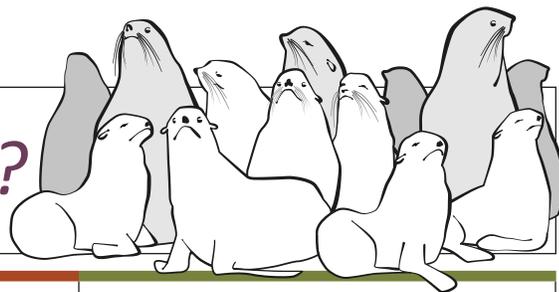


## LESSON THREE

# What is a fur seal rookery?



**Subject Area(s):** Life science, genetics, reading

**Grade Levels:** K-6

**Presentation – 10–15 minutes**  
**Activities – variable**

<b>Lesson Topics:</b>	Fur seal rookery structure, location, and seasonal changes.	<b>Focus Questions</b>	<ul style="list-style-type: none"> <li>• What is a fur seal rookery?</li> <li>• What do seals do at the rookery?</li> <li>• How does the rookery change over the season?</li> <li>• Why do we want to know?</li> </ul>
<b>Learning Objectives:</b>	Students will: <ul style="list-style-type: none"> <li>• describe the seasonal timeline of a northern fur seal rookery</li> <li>• describe what fur seals in different age groups do at the rookery</li> </ul>	<b>Key words:</b>	rookery, haulout, vocalization

ACTIVITIES		ALASKA STANDARDS			
		Math	Science	Minutes	Grades
Activity 3.1	How Many Babies?	K.CC.4–6 K.MD.3 1.MD.7 2.MD.9–10 3.MD.6 4.MD.6 5.MD.6	SC 2	2x15	K–6
Activity 3.2	Rookery Timeline	4.MD.1 5.MD.1	SC2	25	3–6
Activity 3.3	Create a Rookery – Rubber Stamp Making		SC2	50	K–6
Activity 3.4	Find Your Fur Seal Family		SC2	10	K–6
Activity 3.5	Vocalizations in Northern Fur Seals		SC2	10	3–6

### Targeted Alaska Grade Level Expectations (GLEs) — SCIENCE

#### Math

**CC** Counting and Cardinality

**MD** Measurement and Data

#### Science

##### Concepts of Life Science

**SC2** Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

# Laaqudaŋ: The Northern Fur Seal

## Lesson 3:

What is a fur seal rookery?



© Thomas Stream Northern Fur Seal

Lesson 3 gives an overview of what a rookery is, the timing of fur seals' arrival at and departure from the rookery during the breeding season, and what we can learn from the rookery.

## What will you learn?



- What is a rookery?
- Where are northern fur seal rookeries?
- When do fur seals arrive?
- What do fur seals do at the rookery?
- When do fur seals leave?
- What can we learn from the rookery?



Lesson 3: What is a fur seal rookery?

1

### Background on fur seal life history

Northern fur seals spend much of the year at sea, but return to land to breed (mate and have pups) during the summer. They gather in large groups at specific areas, called rookeries, on islands in Alaska, California, and Russia.

Most female fur seals return to the same spot year after year to give birth (a behavior called philopatry).

**Philopatry** – returning to the location where an individual was born

Some females return to the same island and rookery but not the site where they were born (a behavior called site fidelity).

**Site fidelity** – returning to the same place (can be in relation to the destination of a feeding place, a migration, or a breeding area, among other things)

Because of this, males gather in areas where female fur seals will arrive each year to breed, and set up territories that they defend against other males.

The biggest, strongest, most dominant males have the most females in their territories.

Sources: Riedman, M. 1990. The Pinnipeds. Gentry, R. 1998. Behavior and ecology of the northern fur seal.

Photo: NOAA/NMFS/AFSC/NMML

## What is a rookery?



- **Rookery:** A colony of breeding animals.
  - Examples: nesting place for birds, breeding grounds for seals
  - Algaŋiiluŋ = rookery



- **Haulout:** Areas where non-breeding pinnipeds leave the water to rest and practice.

Haulout areas can be next to the rookery, or in a separate location.

Lesson 3: What is a fur seal rookery?

2

Rookeries are specific areas where animals gather each year to mate and raise young. Many different kinds of animals gather in rookeries; examples are elephant seals, fur seals, seabirds (including penguins).

There are several Unangam words for "rookery" – algaŋiiluŋ, angaŋtaaluŋin, isxaŋ, tanaŋ

Haulout sites are specific areas where pinnipeds who are not breeding gather to rest. Haulout sites may be at the edges of rookeries, or they may be totally separate from rookeries.

Juvenile males sit off to the side at haulout sites and practice territorial behavior.

Photo: Lisa Hiruki-Raring, NMML/AFSC/NMFS/NOAA

## Who is at the rookery?



- **Adult male (aataax):** a male seal that is old enough to mate (usually 7 years or older)
  - Breeding male – defends a territory containing females, usually 9 years or older
  - Idle male – may hold a territory but does not hold females on the territory
- **Adult female (maatkaâ):** a female seal that is old enough to have pups (usually 3 years or older)
- **Pup (laaqudaâ):** A fur seal in the first year of its life



Lesson 3: What is a fur seal rookery?

3

Source: Antonelis G. (1992) Northern fur seal techniques manual. U.S. Dep. Commer, Seattle. NOAA Tech Memo NMFS F/NWC-214, 47 p. (adult males); York (1987) – female reproduction

Photo: NOAA/NMFS/AFSC/NMML

The next two slides briefly describe the different age groups of fur seals that are found at the rookery and on haulouts.

- Male fur seals may take up to 7-10 years to become breeding males and may only keep a territory on the rookery for a few years.
- If they become territorial males (adult males who hold a territory on the rookery) they may father many pups per year during the time that they have a territory. Not all males become breeding males; some are idle males (defend a territory but don't have females) and some remain on the haulout areas.
- Female fur seals begin to breed at 3-5 years of age and then have one pup per year until they are 18-20 years old. Females choose a location on the rookery that increases their chances of weaning a pup.
- Pups are born in July and remain on the rookery until they are weaned, four months later.

Adult males who hold a territory exclude all non-adult males from the rookery. Adult males defend territories from May to August. After territorial males leave the rookery in August, they are replaced on the rookery by non-territorial males (usually older subadult males or adult males who have not been able to hold territories). During this time, adult females with pups continue to use the rookery as a nursery area.

The pregnancy rate for females is approximately 60% for females age 3 and greater, and 68% for females age 4 and greater (York 1987). Nearly 90% of females in their reproductive prime, 8-13 years old, are pregnant every year with the pregnancy rate gradually decreasing after 13 years of age.

## Who is NOT at the rookery?



- **Juvenile:** A fur seal that is too young to mate or have pups
  - Juvenile males (xulustaakaâ) are up to 7 years old and stay on haulout sites
  - Juvenile females return to the rookery when they are ready to mate for the first time.

As males get older (7-8 years old), they move from the haulouts to the edge of the rookery.



Lesson 3: What is a fur seal rookery?

4

Most yearlings and 2-year-olds are not at the rookery, they spend their first two years at sea. Each summer, juveniles 3 years and older return to the Pribilof Islands. Females return to mate while males return to practice mating behavior. Juvenile males gather on haulout sites, which can be on the edge of the rookery or inland of the rookery, or in a separate area of the island.

Because it takes males longer to reach breeding age (they do not reach breeding age until 7-9 years old, while females can start breeding between 3-5 years old), there are many more juvenile males than females. Juvenile males spend their time on the haulout practicing herding behavior.

Males can physically mate at 7 years, but most are not socially able to mate (i.e., they are not able to hold and defend territories on the rookery) until they are a few years older. Males who are closer to breeding age start to defend areas at the edge of rookeries. As they gain more experience, they can begin to hold territories and breed.

Xulustaakax – male fur seal too young to have a territory with females

Source: Gentry R. 1990. Behavior and ecology of the northern fur seal, Antonelis

Photo: Rolf Ream, NOAA/NMFS/AFSC/NMML: [http://www.afsc.noaa.gov/nmml/gallery\\_admin/albums/nfs/SNP92juvs.jpg](http://www.afsc.noaa.gov/nmml/gallery_admin/albums/nfs/SNP92juvs.jpg)

## Fur seal life history



- **Breed on rookeries**
  - Territories - areas on the rookery defended by a male; can contain one or more females
- **Each female has one pup**
  - Female nurses the pup for about 4 months, then pup is on its own

Lesson 3: What is a fur seal rookery?

5

During a given year, a female has one pup.

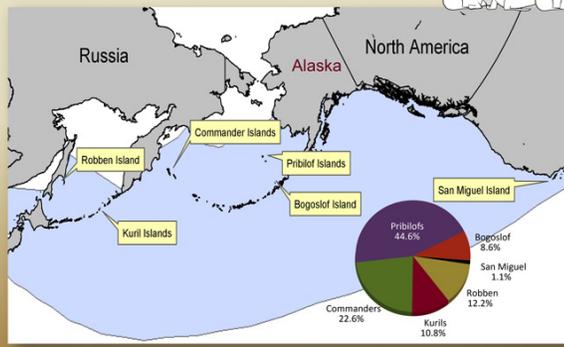
Males can mate with many females.

Only about 10% of male pups become breeding males, whereas most females become breeding females.

Source: Gentry, R. 1990. Behavior and ecology of the northern fur seal.

Photos: Pam Goddard, [www.thalassa-education.com](http://www.thalassa-education.com)

## Where are northern fur seal rookeries?



Lesson 3: What is a fur seal rookery?

6

Unangam names:

Tanaĭ-Amiĭ - Pribilof Islands

Aġasaagūĭ - Bogoslof Island

There are five northern fur seal breeding rookery locations: three in Russia (Commander Islands, Robben Island, Kuril Islands), two in the Bering Sea (Pribilof Islands, Bogoslof Island) and one in California (San Miguel Island). The largest proportion of the northern fur seal population is on the Pribilof Islands. At each location, fur seals breed at specific rookeries (e.g., in the Pribilof Islands, there are 15 rookeries on St. Paul Island and 6 on St. George Island).

Percentage of the worldwide northern fur seal population in different rookery locations (2012):

- 44.6% Pribilof Islands
- 22.6% Commander Islands
- 12.2% Robben Island
- 10.8% Kuril Islands
- 8.6% Bogoslof Island
- 1.1% San Miguel Island

Map: NOAA/NMFS/AFSC/NMML observer PowerPoint

## Where are the Pribilof rookeries?



Lesson 3: What is a fur seal rookery?

7

Unangam names:

Amiĭ - St. Paul Island

Aġsaaxchaluĭ - St. George Island

There are 15 rookeries on St. Paul Island and 6 on St. George Island.

Maps adapted from NOAA/NMFS/AFSC/NMML website and NOAA Office of Response & Restoration

## When do fur seals arrive on land?



### On the rookery:

- Adult males – May
- Adult females – late June to Aug.
  - Oldest arrive first, younger ones later; most arrive in July
  - The pup is born a few days after the female arrives at the rookery



### On the haulouts:

- Juveniles – start to arrive in May
  - Juvenile males arrive by age: oldest first, younger ones later
  - All juvenile males are excluded from the rookery until late August-early September, when breeding males have left

Northern fur seals arrive at different times on the rookery and haulout.

Adult males arrive first to set up their territories. Adult males start arriving in the water around the islands in March and are seen on land in late April to June. They get situated on the rookery in May.

Adult females arrive during late June-August, with the peak in July; oldest females arrive first, younger ones arrive later. The pup is born a few days after the female arrives at the rookery.

Juvenile males arrive by age with oldest males first, and progressively younger fur seals arriving later. Juvenile males are kept out of the rookery by breeding males until late August-early Sept.

Source: Gentry, R. 1998. Behavior and ecology of the northern fur seal; also, NOAA/NMFS/AFSC/NMML Alaska Ecosystem Program staff

Photo: Mikhail Shlemov (Russian photographer) via Vladimir Burkanov, NOAA, NMML (0K9O2848-Shlemov.jpg)

Lesson 3: What is a fur seal rookery?

8

## What do seals do at the rookery?



- Adult males
  - Defend territories, herd females within territories, mate with females
  - Do not eat while on rookery
- Adult females
  - Return to the same area each year to give birth to one pup (site fidelity)
  - Mate with an adult male
  - Alternate feeding trips at sea with visits ashore to nurse pup
- Pups
  - Nurse, grow, play



Lesson 3: What is a fur seal rookery?

9

The main purpose of fur seals on the rookery is for breeding fur seals to mate and for the females to raise their pups. Therefore, the adult males guard their territories and keep their females in the territory, while the females alternate feeding at sea and coming back to nurse their pups.

Some females return to the rookery where they were born (philopatry). Scientists have seen tagged females who will even come back to a specific rock each year. Other females return to the general area where they were born (site fidelity).

Pups stay on the rookery while their mothers are away feeding, so they play with other pups and learn to swim in the water close to shore. When the mother comes back to the rookery after a feeding trip, she will call and listen for her pup to respond. Mothers recognize their pup's call and then verify the identity of their pup by smelling it when the pup is close enough to touch.

Photo: Mikhail Shlemov (Russian photographer) via Vladimir Burkanov, NOAA, NMML

## What do seals do at the haulout?



- Juvenile males
  - Alternate feeding trips at sea with time ashore to rest and practice breeding behavior
  - Practice holding territories and mating behaviors
  - Molt (shedding old fur and growing new fur)



Lesson 3: What is a fur seal rookery?

10

Juvenile males are the only seals on the haulouts. They use time at the haulouts to practice breeding behavior and to molt (shedding old fur and growing new fur). Males will practice herding females and mock fighting with other males.

Source: Riedman, M. 1990. The Pinnipeds. Gentry, R. 1998. Behavior and ecology of the northern fur seal.

Photo: Vladimir Burkanov, NOAA, NMML visiting scientist

## When do seals leave the rookery and haulout?



- Adult males – mid to late August
- Adult females – late Oct. to early Dec.
- Juveniles – late Oct. to early Dec.; older first, younger ones later
- Pups – mid-Nov. to early Dec, after first big storms of the fall



Lesson 3: What is a fur seal rookery?

11

Fur seals of all ages molt on land. Male and female fur seals of different ages leave the rookery at different times.

- Because adult males arrive first (in May), and they don't eat while they are on the rookery, they are the first to leave (late July)
- Adult females leave between late Oct and early Dec. Females who didn't have pups, or whose pups died leave as early as October. All other females leave once their pup has weaned itself, usually in November.
- Juvenile male fur seals leave once molting is complete, up to early Dec.
- Juvenile males leave the rookery in the same order they arrived – older juveniles first, younger ones last.
- Pups leave the rookery in Nov. after the first big storms; tagging data suggests pups leave when the mother is away on a feeding trip.
- Females whose pups have left the island return to the rookery one last time, spend a few days, and then depart for the year.

Source: Lea, M.; Goebel PhD thesis; Ragen 1995; Ream 2005.

Photo: Jeremy Sterling, NMML/AFSC/NMFS/NOAA

## What can we learn at the rookery?



- Size of population
- Behavior of fur seals
- Diet and feeding behavior
- Health and diseases
- Which seals are related
- Births and deaths

Lesson 3: What is a fur seal rookery?

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Scientists from around the world come to the Pribilof Islands to study northern fur seals.

Photo: Rolf Ream, NMML/AFSC/NMFS/NOAA

## How do we know?



- Observation
- Counts
- Capture live seals
  - Collect tissues (blood, skin, nasal swab, fat)
  - Mark with tags
  - Attach tracking instruments (radio tags, satellite tags, time-depth recorders)
- Collect scats



Lesson 3: What is a fur seal rookery?

13

- Size of population and behavior of fur seals is studied by observing the fur seals, conducting counts, putting instruments on seals, and analyzing genetic samples.
- Feeding, diving and migrating behavior can be studied by instrumenting animals.
- Health and diseases can be studied by scat, blood, and genetic analyses of tissues.
- Diet can be studied by examining scat, spews (thrown up bones) and analyzing fat samples.
- Relatedness of seals is studied using genetic samples.

Photo: Rolf Ream, NMML/AFSC/NMFS/NOAA

## Summary



- Northern fur seals return to rookeries once a year to have pups and mate
- Adult males arrive first in May, followed by adult females in late June-Aug.
- Pups are born a few days after females arrive
- By studying the seals on the rookery, scientists learn about their life history both on land and at sea



Lesson 3: What is a fur seal rookery?

14

- Seals arrive in reverse order of age, oldest first, youngest last
- Pups wean themselves and most leave by early December (average date of leaving for pups is mid-November); by late December all seals have left the rookery.

Photo: Pam Goddard, [www.thalassa-education.com](http://www.thalassa-education.com)

## How Many Babies?

### OBJECTIVE

Students learn that some mammals have one baby at a time and some mammals have many babies. Marine mammals only have one baby at a time

### TIME REQUIRED

2 x 15 minutes

### BACKGROUND

Animals have different numbers of babies at one time. Some animals have many thousands of babies (fish), and some have only a few (cats, dogs) and some have only one at a time (fur seals). In general, mammals have fewer babies than non-mammals. We will go through different types of animals, review the characteristics of mammals and marine mammals, and learn how many babies they have. This activity provides background information for the upcoming rookery activities, to emphasize that northern fur seals have only one pup per year. If that pup dies the female does not have another pup until the following year.

### MATERIALS

- Worksheets
- Internet
- Encyclopedias

### PROCEDURE

- Have the students work independently or in pairs to complete the following worksheets.
- Tell students that they will be learning about how many babies different kinds of animals have.
- For younger grades, complete the worksheets as a class. Use words like "one, a few, several, lots" rather than specific numbers, if necessary.
- Older students should work independently or in pairs to research exact numbers of offspring produced by each animal.

### DISCUSSION

- Students should learn that all marine mammals (except polar bears) have only one baby at a time. Some marine mammals, like seals, have one each year; others, like walrus or large whales, have one baby every two to three years.
- Ask if all animals have the same number of babies  
Some have many babies, some only have one at a time.

Students may also notice that some egg-laying animals have many babies at a time.

- Discuss examples of animals that have a lot of babies and animals that only have one baby at a time.  
Use different categories of animals (e.g., non-mammals, mammals, land animals, sea animals)
- How many babies does a female fur seal have each summer?  
One
- Why is it important to know how many babies an animal has?

If a fish lays thousands of eggs but only 100 of the eggs hatch and the rest die or are eaten, the fish will still have some babies that survive. If a fur seal has only one pup and that pup dies, the fur seal cannot have another pup until the next year.

The death of a seal's pup has a much bigger effect on the population than the loss of thousands of fish eggs.

### EXTEND AND EXPLORE

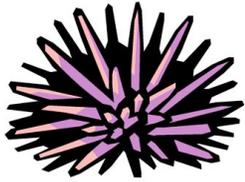
Define the word fecundity. Research one of the animals on the worksheets and answer the following questions.

- At what age does it begin to reproduce?
- How long does it live?
- How often does it reproduce?
- How many offspring does it have?
- An animal's reproductive strategy is the way it allocates energy to producing babies that survive. For example, some animals put their energy into making lots of eggs so that a few will survive, while other animals spend a lot of energy having a few large babies that will have a good chance of surviving. Explain your animal's reproductive strategy and tell why you think it is successful.

ACTIVITY 3.1

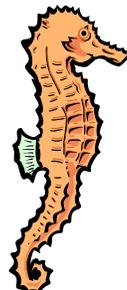
WORKSHEET 3.1.1

How Many Babies?  
SEA CREATURES



sea urchin

eggs



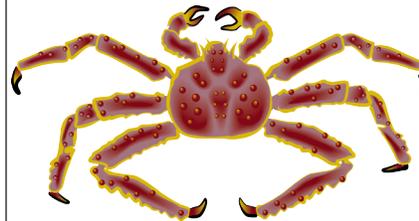
sea horse

eggs



lobster

eggs



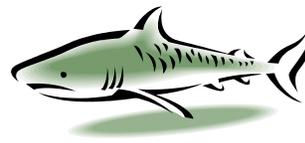
red king crab

eggs



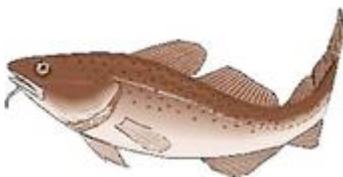
starfish

eggs



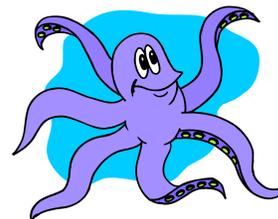
Salmon shark

pups



Pacific cod

eggs



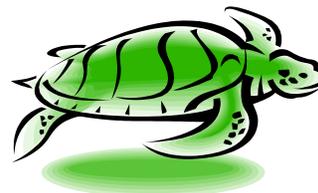
giant Pacific octopus

eggs



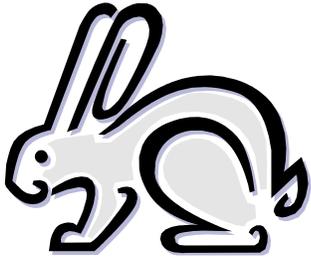
clown fish

eggs



sea turtle

eggs



rabbit



mouse



wolf



fox



bear



moose



musk ox

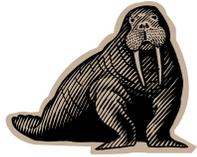


bison

**ACTIVITY 3.1**

**WORKSHEET 3.1.3**

**How Many Babies?  
MARINE MAMMALS**



walrus  
(pinniped)



orca  
(cetacean)



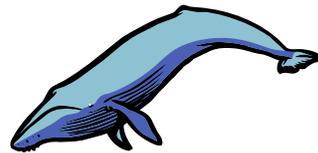
sea lion  
(eared seal, pinniped)



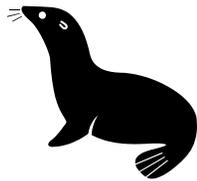
dolphin  
(cetacean)



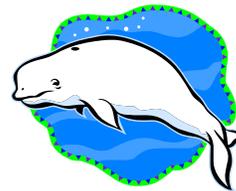
harbor seal  
(true seal, pinniped)



humpback whale  
(cetacean)



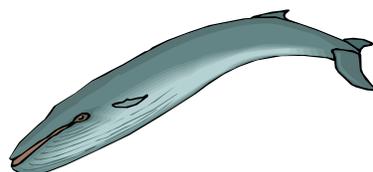
fur seal  
(eared seal, pinniped)



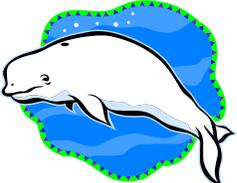
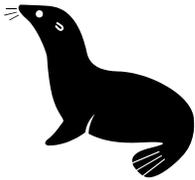
beluga whale  
(cetacean)



sea otter  
(fissiped)



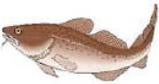
blue whale  
(cetacean)

	<p>fox</p>	
	<p>wolf</p>	
	<p>bison</p>	
	<p>beluga whale</p>	
	<p>fur seal</p>	

# ACTIVITY 3.1 TEACHER KEYS

Elementary Curriculum: Grades K-6

## ACTIVITY 3.1 WORKSHEET 3.1.1 How Many Babies? SEA CREATURES

 sea urchin	1,000,000 eggs	 sea horse	25-1,000 eggs
 lobster	3,000-75,000 eggs	 red king crab	25,000-75,000 eggs
 starfish	1,000,000s eggs	 salmon shark	2-5 pups
 Pacific cod	>1,000,000 eggs	 giant Pacific octopus	20,000-100,000 eggs
 clown fish	100-1,000 eggs	 sea turtle	50-200 eggs

Elementary Curriculum: Grades K-6

## ACTIVITY 3.1 WORKSHEET 3.1.3 How Many Babies? MARINE MAMMALS

 walrus (pinniped)	1 every 2 years	 orca (cetacean)	1 every 5 years (average)
 sea lion (eared seal, pinniped)	1 every year	 dolphin (cetacean)	1 every 2-3 years
 harbor seal (true seal, pinniped)	1 every year	 humpback whale (cetacean)	1 every 2 years
 fur seal (eared seal, pinniped)	1 every year	 beluga whale (cetacean)	1 every 2-3 years
 sea otter (hissiped)	1 every year	 blue whale (cetacean)	1 every 2-3 years

Laaquda: The Northern Fur Seal

## ACTIVITY 3.1 WORKSHEET 3.1.2 How Many Babies? MAMMALS

 rabbit	5-7	 mouse	7-12
 wolf	4-7	 fox	5-8
 bear	1-2	 moose	1-2
 musk ox	1	 bison	1

Laaquda: The Northern Fur Seal

## ACTIVITY 3.1 WORKSHEET 3.1.4 REVIEW How Many Babies?

	fox	5-8
	wolf	4-7
	bison	1
	beluga whale	1
	fur seal	1

## Rookery Timeline

### OBJECTIVE

Students will learn about the sequence of events at a fur seal rookery through creation of a timeline.

### TIME REQUIRED

25 minutes

### BACKGROUND

The Create a Rookery Timeline Activity demonstrates the sequence of events over a one-year period at a fur seal rookery. As fur seals of different ages arrive on the rookery, the structure of the rookery changes.

The activity can be used to introduce concepts of northern fur seal seasonality and rookery structure:

- males establish territories, which they defend from other males
- females gather in the same areas each year to have their pups (site fidelity)
- non-breeding seals gather in haulouts
- pups gather into groups called “pup wads” when their mothers are not on the rookery

The activity can also introduce life history:

- adult males stay on the rookery to defend their territory and to mate with females
- adult males fast during the breeding season
- females alternate periods of time at the rookery to nurse their pups with trips out to sea to feed
- females only have one pup per year.

### MATERIALS

Large sheet of butcher paper (five to six feet long) or smaller pieces taped together to form a long line.

- (optional) pictures or drawings of northern fur seal male, female, juvenile and pups - can be taped or glued to the timeline at the appropriate locations.
- Markers

### PROCEDURES

For younger grades, the timeline can be a class project, with images pasted onto a large timeline at the front of the class. For older students, each student can create his or her own timeline, or they can work in groups of two to four students.

- Introduce the concept of a timeline by using the school year as an example. Add holidays and any other significant events.
- Have students draw a timeline on their paper and divide it into 12 months: January to December (or May to December, if space is an issue)
  - ◆ Ask the students to add the following events to the rookery timeline:
    - i. adult males arrive
    - ii. adult females arrive
    - iii. pups are born
    - iv. adult males leave
    - v. pups leave
    - vi. adult females leave

### DISCUSSION

Discuss why the rookery changes over the season. Lesson 3 PowerPoint or Activity 3.3 Create a Rookery Teacher Key can be used as a reference.

- Why do all the seals come to the rookery at the same time of year?

**To mate and raise pups.**

- Why do the fur seals leave the rookery before the winter?

**Cold weather/storms; can feed farther away where waters are more productive in winter; pups are weaned, so females don't have to stay around the rookery.**

- What is a similar timeline in your life?

**Compare the rookery cycle to the school year – teachers come back to school first, then students; limited amount of time (August to May); at the end of the school year, students leave school and when they come back in the fall, they are in the next grade.**

- Can you think of other examples of seasonal cycles in the year?

### EXTEND AND EXPLORE

Add the juvenile males to the timeline. Males reach breeding age between seven and nine years of age (females reach breeding age earlier, at age three to five years). Juvenile males gather on haulouts until they are able to breed, then they move closer to the rookery and challenge territorial males.

Technology – older students can learn Excel to recreate the timeline on the next page.

## ACTIVITY 3.2 TEACHER KEY

## Create a Rookery Timeline

The following events should be on the rookery timeline:

- i. **May:** Adult males arrive at the rookery.
- ii. **Late June–August:** Adult females begin to arrive at the rookery. Oldest arrive first, youngest arrive last, with most females arriving in July.
- iii. **June–July:** The pup of each female is born a few days after she arrives at the rookery.
- iv. **July:** Adult females stay at the rookery for one week after the pup is born, to nurse the pup; after a week, the female starts alternating feeding trips at sea with visits ashore to feed the pup.
- v. **May:** Juvenile males start arriving at the haulouts in May, with older juveniles returning first and progressively younger males arriving later.
- vi. **Late July:** Pup wads (big groups of pups of all ages that play and hang out together) form at the rookery since their mothers are out at sea feeding.
- vii. **Mid to Late August:** Adult males begin to leave the rookery; older juvenile males start to move to the edges of the rookery.
- viii. **Mid-November:** Pups wean from their mothers (they stop nursing) and leave the rookery after the first winter storms.
- ix. **Late-October–early December:** Adult females and juveniles leave the rookery. Adult females without pups, or whose pups have died, leave in late October/early November; adult females with pups leave after their pups have weaned and left the rookery.

Activity 3.1 Northern Fur Seal Rookery Timeline

	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Adult males			Adult males arrive on the rookery in May. Adult males leave the rookery in mid to late Aug.							
Adult females				Females arrive late June to August (older females first, younger ones later) with most arriving in July. Females have pups within a few days of their arrival on rookery, then alternate nursing pup on shore with feeding trips at sea. Females leave the rookery in mid-November after their pup leaves.						
Juvenile males			Juvenile males start to arrive at haulout sites in May, with older males arriving first, and progressively younger males arriving later. Juvenile males are excluded from the rookery by adult males. Older juveniles start to come into the rookery in late August-early Sept. after adult males leave.							
Pups				Pups are born a few days after a female arrives on rookery. As they grow, pups group together into “pup wads.” Pups leave the rookery in November after the first winter storms.						

## Create a Rookery — Rubber Stamp Making

### OBJECTIVE

Students will learn the structure of a rookery through art. Make rubber stamps of the components of a rookery. Create pictures of the rookeries at different times of the year using the stamps.

### TIME REQUIRED

50 minutes

### BACKGROUND

The rookery structure changes throughout the season. First males arrive, then females arrive, pups are born, males leave, pups leave, and finally the females leave. Through art, students can visualize the changes on the rookery between June and November. The different behavior of males and females is shown through their distribution on the rookery. See diagrams of rookery structure in the Teacher Key.

### NOTE

This art project can be adapted for all age levels. Students as young as five are able to sketch basic images of seals, grass, rocks, clouds, and water, which can be cut out by older students or adults. The older the students, the more complex the final image can be.

### MATERIALS

- #2 pencils
- 3-inch x 3-inch Post-its
- Soft-Kut rubber (size of a square post-it note) for each student; can be purchased in a 12 x 18-inch mat and cut to size
- paper plates – for paint
- sponges – 1-inch x 1-inch cubes for painting
- acrylic paint
- stamp pads (washable ink) – various colors
- linoleum cutters – various size blades, e.g. #1 liner, #2 V-gouge, #3 large line, #4 U-gouge
- paper to print on – good variety of colors and textures, but copy paper will work. Fabric can also be used instead of paper.
- wipes – for hands
- newspaper – to cover painting surfaces
- table covering paper
- 2-inch or 3-inch paint brayer (roller)

### PROCEDURES (See illustrations below)

1. Sketch on post-it; have each student pick one component of the rookery for each Soft-Kut rubber block (make sure all components of the rookery are represented, males, females, pups, rocks, waves, grass, clouds...)
2. Put Post-it on soft cut rubber with the image touching the rubber. The student should be looking at the blank side of the Post-it.
3. Transfer image to Soft-Kut rubber by gently rubbing the blank side of the Post-it with your hand or by rolling a pencil over the Post-it.
4. Cut image into rubber using linoleum cutters.
  - a. Don't cut too deep
  - b. Cut what you don't want to show up.
  - c. Trace around objects
5. Spread small amount of paint on paper plate.
6. Lightly roll paint onto brayer/roller.
7. Once roller is covered with light coating, gently roll paint onto the soft rubber.
8. Invert soft rubber cutout onto paper or fabric.
9. Gently rub back of cutout to transfer paint to paper or fabric.
10. Allow paint to dry.
11. Wash cutout and try with other colors.
12. Create four rookery scenes that represent the changes over one breeding season.

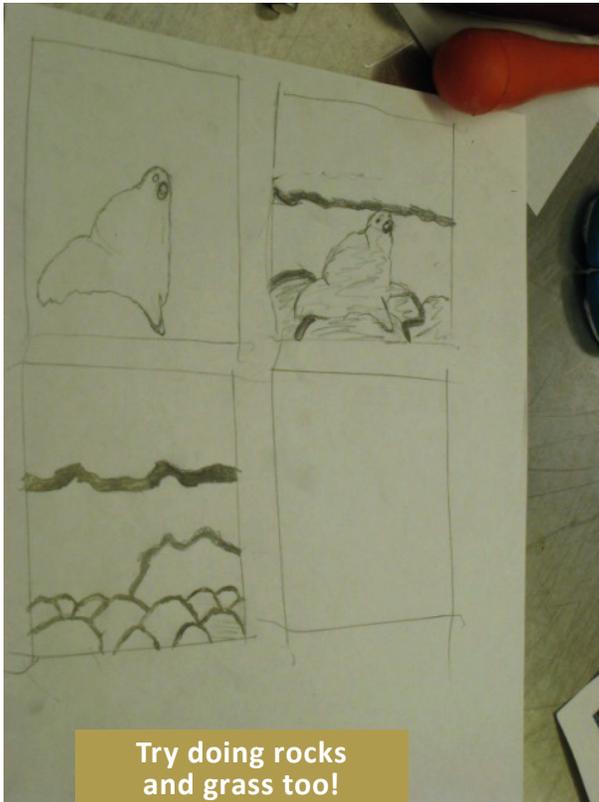
### DISCUSSION

- How does the rookery change over the summer?
- Discuss other seasonal cycles (e.g. birds, deciduous trees, gray whales).
- Many other animals migrate to Alaska for the summer. Research some of the other animals.

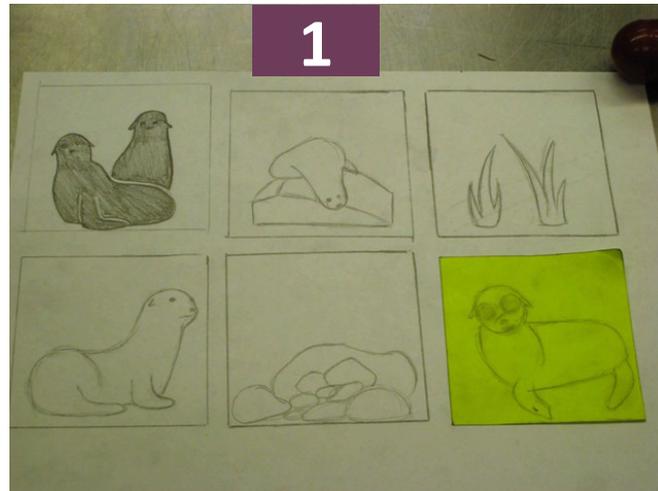
Creata Rookery activity was developed with Seattle artist Liz Haven.

## ACTIVITY 3.3

### Create a Rookery with rubber stamps!



1. Sketch a picture on a post-it note
2. Put post-it face-down on rubber square.
3. Transfer image to rubber square by rubbing the the back of the post-it.



Outlines and simple shapes are easiest.





Cut the area around your design (cut what you don't want to show).

4. Cut image into rubber, using linoleum cutters.
5. Spread small amount of paint on paper plate.
6. Lightly coat roller with paint.
7. Gently roll paint onto rubber stamp.
8. Place rubber stamp onto paper face down.
9. Rub back of stamp to transfer paint.

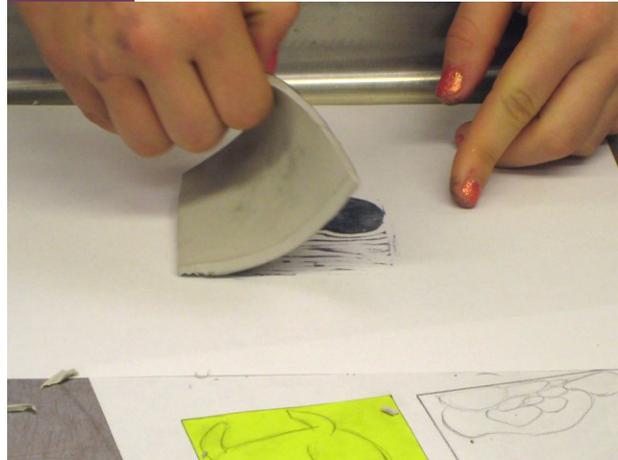


Note: paint only on raised image.  
If you push too hard on the roller the paint will transfer to the areas around the image that you want to be paint free.



10. Look at your picture! Allow paint to dry.
11. Wash rubber stamp (with wipes or wet paper towel) and try other colors.
12. Combine stamps to make a picture.
13. Try different paper and ink colors!

10



11



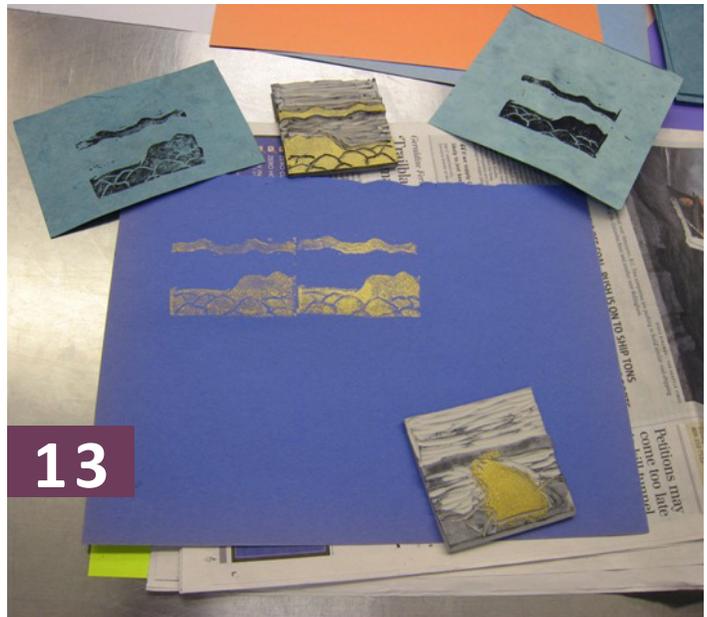
Try using two colors on the same stamp.

12



Make a landscape by repeating a scenery stamp.

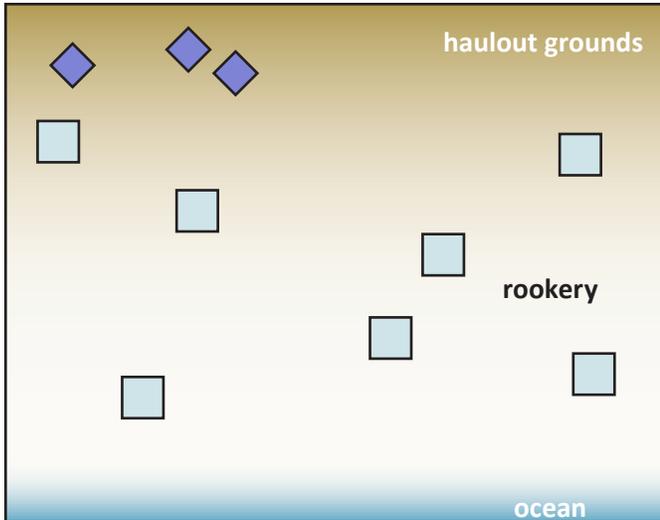
13



**ACTIVITY 3.3**

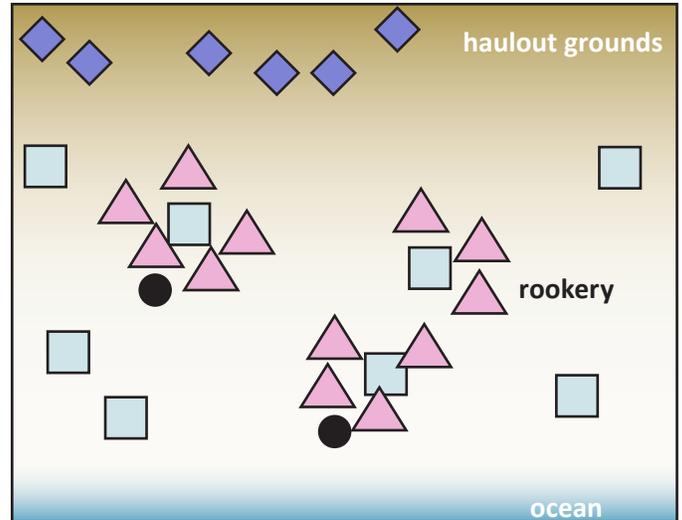
**TEACHER KEY**

**Create a Rookery**



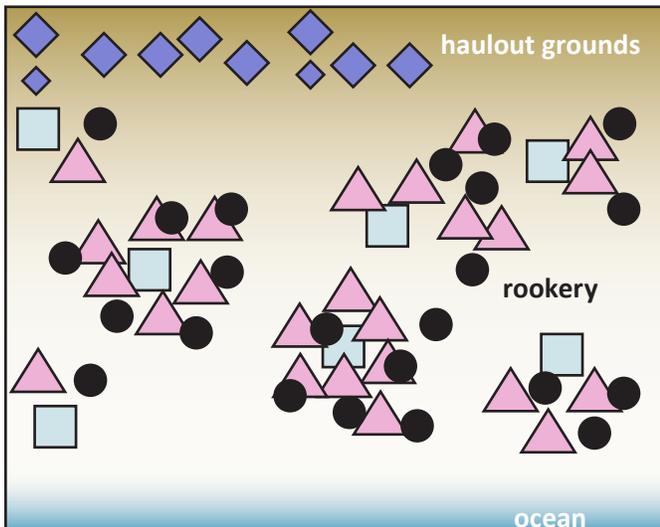
**Early to mid-May**

- adult males on territories
- males are spaced out (they defend area around them)
- no females at rookery yet
- older juvenile males arrive at haulout grounds



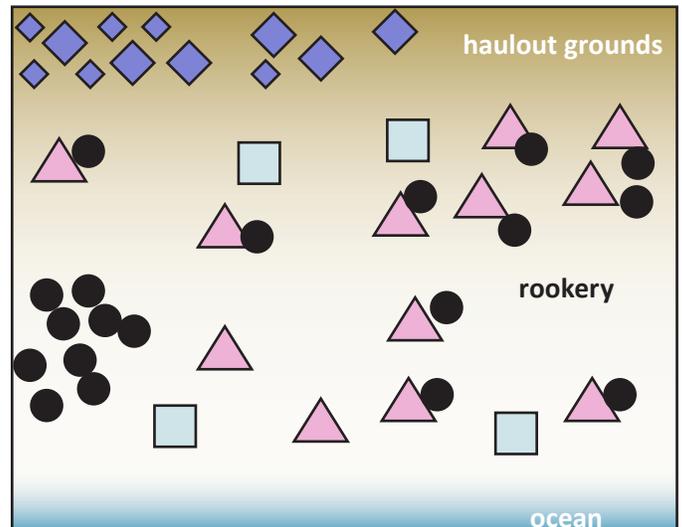
**Late-June**

- adult females begin to arrive at rookery and have pups within two to three days.
- females gather in territories
- a few males with central territories have most females
- some males only have a few females, over half have none



**Mid-July**

- more adult females arrive at rookery
- females have pups a few days after they arrive at rookery (one pup/female)
- females stay with pups for about a week, then begin to alternate feeding trips at sea with visits ashore to nurse pup
- Younger juvenile males arriving at the haulout grounds



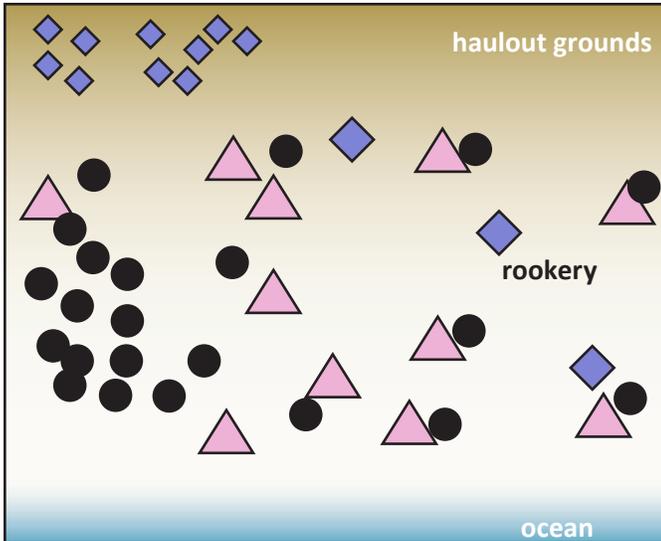
**August**

- all females are coming and going from rookery; some pups are nursing
- pups whose mothers are feeding at sea gather in "pup wads" (big groups of pups)
- adult males leave rookery in mid to late August
- juvenile males gather at haulout grounds at the edge of the rookery



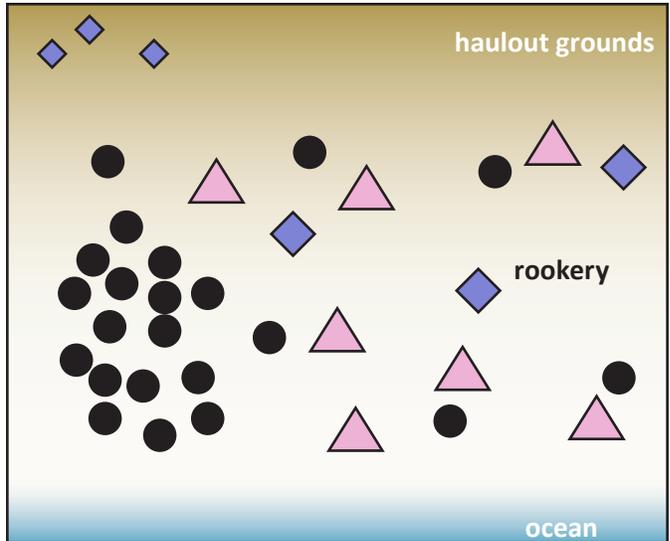
**ACTIVITY 3.3** **TEACHER KEY**

Create a Rookery



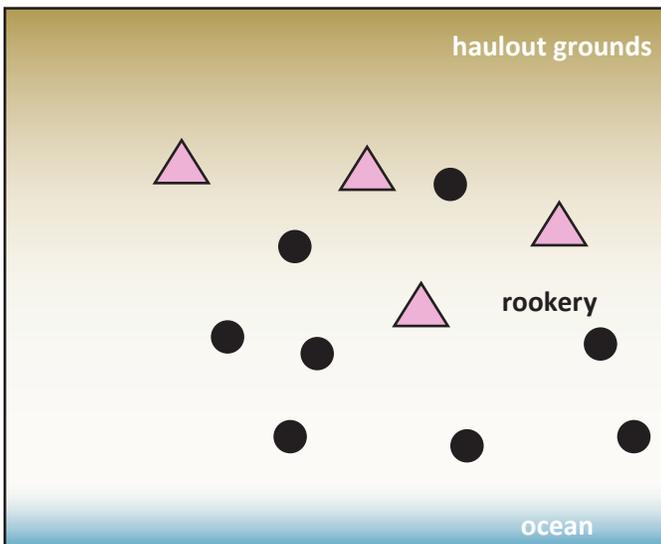
**September**

- females nursing pups, returning to and leaving the rookery
- pups are in “pup wads”
- younger juveniles are at haulout grounds
- older juvenile males are at the rookery practicing for the next breeding season



**Late October**

- females without pups begin to leave rookery
- pups are in “pup wads”
- older juvenile males begin to leave the rookery



**November–December**

- pups depart while their mothers are feeding at sea
- females leave rookery after their pup leaves
- juveniles leave rookery



## Find Your Fur Seal Family

### OBJECTIVE

Students will learn how a fur seal mother finds her pup in a crowded rookery.

### TIME REQUIRED

10 minutes

### BACKGROUND

Because female northern fur seals have to leave the rookery to feed at sea, they face the problem of finding their pup when they return. Females and pups reunite by calling to each other (the female recognizes the pup's call); when they get close enough, the female double-checks that the pup is hers by smelling it. Pups will answer several females' calls, but the female recognizes the pup's call and navigates across the rookery, calling to the pup all the way and listening for the pup's answering call.

### MATERIALS

Slips of paper with pairs of capital and small letters.

### PROCEDURE

Distribute the slips of paper to the students (make sure that you distribute pairs of letters, but only give one slip of paper to each student). Ask the students to keep their letters secret from one another.

#### First activity – early season

- When all students have received their slips of paper, tell them that if they have a CAPITAL letter, they are adult female seals. If they have a small letter, they are pups. They are to find the student with the letter that matches them, by calling out their letters.
- Pups may answer to several letters but females have to listen very carefully for their own letter and only respond to that one.
- When the pup and female get close enough that they can touch each other, they can show each other their letters.
- After all the students have matched up, collect the slips and discuss whether it was difficult for student pairs to find each other.

### DISCUSSION

How do females find pups?

- ◆ Females and pups have unique vocalizations that they recognize. Once the female gets close enough to the pup, she uses smell to confirm its identity.

#### Second activity – late season

- The second round of this activity takes place after pup wads have formed (late July-early August). Distribute only the small letters for the pups, and have them gathered together in a small area.
- Choose two or three other students, give them a CAPITAL letter, and tell them to go to the pup wad and find their pup.
- All the pups are allowed to answer when a female calls, but the female has to listen very carefully for her own pup's call.
- This round can be repeated several times with different students playing the role of the females.

### DISCUSSION

Discuss with the students whether it's easier or harder to find pups when they are in a pup wad. Why do pups respond to many females' calls but females only respond to one pup?

*If a pup gets close enough to a female to fool her into thinking it is her pup, it can get more milk than if it only responds to its own mother.*

### EXTENSION

- Visit a rookery; look for mothers calling for their pups. Are the pups responding to the females?
- Watch a video of fur seals and pups.

## ACTIVITY 3.4

## Find Your Fur Seal Family

<b>A</b>	<b>a</b>	<b>N</b>	<b>n</b>
<b>B</b>	<b>b</b>	<b>O</b>	<b>o</b>
<b>C</b>	<b>c</b>	<b>P</b>	<b>p</b>
<b>D</b>	<b>d</b>	<b>Q</b>	<b>q</b>
<b>E</b>	<b>e</b>	<b>R</b>	<b>r</b>
<b>F</b>	<b>f</b>	<b>S</b>	<b>s</b>
<b>G</b>	<b>g</b>	<b>T</b>	<b>t</b>
<b>H</b>	<b>h</b>	<b>U</b>	<b>u</b>
<b>I</b>	<b>i</b>	<b>V</b>	<b>v</b>
<b>J</b>	<b>j</b>	<b>W</b>	<b>w</b>
<b>K</b>	<b>k</b>	<b>X</b>	<b>x</b>
<b>L</b>	<b>l</b>	<b>Y</b>	<b>y</b>
<b>M</b>	<b>m</b>	<b>Z</b>	<b>z</b>

## Vocalizations in Northern Fur Seals

### OBJECTIVE

Students will learn that males, females, and pups have different vocalizations.

### TIME REQUIRED

10 minutes

### BACKGROUND

Northern fur seals have a variety of calls. Female seals and pups use their calls to identify each other. Students will listen to fur seal vocalizations and describe them.

### MATERIALS

Pribilof Islands, Preserving the Legacy DVD or website

### PROCEDURES

Students will watch a short video segment on northern fur seal research (Video clip “Fur Seal Research” in the Video Gallery section) or listen to northern fur seal audio files from the resources listed below. Students will describe the vocalizations that they hear, and identify them as coming from a male, a female, or a pup.

### DISCUSSION

- What do they sound like? Are the sounds what you think a seal sounds like, or are they different?
- Why do the animals have different vocalizations?

### RESOURCES

Pribilof Islands: Preserving the Legacy DVD or website  
[http://docs.lib.noaa.gov/noaa\\_documents/NOS/ORR/TM\\_NOS\\_ORR/TM\\_NOS-ORR\\_17/HTML/Pribilof\\_html/Images/Movies/SealResearch.mpg](http://docs.lib.noaa.gov/noaa_documents/NOS/ORR/TM_NOS_ORR/TM_NOS-ORR_17/HTML/Pribilof_html/Images/Movies/SealResearch.mpg)

Northern Fur Seals  
<http://www.dosits.org/audio/interactive/#/70>

Borror Laboratory of Bioacoustics  
 The Ohio State University (used with permission  
 borrowerlab@osu.edu)  
<http://blb.biosci.ohio-state.edu/commonname.asp>  
 Search on northern fur seal.

### EXTENSION FOR PRIBILOF STUDENTS

On the field trip to the blind, listen for different vocalizations. Try to record the vocalizations with a video camera or tape recorder. Play back the vocalizations in the classroom. Can you distinguish between the males, females and pups?

Post your video on YouTube for other students.

Listen to other pinniped vocalizations.  
 Scripps Institute of Oceanography: Voices of the Sea  
[http://cet.uscd.edu/voicesinthesea\\_org/species/pinnipeds/caSeaLion.html](http://cet.uscd.edu/voicesinthesea_org/species/pinnipeds/caSeaLion.html)

Discovery of Sounds in the Sea  
<http://www.dosits.org/audio/interactive>

