PolarTREC
Learning Resources

1, 2, 3 Counting Seals: How can you possibly count all the seals in the Arctic?

Overview
During the 2007 Bering Ecosystem study, population sampling was done for seals by boat and helicopter. By using raisin bread and your students' imagination you can create your own sampling of the Arctic populations of seals in the comfort of your classroom. Not to mention, clean-up is a favorite among students with this activity that mixes math with science and a dash of yummy.

Objectives
Students will learn a population sampling technique. Students will practice counting, estimating, addition, multiplication, and percents.

Lesson Preparation
Prior to the start of this lesson, a discussion of seals in the Arctic and even a short video to get students excited could be shown. The activity would also be good to follow after the students had learned about fractions and percentages in their math class. This lesson would be a great way to show cross-curriculum connections. The steps for the lesson can be found in the procedure section.

Procedure
1. Ask the students why it is impossible to count the exact number of arctic seals. (Because we can't see into the water and the seals move from place to place, cold environment, the ice, hard to get around in the Arctic) In this version the raisins in the loaf are seals in the ocean, while raisins in the crust are hauled out seals on the ice. (You can use the ends of the loaf as a large ice floe and you may even tear a section off to represent part of the floe having melted) Population surveys are done by sampling methods. Observers on land, in boats, and in helicopters count animals actually seen in the area. Based on that sampling information, they es-

Materials

- As many loaves of raisin bread as you need for each student to have one slice (average loaf has 12 slices).
- Class chart for all students to enter their totals
- Student recording sheet for each student
- A paper towel for each student

timate (extrapolate) the entire stock or population. We will simulate this sampling procedure by trying to determine how many raisins are in a loaf of raisin bread. Have students imagine that the loaf of raisin bread is the ocean and the raisins are the seals.

2. Supply each group with a recording sheet. Have the students hypothesize how many "seals" are in the whole loaf and record their number. Students should also hypothesize how many will be on the ice and record that number. Explain that the principal researcher in a population study establishes counting guidelines that all data collectors must follow so that the count can be as consistent as possible. Set some sampling perimeters for your class, for example a raisin that is cut still counts as one in each slice. Discuss with your class or in small groups any other guidelines that should be followed.

3. Record the number of slices in each loaf. Each student should then take one slice of bread and count and record the number of raisins in the entire slice (both sides including the crust). Then based on the count of their individual slice have the students estimate the total number of seals hauled out onto the ice (A on the recording sheet), total seals in the ocean (B on the recording sheet). Researchers must often determine a population size based on this estimation process. However, in this activity the students can actually test how close their estimates are to reality. Continue counting all the raisins in the loaf or if done as a large group activity, compile all the slice data from each student onto a chart. Determine the grand total of raisins in a loaf. What do students conclude about population data based on estimates?

Extension
This lesson can be included in an entire unit on seals of the Arctic. Students could do research projects on the ribbon, spotted, bearded, fur, ringed, and even include the walrus. Several loaves can be assigned a different species of seal. Other questions to lead to further discussion: What problems could wildlife managers confront if a population estimate is actually too high or too low? What would be some of the causes for these types of scenarios? What could future scientists such as yourselves do/learn/invent to improve seal population sampling techniques?

Resources
N/A

Assessment
Students will understand that not all seals are in the water but many can be found on land and ice. From the datasheet, teachers will have a chance to have students practice their math skills. This lesson should be the beginning or the end of a lesson on seals and their behaviors.

Credits
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Adapted from "Raisin Reasoning Extension- Stranded Marine Mammals" The Marine Mammal Center. www.marinemammalcenter.org

National Science Education Standards (NSES):

Content Standards, Grades 5-8

Content Standard C: Life Science
d. Populations and ecosystems

Content Standard F: Science In Personal and Social Perspectives
b. Populations, resources, and environments

Content Standards, Grades 9-12

Content Standard F: Science In Personal and Social Perspectives
b. Population growth

Other Standards:
N/A

Seals in the Arctic Ocean Recording Sheet

Initial guesses: # of raisins on the outside_____ # of raisins in the loaf_____

Collect the following data from one slice of bread:

# Raisins in crust (hauled out seals on ice)	# Raisins in 1 slice (seals in the ocean)	# Slices in the loaf (size of the Arctic Ocean)

Use this data in the following formulas:

A) First, calculate the number of hauled out seals on ice in the entire ocean

# Raisins in crust	X	# Slices in Loaf	=	# of hauled out seals on ice in the Arctic Ocean
	X		=	**A)**

B) Next, calculate the number of seals in the entire Arctic Ocean.

# Raisins in 1 slice	X	# Slices in Loaf	=	# of seals in the Arctic Ocean
	X		=	**B)**

C) With the data you have calculated, now determine the percentage of hauled out seals on the ice in the Arctic Ocean.

__A__ X 100 = % of hauled out seals on ice in the Arctic Ocean
** B**

Your answer: _____%