiction:</b> <i>krill are zooplankton that get energy from eating other living things.</i></p>	<p>More phytoplankton means more carbon dioxide will cycle into atmosphere.  <b>Fiction:</b> <i>more phytoplankton will store more carbon dioxide in the deep ocean.</i></p>
<p>Polar bears use sea ice as a platform to hunt for seals.  <b>Fact.</b></p>	<p>Bowhead whales use the baleen in their mouths to filter the krill from the water.  <b>Fact.</b></p>	<p>There are few species of Arctic fish, but they are an important source of food MANY predators, including polar bears and whales.  <b>Fact.</b></p>
<p>Phytoplankton usually obtain their food by eating each other.  <b>Fiction:</b> <i>phytoplankton get most of their energy through photosynthesis.</i></p>	<p>Most detritus works its way down to the bottom of the water column.  <b>Fiction:</b> <i>most detritus ends up suspended in the water, and eventually settles.</i></p>	<p>Inupiat traditionally relied on bowhead whale to supply most of their food for the year.  <b>Fact.</b></p>
<p>There are 5 different types of seals that live the Arctic.  <b>Fact.</b></p>	<p>Pacific walrus can grow to be 2 tons!  <b>Fiction:</b> <i>they grow to be 1.3 tons- still pretty big!</i></p>	<p>The Arctic is one of the most intensely studied ecosystems of the world.  <b>Fiction:</b> <i>studies of the region have long been hampered by short summer seasons and expense.</i></p>
<p>Zooplankton feed on other zooplankton, detritus and phytoplankton.  <b>Fact.</b></p>	<p>Whales of different kinds were what first lured hunters and whalers to the Arctic.  <b>Fact:</b> <i>some species were hunted nearly to extinction.</i></p>	<p>Ice algae and phytoplankton are the main producers in the Arctic ecosystem.  <b>Fact.</b></p>