



## Overview:

During this activity students interview Elders and local hunters to learn traditional ways of determining sea ice conditions, changes in formation and melting of local sea ice over time, and the impacts of these changes on the subsistence lifestyle.

## Objectives:

The student will:

- understand traditional ways of determining sea ice conditions;
- describe how sea ice formation has changed over time; and
- describe the ways (if any) that these changes impact local subsistence lifestyles.

## GLEs Addressed:

### *Science*

- [3-4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [3] SB3.1 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by recognizing that temperature changes cause changes in phases of substances (e.g., ice changing to liquid, water changing to water vapor, and vice versa).

## Whole Picture:

Sea ice forms on top of salt water when the air above that water is about 28 degrees Fahrenheit (about -2 degrees Celsius) or colder for a long period of time. Even though it grows on top of salt water, sea ice is not always salty; if you licked a freshly grown chunk of sea ice, it would still taste salty, but the older ice gets, especially if it survives the summer melt season, the less salt it contains, and it can taste just like an ice cube in your freezer. This is because much of the salt is forced out of the water and back into the ocean when sea ice grows, and more salt is lost as the ice undergoes a summer melt cycle.

Because it needs very cold air to grow, sea ice forms in very cold places, like near the North Pole and off the coast of northern and northwestern Alaska. When winter comes, new sea ice can grow to three feet thick during the long winter. In some very cold areas, ice from years before doesn't melt completely. It can combine with newer ice and make the floating ice pack 15 feet thick or more.

Sea ice that floats on the ocean north of Alaska doesn't make up a solid ice-cap. Winds and ocean currents constantly crack up the ice into pieces, and the ice floating on the northern oceans is like a moving jigsaw puzzle. If you stuck a flag into the ice at the North Pole, the flag would move miles away in just one day.

Some people in Alaska villages use sea ice to help them get away from shore to hunt for seals, walrus, and whales. Sea ice also acts as a lid that in the winter prevents storms from riling up the sea and damaging coastlines

## Materials:

- Colored pencils
- Construction paper (for invitations)
- *Watching Ice and Weather Our Way*, by Conrad Oozeva, Chester Noongwook, George Noongwook, Christina Alowa, and Igor Krupnik, published by the Arctic Studies Center, National Museum of Natural History, Smithsonian Institution (2004) and Savoonga Whaling Captains Association, Savoonga, AK (2004), ISBN: 0967342953. (optional resource)
- STUDENT WORKSHEET, LEVEL I: “Understanding the Ice”
- STUDENT WORKSHEET, LEVEL II: “Understanding the Ice”

## Activity Preparation:

1. Identify local community members (possibly Elders or hunters) who are knowledgeable about sea ice.
2. Ask students to prepare cards or letters to invite the community members to the classroom to discuss their sea ice experiences and knowledge with students. Students also may invite the community members in person.
3. Before the visit, prepare snacks and beverages for guests. Consider inviting the guests just before lunch so that they may stay for lunch with the students.
4. Review respectful listening skills with the students.

## Activity Procedure:

1. Welcome community members to the classroom. Ensure each is comfortably seated and introduced. Explain that the students are learning about sea ice and ask the visitors to share their sea ice knowledge, such as: how they determine sea ice conditions; changes they may have noticed when the sea ice forms or melts; the impact of these changes on subsistence activities; and any old or personal stories about experiences on the ice.
2. Encourage students to ask questions only if visitors invite questions. After visitors are finished speaking, thank them and share snacks or lunch. After visitors depart, discuss the information they shared with students.
3. Distribute colored pencils and the Level I and Level II Student Worksheets: “Understanding the Ice.” Ask students to draw a picture on their worksheet of something they learned about sea ice from the community member who visited their classroom.
4. After students have completed their drawing, ask Level II students to write about their picture on the lines below it. Ask Level I students to explain their drawings verbally. Write Level I student explanations on the lines below their drawings.
5. Discuss the following questions as a class:  
How do local sea ice experts determine sea ice conditions (i.e. ice upon which it is safe or unsafe to walk)?  
Has the ice changed over time? Does it melt or freeze earlier or later than it used to?  
How might a change in when the ice melts or freezes affect hunting or other activities?
6. Ask Level II students to answer the remaining questions on their worksheet.

## Language Links:

Alaska Native people have always been careful observers of the weather. Their languages are rich in words describing weather. Ask a local Native language speaker to provide the words in the local dia-

lect for the weather phenomenon listed in the chart below. The local dialect for these words may differ from the examples provided. Share the words with students to build fluency in local terms related to weather. Include local words in songs, stories and games when possible.

English	Yupik	Inupiaq	Local Dialect
first ice of winter	elliqaun	sikuliuraq	
iceburg	ugmitaghaq	puktaa	

### Extension Idea:

Read excerpts from *Watching Ice and Weather Our Way* to help students understand the importance of sea ice to marine subsistence lifestyles in the Arctic, and to learn more about traditional observations of sea ice.

### Answers:

Answers will vary depending upon the community and those interviewed.

Name: \_\_\_\_\_

# Understanding the Ice

## Student Worksheet



Draw something you learned about sea ice from a person who visited your class.



Tell your teacher about your drawing. Ask your teacher to write your words on the lines below.

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Name: \_\_\_\_\_

Level

# Understanding the Ice

## Student Worksheet



1. In the box below, draw something you learned about sea ice from a person who visited your class. Explain your drawing on the lines below the box.

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2. What is one clue an adult can use to determine if it is safe to walk on the sea ice? \_\_\_\_\_
3. Circle the correct answer. According to the community members who visited your classroom, does the sea ice in your area melt earlier, later, or around the same time as it used to?  
                    earlier                      later                      around the same time
4. How might a change in when the sea ice melts or freezes affect your community? \_\_\_\_\_