Dear Teacher:

During the **Flippers, Fur and Fun** assembly program an Aquarium educator will introduce students to seals and sea lions using a PowerPoint presentation, costumes, a song and dance, life-size inflatable animals and specimens such as bones and pelts. This program will focus on comparing and contrasting seals and sea lions and understanding how they are adapted for survival in their marine environment.

Before your assembly program:

- Ask students of their experiences with marine mammals. What marine mammals do they know or have they seen?
- Color the Harbor Seal, California Sea Lion and Elephant Seal coloring sheets**.**
- Conduct the What Makes a Mammal a Mammal activity

After your assembly program:

- Review the differences between seals and sea lions using the Harbor Seal, California Sea Lion and Elephant Seal fact sheets.
- Conduct the Measuring Marine Mammals activity. Using a tape measure, have your students measure out the length of each animal.
- Get students moving with the Marine Mammal Relay!

Participating in this program and using the pre and post curriculum will help your students meet Oregon science standards and Ocean Literacy Principles.

Flippers, Fur and Fun: Grades K-2

Goal: To compare and contrast seals and sea lions and describe what they need to survive in their environment.

Cognitive Objectives:

1. Explain what makes seals and sea lions mammals.
2. Explain that marine mammals have adaptations that help them survive in the ocean environment.
3. Compare and contrast how seals and sea lions move in and out of the water and the sounds they make.
4. Explain how seals and sea lions stay warm.

Affective Objectives:

1. Students will value marine mammals as worthy of protection and conservation.
2. Students will be inspired to learn more about marine mammals.

Oregon Science Standards:

K.2P.1 Examine the different ways things move.
1.1L.1 Compare and contrast characteristics among individuals within one plant or animal group.
1.2L.1 Describe the basic needs of living things.
2.1L.1 Compare and contrast characteristics and behaviors of plants and animals and the environments where they live.

Ocean Literacy: Essential Principals and Fundamental Concepts

5. THE OCEAN SUPPORTS A GREAT DIVERSITY OF LIFE AND ECOSYSTEMS.

Background Information

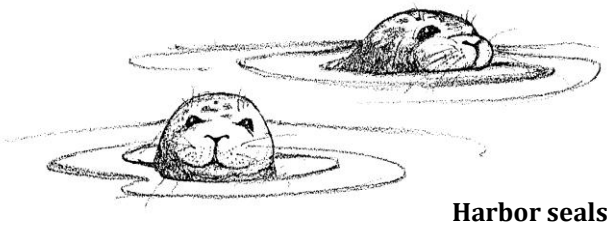
What is a marine mammal?

The colossal blue whale, active sea otter, barking sea lion, plant-eating manatee and even the polar bear are all marine mammals. They share a number of characteristics with their land-dwelling relatives: they are warm-blooded, give birth to live young, nurse their young, have hair at some time in their lives on some part of their bodies, and breathe air.

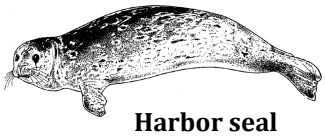
But marine mammals differ from land mammals in that their livelihood depends upon the ocean. They have bodies that are particularly well suited to life at sea. Ears, limbs, mammary glands and sex organs have all been streamlined to reduce drag as these animals swim through the ocean. Except for sea otters, marine mammals have a thick layer of fat called **blubber** under their skin. This aids buoyancy, provides insulation and serves as a reserve energy source for most marine mammals. To keep themselves warm, they also have a specialized circulatory system with an adaptation called **countercurrent heat ex change**, in which blood cooled by exposure at the body's extremities is warmed as it flows next to warm blood moving out from the body's core.

The Pinnipeds

Seals, sea lions and walruses are carnivorous marine mammals that belong to the suborder Pinnipedia *(PINN-ih-PED-ee-ah)*. The word pinniped means "feather-footed" or "fin-footed." There are three families in this suborder. The family Phocidae *(FOE-sih-dee)* includes the "true" or "earless" seals. The true seals have tiny ear holes but no external ear flaps. Members of the family Otariidae *(OE-TAR-EE-IH-DEE)* are known as the "eared" seals and includes sea lions and fur seals. Walruses are the largest pinnipeds and belong to the family Odobenidae *(OE-doe-BENN-ih-dee).* Walruses are neither seal nor sea lion, but share characteristics with each. Like sea lions, walruses have long front flippers that they can use to "walk" on land and hind flippers that rotate underneath their body. Like seals, walruses lack earflaps and use their hind flippers in a side-to-side motion for swimming.



Harbor seals



Harbor seal

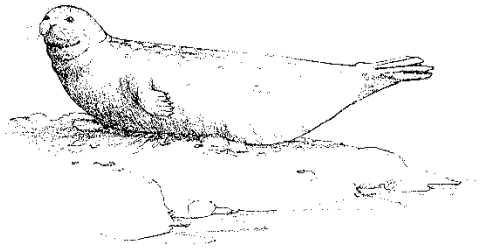
California sea lion

True Seals	Eared Seals
Examples: Harbor seals, monk seals, leopard seals and elephant seals	Examples: California sea lions, Steller sea lions and Northern fur seals
• Found in marine and freshwater habitats	• Found only in marine habitats
• Found in both Atlantic and Pacific regions	• No northern Atlantic species exist
• No ear flaps; sometimes called "earless seals"	• Small ear flaps; sometimes called "eared seals"
• Hind flippers don't rotate forward; bounce along on their bellies on land	• Can rotate hind flippers forward, raise bodies up and "walk" on land with all four flippers
• Swim by moving their hind flippers in a back and forth motion	• Push long front flippers up and down; appear to be flying through the water
• Relatively quiet, with occasional grunts, groans or growls	• Most have a bark that sounds similar to a dog's bark, although some sound more like a lion's roar.

California sea lions have been billed as "trained seals" in circuses. Walruses, which live in the Arctic, are the only pinnipeds with large, heavy tusks, which they use for defense and for help in climbing onto slippery ice floes.

Harbor Seal

What does a harbor seal look like?



- Harbor seals can be silvery gray with dark spots or black with white spots or rings.
- Their bodies are torpedo-shaped, which helps them to move quickly and easily through the water. On land they look a lot like giant sausages.
- Unlike sea lions, seals don't have ear flaps. Instead they just have a tiny ear opening.
- A seal's flippers are not long enough to allow them to "walk" on land like a sea lion. Instead they bounce along on their bellies.

How big are they?

- Males can grow to be about 6 feet long and weigh 370 pounds
- Females are only slightly smaller.

Where do they live?

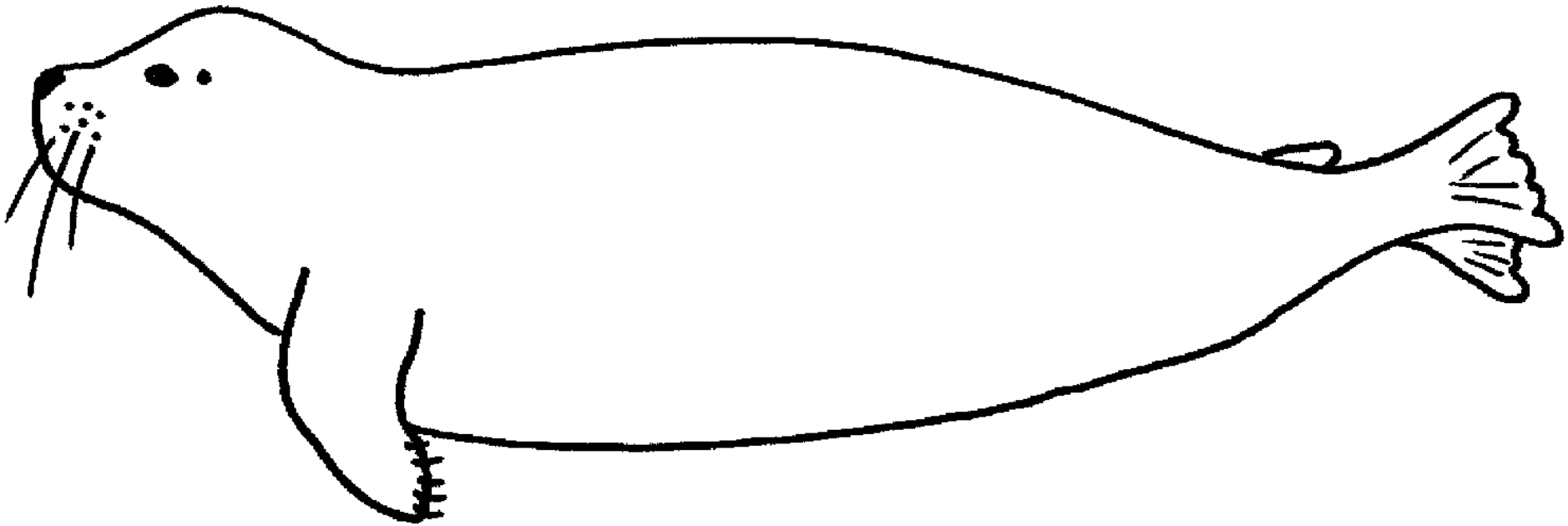
- Harbor seals live along the Pacific coast, from Alaska to Mexico. There are also harbor seals that live on the Atlantic coast.
- They will often haul out onto rocks or sandy beaches to rest, molt (shed their fur) or give birth to their pups.

What do they eat?

- They eat fish, squid, octopuses, mussels and crabs.

Did you know?

- Harbor seals don't bark like sea lions do. Instead they make quiet grunts, growls, snorts and hisses.
- Most harbor seals are darker on their backs than they are on their bellies. How do you think this form of camouflage helps them to blend into their ocean habitat?
- Like most marine mammals, harbor seals have thick slimy tears to protect their eyes while they are swimming. These tears are like built-in goggles.



Harbor Seal

OREGON COAST AQUARIUM
NEWPORT

California Sea Lion

What does a California sea lion look like?

- California sea lions are usually a milk chocolate brown.
- Their bodies are torpedo-shaped, which helps them to move quickly and easily through the water.
- Sea lions are eared seals and have small ear flaps on either side of their heads.
- Male sea lions have a "bump" on the top of their heads called a sagittal crest. This makes them look bigger and stronger when facing other males.

How big are they?

- Males can grow to be 8 feet long and weigh 850 pounds.
- Females can grow to be 7 feet long and weigh about 240 pounds.

Where do they live?

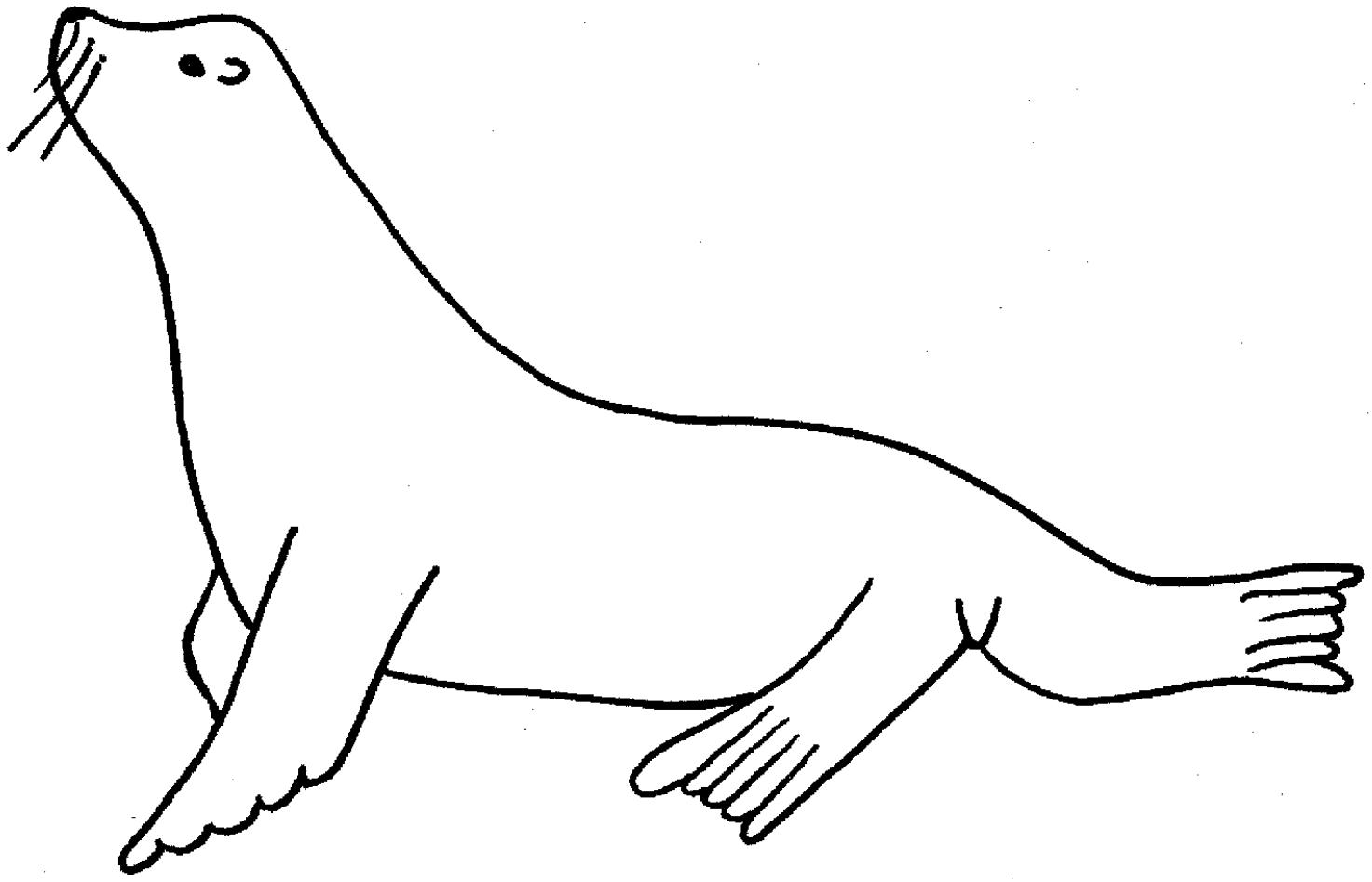
- California sea lions live along coasts in the North Pacific, from Alaska to California and Mexico.
- Sea lions come to shore to rest, molt (shed their fur) and have their pups.

What do they eat?

- They eat a variety of fishes, squid and even octopuses.

Did you know?

- Sea lions can "walk" on land by standing up on their front flippers and rotating their back flippers forward.
- Sea lions bark to communicate with other sea lions.
- Scientists believe that seals and sea lions can echolocate to find their food just like toothed whales (dolphins, porpoises, etc.).
- When a seal or sea lion is relaxed, its nostrils are closed. They have muscles around their nose used to push their nostrils open when exhaling and taking a breath.



California Sea Lion

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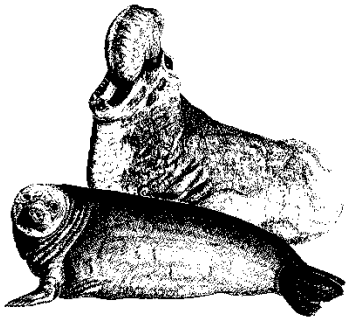
Elephant Seal

What does an elephant seal look like?



- Elephant seals have large sausage-shaped bodies.
- When they bounce along the sand on their bellies, their blubbery bodies jiggle like Jell-O.
- Adults are tan or brown. Their fur is short and bristly.
- Males grow the large trunk-like noses when they are three to five years old.

How big are they?

- Northern elephant seal males can grow to be 14 feet long and weigh up to 4,400 pounds. Northern elephant seal females can grow to be 10 feet long and weigh about 800 pounds.
- Male Southern elephant seals are the largest of all the pinnipeds (seals, sea lions and walruses) and can grow to over 16 feet long and weigh up to 11,000 pounds.

Where do they live?

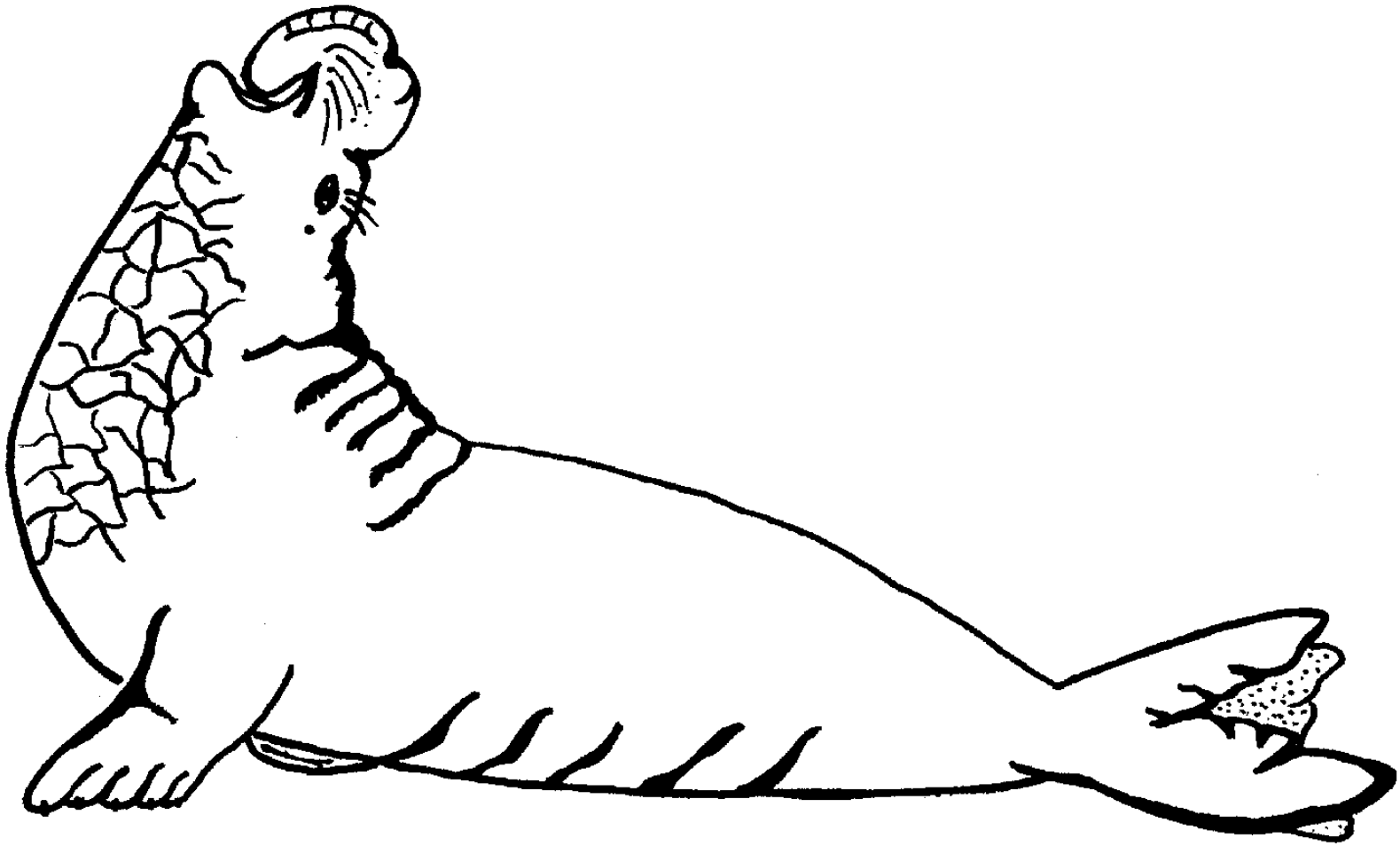
- Northern elephant seals can be found from the Aleutian Islands in Alaska to Baja California Mexico.
- All elephant seals come to shore to molt (shed their fur) and rest twice a year. They also spend time on land during the breeding season.

What do they eat?

- They eat a variety of fish, squid and slow-moving sharks, skates and rays.

Did you know?

- These seals can dive to depths of 5,000 feet or more and hold their breath for up to two hours.
- Males spend about 250 days a year out in the ocean, without ever coming to shore. During this time they are known to travel at least 13,050 miles.
- Females spend about 300 days out to sea during the year and travel over 11,000 miles.



Elephant Seal

OREGON COAST AQUARIUM
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What Makes A Mammal A Mammal?

Lesson at a glance:
This activity will allow students to discover that mammals are a class (group) of animals, that mammals have certain characteristics that distinguish them from other classes of animals and that there are many different kinds of mammals. They will also understand that all mammals share two characteristics that make them unique from other animal groups: they have hair and feed their babies milk. They will also understand that mammals also share most of these other characteristics: breathe air, are warm blooded, give live birth, have a backbone, and have four limbs (arms, legs, flippers, paws).

Oregon Content Standards:
SCIENCE

- **First Grade:** 1.1L.1 Compare and contrast characteristics among individuals within one plant or animal group.
- **Second Grade:** 1.1 Structure and Function: Living and non-living things have characteristics and properties.
- **Third Grade:** 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.

Ocean Literacy: Essential Principals and Fundamental Concepts
5. THE OCEAN SUPPORTS A GREAT DIVERSITY OF LIFE AND ECOSYSTEMS.

Materials:

- A pen or pencil for each group of 4-5 students
- Sets of four pictures of different kinds of mammals labeled 1-4 (one set per group)
- A copy of **What Makes A Mammal?** worksheet for each group of 4-5 students
- A copy of the work sheet, **Who Are the Mammals?** for each student

Background:
This activity will allow the students to begin thinking about the characteristics of mammals. Explain to the students that scientists divide animals into classes or groups based on the traits or characteristics they share. Mention that these classes might include birds, reptiles, fish, mammals and amphibians. For the next few minutes they will imagine that they are scientists looking at pictures of previously undiscovered animals. Their job is to try and decide what characteristics these animals share in common.

Activity:
Preparation:

1. Using magazines or old calendars make a set of four mammal pictures for each group of 4-5 students.
2. Label each picture Animal One, Animal Two, Animal Three or Animal Four.

Activity:

1. Divide the class into cooperative-learning groups of 4-5 students.
2. Give each group a pencil and a **What Makes A Mammal?** worksheet.*
3. Have the group designate a recorder.
4. Hand out the sets of mammal pictures.
5. Give the students 15 minutes to answer the questions on the worksheet about each mammal.
6. Have each group designate a presenter.
7. Have each group share what they discovered about the traits of mammals.

* For younger students, unable to read/write, do this activity as a larger teacher-directed group.

Summary:

1. Review what the students found out about the animals on their pictures.
2. As a group, decide which characteristics make these animals mammals.
3. Now, have the students fill out the worksheet: **Who Are the Mammls?**
4. Discuss their results. How did the students decide which animal was a mammal? Which characteristics did they look for?

What Makes A Mammal?
Worksheet

Animal One

1. How does this animal stay warm?_____
2. How does this animal move?_____
3. How does this animal give birth?_____
4. What does this animal feed its baby?_____
5. How does this animal get oxygen?_____

Animal Two

1. How does this animal stay warm?_____
2. How does this animal move?_____
3. How does this animal give birth?_____
4. What does this animal feed its baby?_____
5. How does this animal get oxygen?_____

Animal Three

1. How does this animal stay warm?_____
2. How does this animal move?_____
3. How does this animal give birth?_____
4. What does this animal feed its baby?_____
5. How does this animal get oxygen?_____

Animal Four

1. How does this animal stay warm?_____
2. How does this animal move?_____
3. How does this animal give birth?_____
4. What does this animal feed its baby?_____
5. How does this animal get oxygen?_____

List four things that these four animals have in common:

1. _____

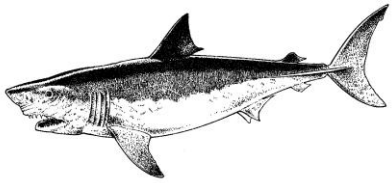
2. _____

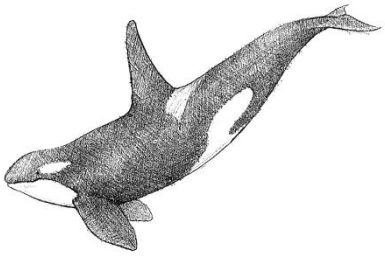
3. _____

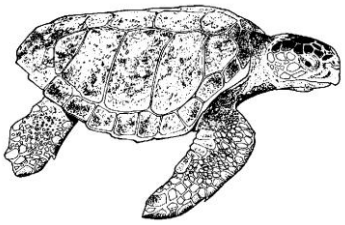
4. _____

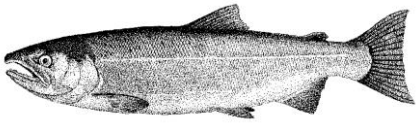
Who Are the Mammals?

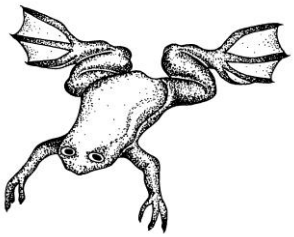
Circle the mammals.

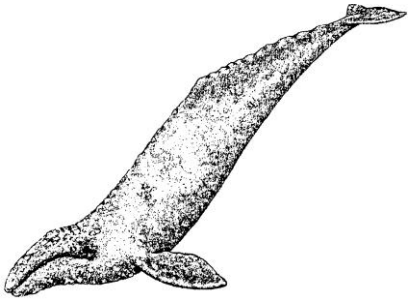












OREGON COAST AQUARIUM NEWPORT

Measuring Marine Mammals

Lesson at a Glance:

Students will measure the lengths of a group of marine mammals and compare each animal's size.

Oregon Content Standards:

SCIENCE

- **First Grade:** 1.1L.1 Compare and contrast characteristics among individuals within one plant or animal group.
- **Second Grade:** 1.1 Structure and Function: Living and non-living things have characteristics and properties.
- **Third Grade:** 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.

MATH

- **Kindergarten:** K.1.2 Connect numbers, including written numerals, to the quantities they represent, using various physical models and representations.
- **Second Grade:** Use rulers and other measurement tools to estimate and measure length in common units.

Ocean Literacy: Essential Principals and Fundamental Concepts

5. THE OCEAN SUPPORTS A GREAT DIVERSITY OF LIFE AND ECOSYSTEMS.

- 5.a. Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.

Materials:

- ❑ One 100-foot length of clothesline or rope
- ❑ Cable ties
- ❑ Single hole punch for each group
- ❑ Permanent marker for each group
- ❑ Measuring tape for each group
- ❑ Laminating materials (optional, but recommended)

Background information:

The lengths used for this activity come from a variety of resources and are currently accepted record lengths for these animals. If your students choose to pursue further research on these animals they may find resources with slightly different information.

In many groups of animals, one sex is different from the other; for instance, hens and roosters are different in size and plumage. This is called sexual dimorphism. With toothed whales (such as dolphins, porpoises and sperm whales), the males are typically larger. With baleen whales (such as gray and blue whales), the females are typically larger.

Here are the lengths of the animals included in this activity, plus some additional lengths (in Italics) that you may choose to add on your own. We have provided the lengths for males and females when that information was available.

Marine Mammals	Accepted maximum lengths
Northern sea otter (female)	4 feet
Northern sea otter (male)	5 feet
Harbor porpoise	5.5 feet
California sea lion (female)	5 feet
Harbor seal	6 feet
Polar bear (female)	6.5 feet
Pacific white-sided dolphin	7.5 feet
California sea lion (male)	8 feet
Polar bear (male)	8.5 feet
Walrus (female)	8.5 feet
Walrus (male)	10 feet
Manatee	10 feet
Northern elephant seal (female)	10 feet
Northern elephant seal (male)	14 feet
Killer whale (female)	23 feet
Killer whale (male)	26 feet
Sperm whale (female)	36 feet
Gray whale (male)	48 feet
Gray whale (female)	49 feet
Sperm whale (male)	65 feet
Blue whale	85 feet (average length, common)
Blue whale	110 feet (record length, very rare)

* Found off of our coast.

Activity:

1. Before class, cut out the pictures, laminate them (to prevent from tearing when attached to rope), and punch a hole near the top for the cable tie.
2. Divide students into as many groups as there are animals to measure out OR have your class make three of the same rope and then compare the measuring accuracy of each finished rope.
3. Explain to your students that these measurements are average lengths.

Group instructions:

1. Have students unravel their rope, preferably in a hallway or gymnasium.
2. Have students take turns using the measuring tape, marking the measurement and attaching the length cards with the cable ties.
3. Make sure that they tie the knot loops for their cable ties as they go. If they wait until all the marks are made, their final lengths on the rope won't be accurate, since they will have shortened the rope as they tie each knot.

4. Explain that they will begin to measure the length of each animal from the end of the rope. The end of the rope is every animal's tail and the mark on the rope (where the tag is hung) is the tip of the animal's face.

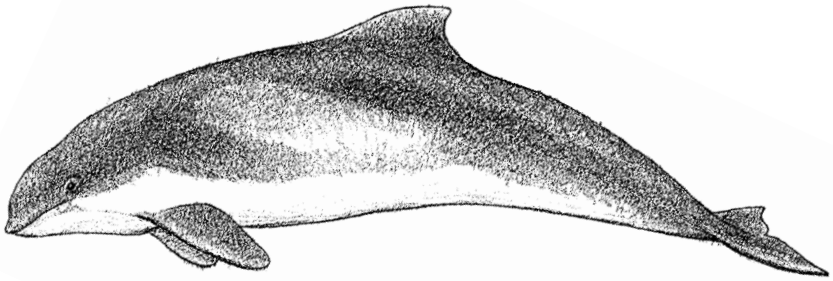
Conclusion:

Have each group share their rope with the rest of the class, by having one student stand at each animal's tag as they hold up the rope.

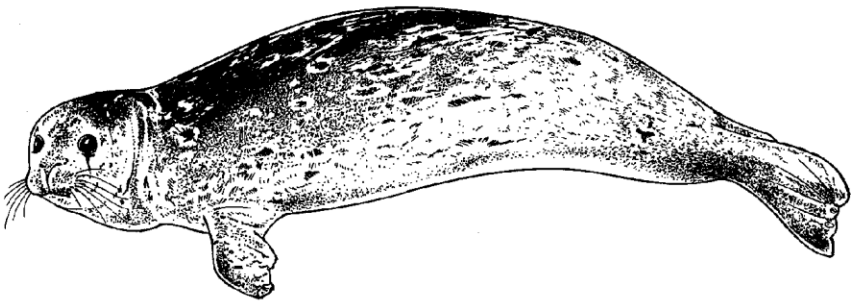
Extension:

1. Have students convert the lengths in feet into inches, yards, meters, centimeters.
2. Add the shorter male and female lengths to the rope. Discuss sexual dimorphism.
3. Have students look up the lengths of other animals or things they are familiar with and add them to the rope. For example, find the length of a school bus or the average height of a fourth grader.
4. Have students use the library and the Internet to find the weights of the animals on their rope.
5. Have students calculate how many of each animal (nose to tail) it would take to reach one end of the hallway or gymnasium to the other.

Northern sea otter
5 feet



Harbor porpoise
5.5 feet



Harbor seal
6 feet

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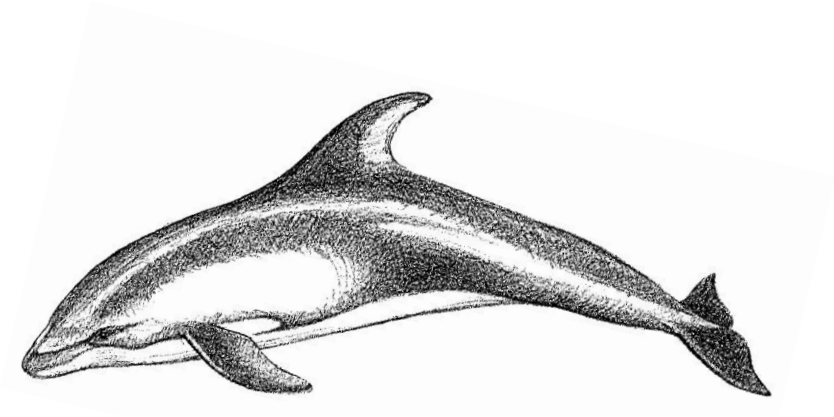
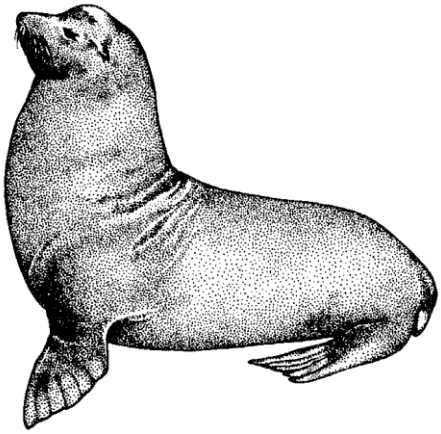
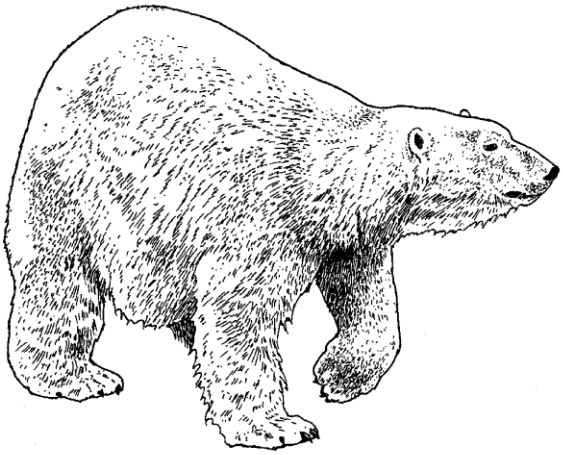


Pacific white-sided dolphin
7.5 feet



California sea lion
8 feet



Polar bear
8.5 feet

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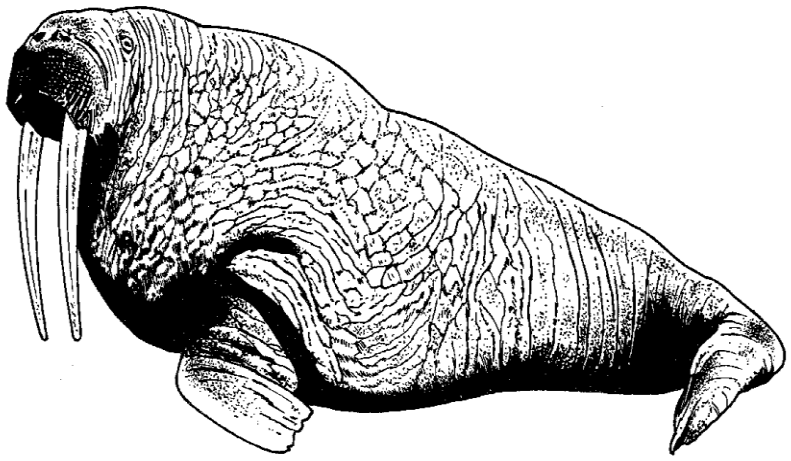
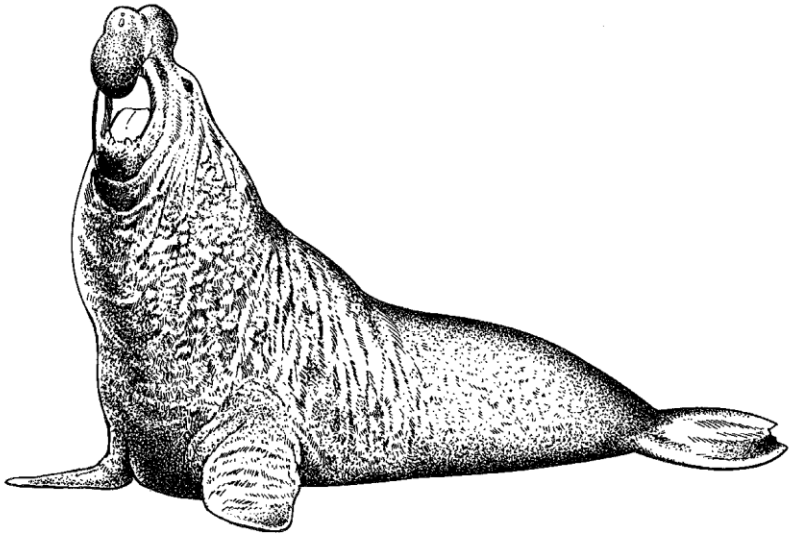


Walrus
10 feet



Northern Elephant Seal
14 feet

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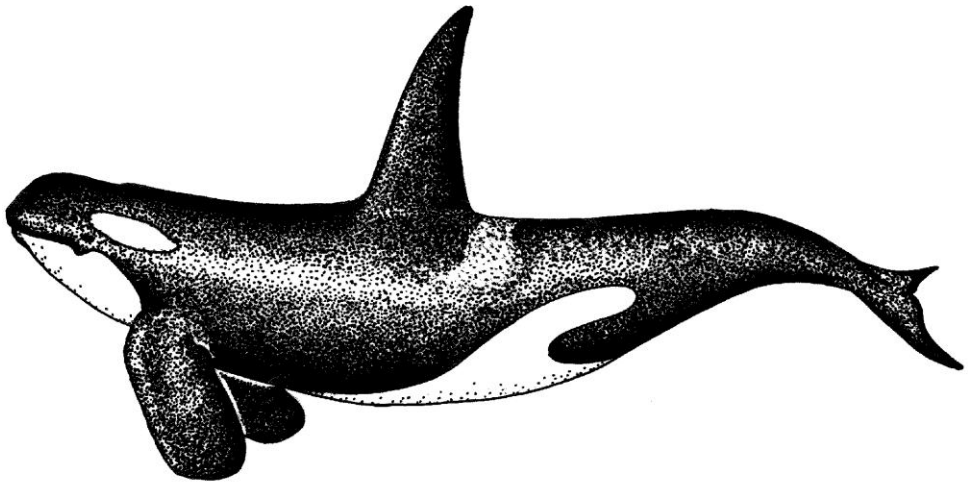
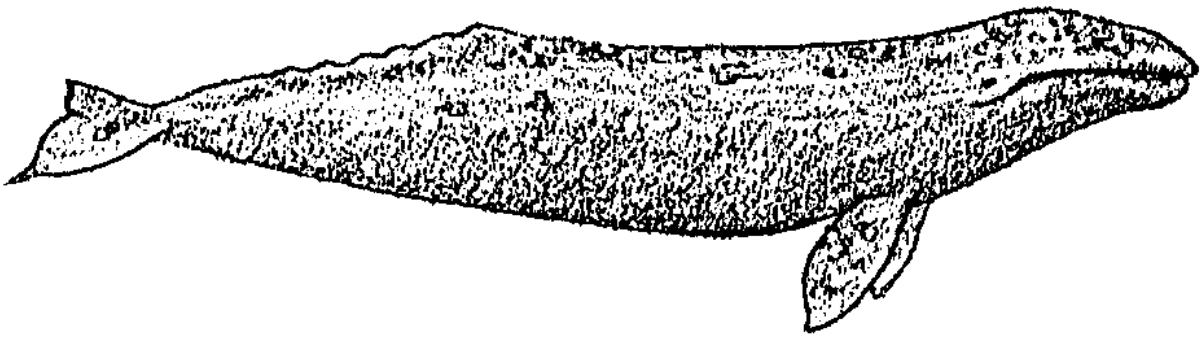
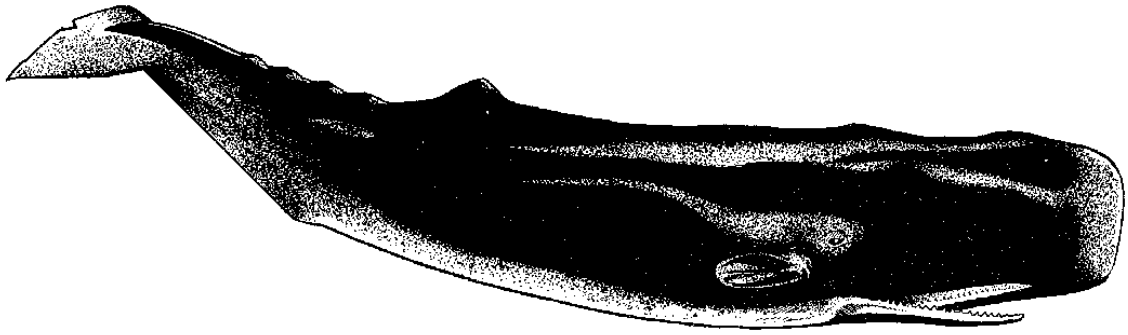


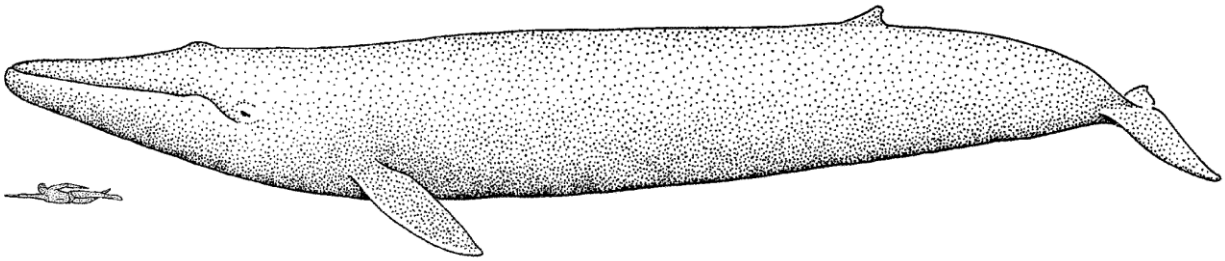
Killer whale (orca)
26 feet



Gray whale
49 feet



Sperm whale
65 feet



Blue whale
85 feet

OREGON COAST AQUARIUM NEWPORT

Marine Mammal Relay

Lesson at a glance:
Students will learn about mammal characteristics and marine mammal as they participate in a relay race.

Oregon Content Standards:
SCIENCE

- **First Grade:** 1.1 Structure and Function: Living and non-living things have characteristics and properties.
- **Second Grade:** 2.1 Structure and Function: Living and non-living things vary throughout the natural world.
- **Third Grade:** 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.

Ocean Literacy: Essential Principals and Fundamental Concepts
5. THE OCEAN SUPPORTS A GREAT DIVERSITY OF LIFE AND ECOSYSTEMS.

- 5.d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

Materials:

- ❑ Ample playing area
- ❑ Dive mask or swim goggles (two sets)
- ❑ Snorkel (two sets)
- ❑ Heavy coat or wet suit (two sets)
- ❑ Swim fins (two sets)

Note: Substitutions may be made for these materials depending on availability (i.e. a paper towel tube instead of a snorkel, rain gear instead of a wet suit, sunglasses instead of goggles). Make sure the "adaptations" are large enough for all of your students.

Background:
What makes a mammal a mammal? Mammals share the following characteristics: hair or fur, breathe air, are warm blooded, give live birth and nurse their young. There are exceptions, however, like the egg laying spiny anteater (echidna) and platypus.

We share each of these characteristics with marine mammals, but our habitat is extremely different. Marine mammals spend all or most of their life in the ocean. To survive in this environment, they have developed many successful adaptations, including fins and/or flippers for swimming, blowholes (on whales) or nostrils high on their head for breathing, blubber or very thick fur (sea otters) for keeping warm and slimy tears for eye protection.

Note: When discussing fins and flippers on marine mammals students might be interested in knowing that a flipper has bones (like your hand or foot) and fins have no bones (i.e. a whale's

dorsal fin or tail flukes [flukes are two fins fused together]), but are supported by a dense fibrous connective tissue similar to cartilage.

Activity:

1. Discuss mammal characteristics and marine mammal adaptations.
2. Show each relay piece and explain the adaptation it represents.

Adaptation Representative	**Adaptation**
Dive mask or swim goggles	Slimy protective tears
Snorkel	Blow hole or nostrils
Heavy coat, wet suit or rain gear	Blubber or sea otter fur
Swim fins	Flippers or fins

3. Divide the class into two teams.
4. Divide each team into two halves.
5. Explain the rules and play the game.

Game Guidelines:

1. The first person in line, ($\mathbf{X^1}$ and $\mathbf{O^1}$) runs to the **Adaptation Pile,** picks up an "adaptation" and puts it on.
2. They must shout out the marine mammal adaptation before they can leave the pile (ie. They must say slimy tears, not goggles.).
3. Then they run to their team on side B, take off their adaptation, give it to the next people ($\mathbf{X^2}$ and $\mathbf{O^2}$) and then sit at the end of the line.
4. The next person ($\mathbf{X^2}$ or $\mathbf{O^2}$), puts on the adaptation that was given to them, runs to the **Adaptation Pile**, picks up a second adaptation, puts it on, shouts it out, runs to side A, takes off both of their adaptations, gives them to the next player ($\mathbf{X^3}$ or $\mathbf{O^3}$) and sits at the back of the line.
5. Play continues, adding adaptations, until each team has all players sitting down. The first team to have all players sitting down wins!

Note: When the pile is empty, players continue to relay as before, putting on and taking off adaptations, but just skip the pile, or you may choose to have as many adaptations as there are players, depending on class size.

Set up:

$\mathbf{XXXX^3X^1}$ $\mathbf{X^2XXXX}$

A **Adaptation Pile** **B**

$\mathbf{OOOO^3O^1}$ $\mathbf{O^2OOOO}$