

Dear Teacher:

During the **Dressed for Success** assembly program an Aquarium educator will introduce students to the adaptations of sea otters, seals and sea lions using a PowerPoint presentation, costumes, life-size inflatable animals and specimens such as bones and pelts.

Before your assembly program:

- Ask students to list the characteristics of mammals and give examples.
- Compare the living conditions of a marine mammal with those of a terrestrial mammal. Where do they sleep? How do they get their food? What do they eat? What environmental conditions must they be adapted to?
- Conduct the Measuring Marine Mammals activity. Using a tape measure, have your students measure out the length of each animal.
- Relate marine mammal adaptations with tools we have to get the job done with the Tools of the Trade activity.



After your assembly program:

- Conduct the The Wonder of Blubber activity to discuss one of many marine mammal adaptations for life in the ocean.
- Conduct the Eating Like an Otter activity to demonstrate to students what it would be like if you had to consume as much food as an otter!
- Lead a classroom discussion using the enclosed Dilemmas card activity.
- Review the difference between endangered and threatened species with your class. Sea otters and several species of whales (sei, fin, sperm, blue, humpback and right) are currently listed as endangered in the state of Oregon. Ask students to consider what actions they can take to prevent further loss of these species.

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

Dressed for Success Assembly Program: Grades 3 - 5

Goal: To familiarize students with marine mammals found off the Oregon coast and their adaptations that help them to survive in this environment.

Cognitive Objectives:

1. Explain that adaptations are body parts that help marine mammals live in the ocean.
2. Name at least two adaptations of sea otters, seals and sea lions and how they are useful.
3. Compare and contrast how sea otters, seals and sea lions move, both in and out of the water, and how they stay warm.
4. Identify a sea otter, California sea lion, Stellar sea lion, harbor seal, and elephant seal.
5. Summarize what the Marine Mammal Protection Act states and why we need it.

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:

- 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.
- 4.1 Structure and Function: Living and non-living things can be classified by their characteristics and properties.
- 5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

Ocean Literacy: Essential Principles and Fundamental Concepts

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

Background Information

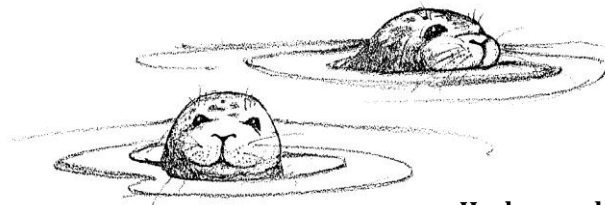
What is a marine mammal?

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
<u>Examples:</u> Harbor seals, monk seals, leopard seals and elephant seals	<u>Examples:</u> California sea lions, Steller sea lions and Northern fur seals
<ul style="list-style-type: none"> • Found in marine and freshwater habitats 	<ul style="list-style-type: none"> • Found only in marine habitats
<ul style="list-style-type: none"> • Found in both Atlantic and Pacific regions 	<ul style="list-style-type: none"> • No northern Atlantic species exist
<ul style="list-style-type: none"> • No ear flaps; sometimes called “earless seals” 	<ul style="list-style-type: none"> • Small ear flaps; sometimes called “eared seals”
<ul style="list-style-type: none"> • Hind flippers don’t rotate forward; bounce along on their bellies on land 	<ul style="list-style-type: none"> • Can rotate hind flippers forward, raise bodies up and “walk” on land with all four flippers
<ul style="list-style-type: none"> • Swim by moving their hind flippers in a back and forth motion 	<ul style="list-style-type: none"> • Push long front flippers up and down; appear to be flying through the water
<ul style="list-style-type: none"> • Relatively quiet, with occasional grunts, groans or growls 	<ul style="list-style-type: none"> • 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.

Sea Otters

Sea otters are marine mammals that belong to the family **Mustelidae** (*must-TEH-lih-dee*). Other members of this carnivorous group include weasels, minks, skunks, wolverines and river otters. Scientists recognize three subspecies of sea otter including the Southern sea otter (also called the California sea otter) and two subspecies of the Northern sea otter (also called the Alaskan sea otters). The sea otter’s scientific name (its genus and species) is *Enhydra lutris*. The genus name comes from the Greek word *enhydris*, meaning “in the water,” and its species name *lutris* is from the Latin word *lutra*, which means “otter.”

Sea otters can be found along rocky coastal areas where food is abundant. Kelp forests are an ideal sea otter habitat, supporting a wide variety of edible invertebrates. Otters will also wrap themselves up in the kelp to keep from being washed away while they rest at the surface.



Sea otters once ranged from Baja California, Mexico, along the west coast of North America up to Alaska (including the Aleutian Islands), and along the Eastern coasts of Russia and Japan. As of the year 2000, the California populations number around 1,700. Sea otters are still found in Washington, British Columbia and Alaska. They are considered to be extinct in Oregon. They are, however, spotted occasionally near the Oregon and California border. When someone claims to have seen a sea otter along the Oregon coast, it is most likely that they have seen a river otter. The river otter is a much smaller member of the mustelid family and is commonly found in bays and rocky intertidal areas.

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 Principles 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
<i>Northern sea otter (female)</i>	4 feet
Northern sea otter (male)	5 feet
Harbor porpoise	5.5 feet
<i>California sea lion (female)</i>	5 feet
Harbor seal	6 feet
<i>Polar bear (female)</i>	6.5 feet
Pacific white-sided dolphin	7.5 feet
California sea lion (male)	8 feet
Polar bear (male)	8.5 feet
<i>Walrus (female)</i>	8.5 feet
Walrus (male)	10 feet
<i>Manatee</i>	10 feet
<i>Northern elephant seal (female)</i>	10 feet
Northern elephant seal (male)	14 feet
<i>Killer whale (female)</i>	23 feet
Killer whale (male)	26 feet
<i>Sperm whale (female)</i>	36 feet
<i>Gray whale (male)</i>	48 feet
Gray whale (female)	49 feet
Sperm whale (male)	65 feet
Blue whale	85 feet (average length, common)
<i>Blue whale</i>	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:

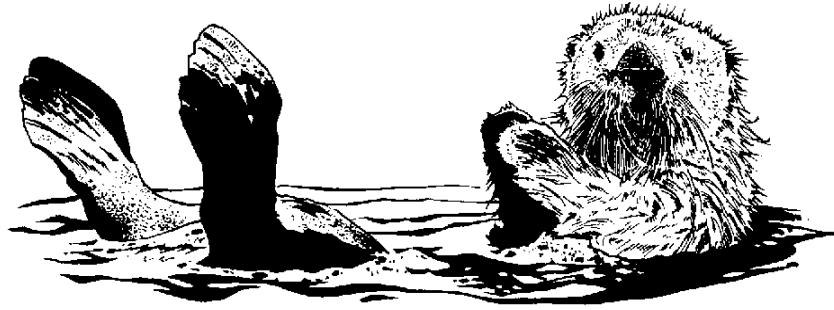
1. Have students unravel their rope, preferably in a hallway or gymnasium.
2. Have students take turns using the measuring tape, marking the measurement and attaching the length cards with the cable ties.
3. Make sure that they tie the knot loops for their cable ties as they go. If they wait until all 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.

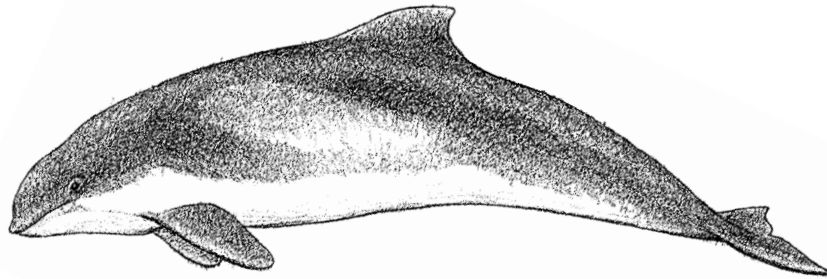
Extension:

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.



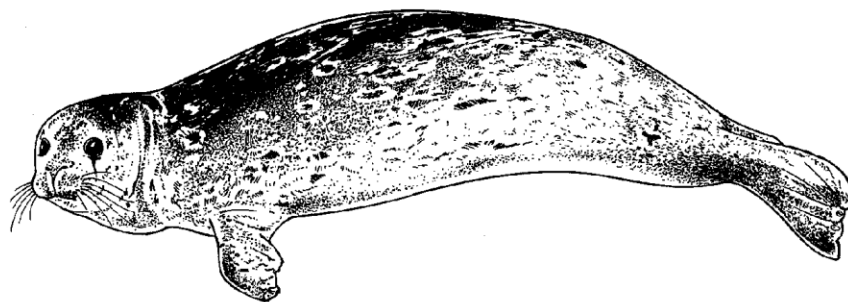
Northern sea otter

5 feet



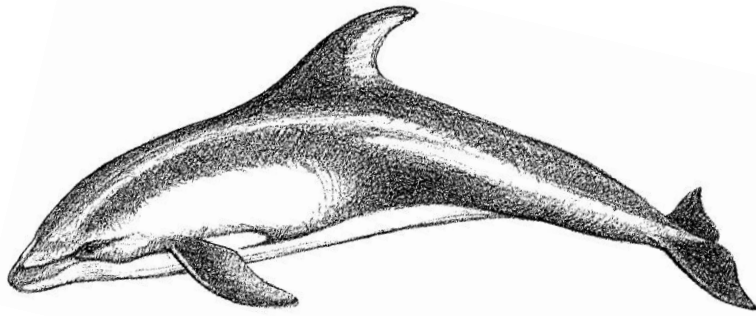
Harbor porpoise

5.5 feet



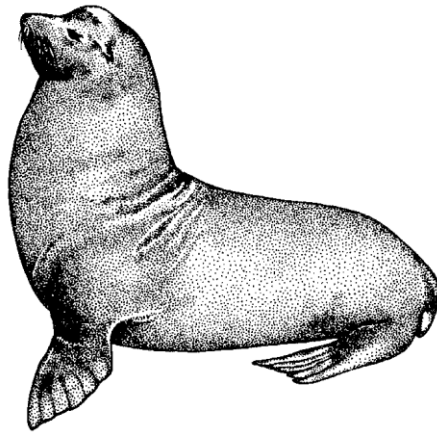
Harbor seal

6 feet



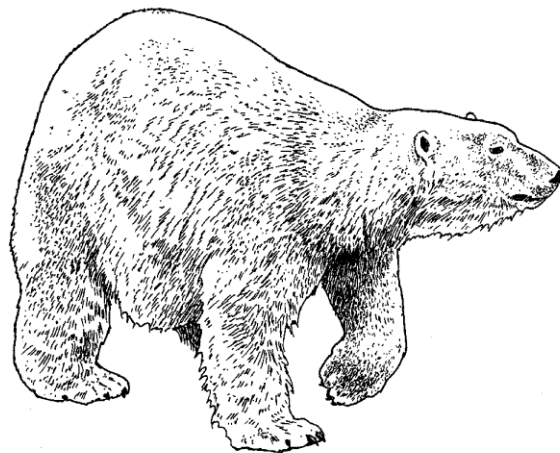
Pacific white-sided dolphin

7.5 feet



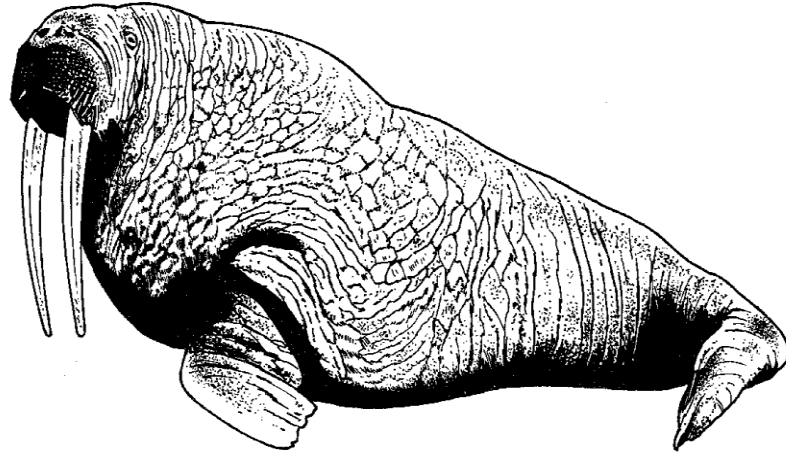
California sea lion

8 feet

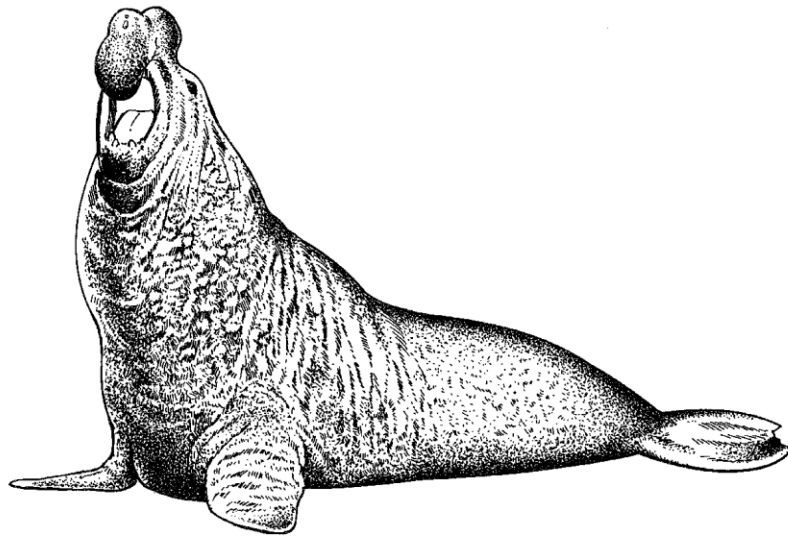


Polar bear

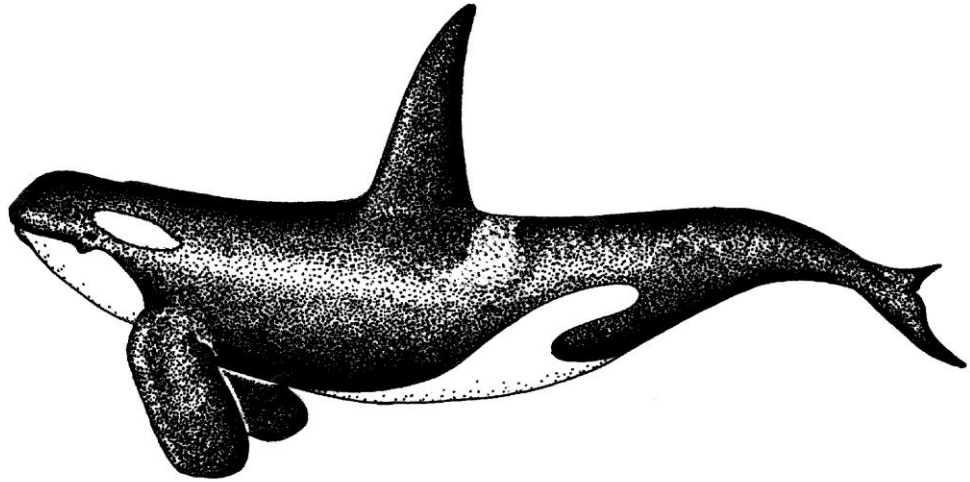
8.5 feet



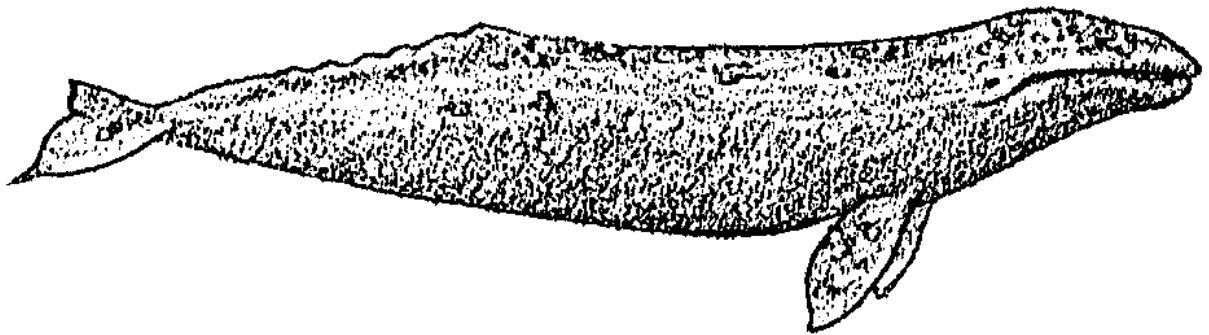
Walrus
10 feet



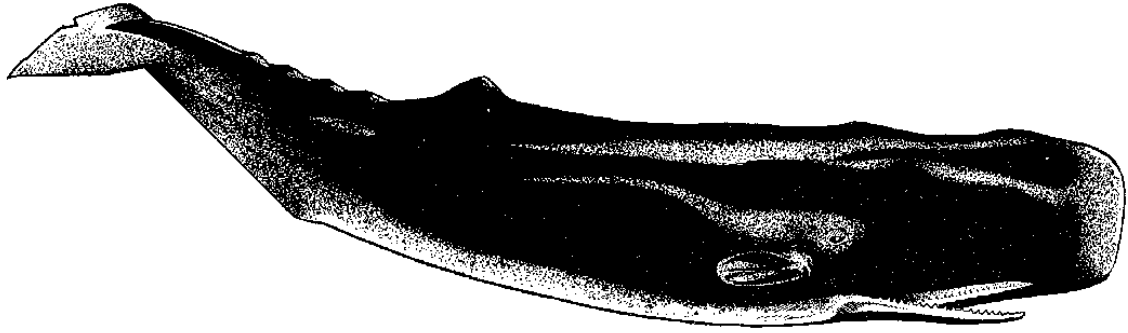
Northern Elephant Seal
14 feet



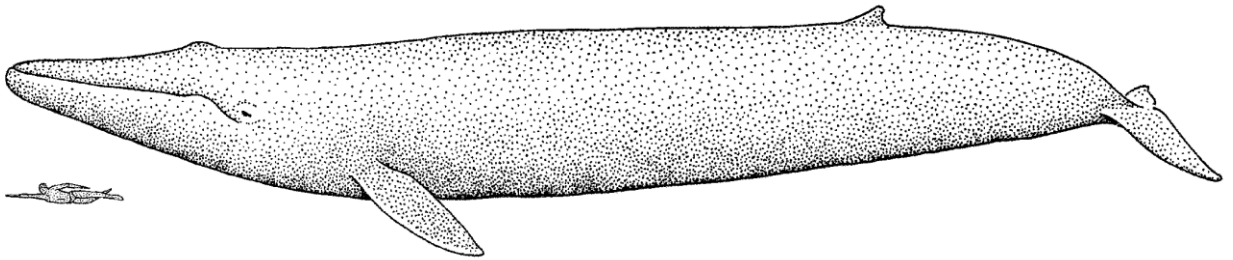
Killer whale (orca)
26 feet



Gray whale
49 feet



Sperm whale
65 feet



Blue whale
85 feet

Marine Mammal Tools of the Trade

Lesson at a glance:

Students will understand and recognize some of the adaptations that marine mammals have to help them survive by comparing them to tools made and used by humans.

Oregon Science Standards:

- **Third Grade:** 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.
- **Fourth Grade:** 4.1L.1 Compare and contrast characteristics of fossils and living organisms.
- **Fifth Grade:** 5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

Ocean Literacy: Essential Principles 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:

- Marine mammal pictures or names on cards
- Human tools and other objects that represent marine mammal adaptations
- Blanket or sheet

Activity:

Note: This activity works best as a review of the marine mammal adaptations learned by your students throughout your unit.

Preparation:

1. Gather a collection of tools and other objects that represent marine mammal adaptations.
2. Before class, place the items under a blanket or sheet on the floor or on a table. Give each student a picture or name of a marine mammal.

Activity:

1. Have the students sit down in a circle around the covered items. Everyone must be able to see the blanket or sheet.
2. Lift the covering off the items and give students three to five seconds to look at the items.
3. Quickly cover up the items.
4. Ask students to name some of the items that they saw that correspond with an adaptation belonging to their assigned animal.
5. Pull out the items that the students listed.
6. Ask the student(s) holding the appropriate animal picture or name to describe why they think their animal has an adaptation that works like the tool.
7. Repeat the activity until all of the items have been seen and explained.

Examples:

- Many marine mammals, such as **sea lions**, have webbed feet or flippers, just like a human's **swim fins**, to help them swim quickly and easily through the water.
- A baleen whale, such as a **humpback whale (blue whale, right whale, etc.)**, uses its mouthful of baleen like a **net** to trap tiny animals (plankton) or small fish.
- A **sea otter** uses its powerful front paws like a **crowbar** to dislodge food items such as abalone from the rocks.
- **Sea otters** have flat, crushing molars that they use like a **nutcracker** to break open hard-shelled food such as clams.
- **Sea otters** have built-in pockets under their forearms (armpits) that they use like a **lunch box** so they can eat as much as they can before they have to dive down again for more food.
- **Walruses** shoot a strong stream of water, like a **squirt gun**, at the muddy ocean bottom to uncover juicy tidbits like shrimps, clams and octopus.
- Once a **walrus** has uncovered its prey, it will suck it up like a **vacuum cleaner**. To have as much suction as a walrus, you would have to be strong enough to drink a soda through a 32-foot straw!
- Scientists used to think that **walruses** used their tusks for eating, but actually they use them like a giant **ice pick or pick axe** to lift their huge bodies out of the water and onto ice flows.
- **Manatees** are plant eaters and have flat molars that they use like a **mortar and pestle** to grind the 30 to 100 pounds of stringy plants they eat every day.
- A **leopard seal's** teeth can grab unsuspecting penguins like a **garden rake**. Once they have them in their grasp they can skin them in less than five minutes!
- A **crabeater seal** uses its teeth like little **strainers** as it sucks in schools of shrimp-like krill as a tasty meal.
- Like *all* marine mammals, a **harbor seal** has a coating of mucus that protects its eyes, just as we might wear **goggles or a mask** to protect our eyes when we go swimming.
- A thick layer of blubber insulates most marine mammals, including a **beluga whale**, so that they will stay warm in the cold ocean water. A human swimming in such cold water would have to wear a thick **neoprene wet suit**. (Use butter or lard to give students an idea of what blubber looks and feels like.) You could also

use a warm jacket or rain gear to represent how blubber protects marine mammals from the cold.

- **Killer whales**, other toothed whales and seals and sea lions use their cone-shaped teeth like **daggers** for grasping and tearing their prey. Once they catch their prey, they swallow it whole.

Summary:

1. Discuss how organisms are born with the adaptations that they need to deal with most environmental pressures and that they cannot always keep up with changes made to their environment by humans. For example: Sea otters have not adapted to deal with oil spills.
2. Have students brainstorm things that they can do at home to help protect the marine environment and its inhabitants.

Extensions:

1. Have students create their own marine mammal adaptation analogies.
2. Introduce evolution and discuss the theory of natural selection to help explain how marine mammals came to have these adaptations.

The Wonder of Blubber

Lesson at a glance:

Students will understand how a layer of blubber insulates most marine mammals to help keep them warm in cold water.

Oregon Science Standards:

- **Third Grade:** 3.3S.2 Use the data collected from a scientific investigation to explain the results and draw conclusions.
- **Fourth Grade:** 4.2L.1 Describe the interactions of organisms and the environment where they live.
- **Fourth Grade:** 4.3S.2 Summarize the results from a scientific investigation and use the results to respond to the question being tested.
- **Fifth Grade:** 5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.
- **Fifth Grade:** 5.3S.2 Identify patterns in data that support a reasonable explanation for the results of an investigation or experiment and communicate findings using graphs, charts, maps, models, and oral and written reports.

Ocean Literacy: Essential Principles and Fundamental Concepts

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- 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:

- ❑ A large container (such as a plastic bowl or bucket) full of ice
- ❑ Two Fahrenheit thermometers
- ❑ 1 “blubber bag” (Zip-lock baggies lined with shortening)
Make your own “blubber bag”:
- ❑ Two sandwich-sized zip-lock bags (freezer bags last the longest)
- ❑ 2 cups of shortening
- ❑ Duct tape

Background:

Just like mammals that live on land, marine mammals, are warm blooded and must keep a constant body temperature. However, it is much easier to retain body heat out of water than in water. This is because water absorbs heat five times faster than air does. That is why humans get chilled after spending a long time in water, even if the water is relatively warm (such as in the tropics). Our bodies are not designed to survive for very long in a watery environment.

With the exception of sea otters, all marine mammals have a layer of fat called blubber, which helps keep them warm. Unlike our body fat, this special marine mammal fat is very dense and similar in texture to butter. Usually, the colder the water, the thicker the blubber. Blubber serves as an insulator by keeping the marine mammal's body heat from

escaping into the cooler water outside its body. Blubber also streamlines their body, helping them to swim faster. It also gives them energy when food is scarce.

Activity:

1. Make your “blubber bag”:
 - Fill one zip-lock bag with 2 cups of shortening.
 - Push the other bag inside the bag of shortening and seal the edges of the two bags together with the duct tape.
 - Carefully distribute the shortening evenly inside the bag

Note: “Blubber” bags may last several years if kept in a cool place.

2. Fill your large container with ice.
3. Push the “blubber bag” down into the container of ice until most of the bag is submerged.
4. Let the “blubber bag” sit in the ice for several minutes.
5. Have students make observations and form hypotheses about how much of a temperature difference there may be in the ice versus inside the “blubber bag.”
6. Have one student hold one thermometer directly in the ice while another student holds another thermometer in the “blubber bag”.
7. After 15-30 seconds, have the students read the temperatures on each thermometer.

Summary:

1. Ask the students to discuss which one was warmer and why.
2. Explain to students that water absorbs heat about 5 times faster than air.
3. Ask students to describe how having a layer of blubber would be a helpful adaptation for a marine mammal.
4. Would a human be able to survive for very long in such cold water? Discuss hypothermia if age-appropriate.
5. Ask your students to think of ways they stay warm in their environment. (Blubber is like a warm coat that marine mammals have built into their bodies. The thicker their blubber is, the easier it is for them to stay warm inside, just as the thicker the coat you wear, the warmer you will be.)

Extensions:

1. Have your students write a research report on their favorite blubbery marine mammal (sea otters are excluded from this group).
2. Have students see if they can find out which marine mammal has the thickest blubber layer. Answer: Bowhead whales have a blubber layer that is up to 20 inches thick! This is because they live in the cold waters of the Arctic ocean year-round.
3. Introduce the concept of cold blooded animals. Have your students research a cold blooded animal and compare it to a marine mammal.

Eating Like an Otter

Lesson at a glance:

Students will gain an understanding of the food and energy requirements of a sea otter.

Part 1: Students will calculate the “daily pounds of food” they would have to consume if they were a sea otter.

Part 2: Students will calculate how much of their favorite healthy snack they would have to consume each day if they were a sea otter.

Oregon Content Standards:

SCIENCE

- **Fourth Grade:** 4.2L.1 Describe the interactions of organisms and the environment where they live.
- **Fifth Grade:** 5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

OTHER CONTENT AREAS

Mathematics: measurement, weights, multiplication/division

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Materials:

- Calculators (one per student or team of students) *Optional*
- Bucket (at least five-gallon capacity)
- Rocks or weights (enough to equal 25% of your heaviest student)
- Bathroom scale
- Postal or food scale
- Food items (You may ask students to bring in a sample of their favorite healthy snack, although you should probably have a few things on hand for the forgetful.)
- Pens or pencils
- Scratch paper

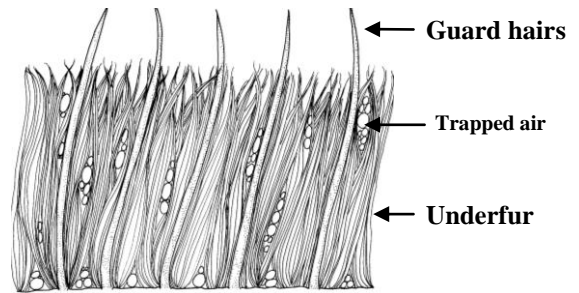
Background:

Sea otters live in very cold water ranging in temperature from 35°F to 60°F. But the temperature of the water is only part of the problem. Living in a watery environment poses many challenges. **Heat loss** is one of them. Water draws heat away from the body 25 times faster than air. For example, a human in 80 degree water will get chilled relatively quickly, while the same person can remain comfortable in 80 degree air.

Most marine mammals have blubber to help keep them warm. Blubber is a thick layer of fat that insulates whales, seals, sea lions and walrus. Blubber does not create heat for the animal but rather serves to hold the animal’s own body heat in and the cold of the ocean environment out.

Sea otters don't have blubber. Instead they have a very thick coat of fur—the densest of any animal on earth. In a single square inch, an otter may have as many as one million hairs. There are two layers of hair in a sea otter's pelt: the longer guard hairs and the shorter underfur. Among the hairs, otters trap an insulating layer of warm air. Otters spend a good portion of their day grooming their fur—spreading oils and trapping air—all in an effort to keep the cold ocean water away from their skin.

Otters also have a very fast metabolism. Your metabolism is the sum of all the actions your body takes to process the food you eat. One of the byproducts of your metabolism is heat (that's where the expression "burning" calories comes from). The faster the metabolism, the more heat created. A sea otter's metabolism is two to three times faster than most comparably sized land mammals.



Sea otter fur

On average, an adult sea otter needs to eat around 25 percent of its own body weight every day to keep its metabolism running fast enough to keep it warm. For a 60-pound otter, that means 15 pounds of food a day. That's a tall order when you consider that all that food must be found, captured, handled, eaten and digested. And that weight excludes the shells, spines and other indigestible parts of the otter's prey. Otters spend roughly two-thirds of their waking hours feeding. That's about eight hours a day.

Individual sea otters show preferences for certain food items even though there are over 50 marine invertebrates that can make up their diet. Some sea otters will eat mainly one or two species and will usually maintain the same diet that they learned from their mothers as pups. An otter's menu includes crabs, clams, mussels, oysters, abalone, snails, shrimp, urchins, sea cucumbers, sea stars and octopuses.

Activity:

Preparation:

1. Introduce your students to sea otter adaptations for warmth and feeding.
2. Before class, gather your bucket, rocks, scales and calculators. Create two stations. At one station, place the bathroom scale, the bucket and the rocks. At the other station, place the postal/food scale and the food items (unless students will bring their own).
3. Place the empty bucket on the bathroom scale. Use the dial to return scale to zero. If your scale doesn't have a tare dial, weigh the empty bucket first and have students subtract the weight of the bucket later.

Activity:

Part 1: Students will calculate the "daily pounds of food" they would have to consume if they were a sea otter.

1. At the start of class, have each student weigh him or herself (shoes optional).
2. Talk about some of the challenges of living in the North Pacific Ocean. Explain how otters conserve and create heat (fur and metabolism).

3. Have each student enter their weight into their calculators and divide by 4 or multiply by .25 (25%). This is the number of pounds a student would have to eat every day to keep their energy and body heat up if they were an otter. *Optional: Have students do their calculations by hand on scratch paper.*
4. Have each student add rocks to the bucket until the scale matches the “daily pounds of food” number (from step 3 above). Let students lift the bucket to get an idea of how much food they would have to eat.
5. Have your students convert each of their calculations from pounds to kilograms by multiplying each answer by 2.205.

Part 2: Students will calculate how much of their favorite healthy snack that they would have to consume each day if they were a sea otter.

1. Have each student weigh one sample of his or her favorite snack. If necessary, have the student convert ounces to partial pounds.
2. Next, the student should divide the “daily pounds of food” number (from step 3 above) by the weight of their favorite snack. This is the number of snacks he or she would have to eat every day.

Summary:

Use these questions to discuss how much time and energy sea otters must spend foraging for food each day.

1. Ask students how long it would take them to eat their individual “daily pounds of food.”
2. Ask them how long it would take if their favorite snacks had little legs and could run all over the room.
3. What if their food was kept in a locked metal box? (like the shells of mussels or urchins)
4. What if their parents hid their snacks around the house?

Extensions:

1. Draw a chart on the board and have each student enter the weight for his or her favorite snack. Have students calculate how much they would have to eat to reach their own “daily pounds of food” for each snack.
2. Have students keep track of how much they eat in a day. One way to do this is to move the bathroom scale to the kitchen. Have students weigh their plates of food before each meal. They should weigh an empty plate as well and subtract the plate weight to get the food weight. Make sure to subtract uneaten food, shells, etc. that are still on the plate after they are finished. You may also want to talk about why x pounds of popcorn isn’t the same as eating a balanced meal that may also weigh x pounds.
3. In captivity, otters don’t have to hunt for their food. That’s a big chunk of their daily activity that keepers need to fill. Have your students do some research about what marine mammal keepers do to help fill that time and keep the otters from becoming bored.

Marine Mammal Dilemmas

Lesson at a glance:

This lesson is designed to give students an opportunity to examine their own values and beliefs related to the environment and to practice discussing environmental issues without placing judgments.

Common Curriculum Goals and Benchmarks:

SOCIAL SCIENCE

- **Third Grade:** SS.03.CG.03 Identify ways that people can participate in their communities and the responsibilities of participation.
- **Third Grade:** SS.03.SA.03 Identify and compare different ways of looking at an event, issue, or problem
- **Third Grade:** SS.03.SA.04 Identify how people or other living things might be affected by an event, issue, or problem.
- **Third Grade:** SS.03.SA.05 Identify possible options or responses; then make a choice or express an opinion.
- **Fourth and Fifth Grade:** SS.05.GE.07 Understand how physical environments are affected by human activities.
- **Fourth and Fifth Grade:** SS.05.GE.07.01 Understand how and why people alter the physical environment
- **Fourth and Fifth Grade:** SS.05.GE.07.02 Describe how human activity can impact the environment.
- **Fourth and Fifth Grade:** SS.05.SA.03 Identify and study two or more points of view of an event, issue, or problem.
- **Fourth and Fifth Grade:** SS.05.SA.04 Identify characteristics of an event, issue, or problem, suggesting possible causes and results.

Ocean Literacy: Essential Principles and Fundamental Concepts

6. THE OCEAN AND HUMANS ARE INEXTRICABLY INTERCONNECTED.

- 5.e. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (point source, non-point source, and noise pollution) and physical modifications (changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

Materials:

- Dilemma cards

Background information:

Discussing environmental ethics can be difficult. There are many sides to every issue, and often the feelings for one position or another are strong. In presenting this activity to students, stress the importance of not placing judgment, and listening to perspectives other than their own. Understanding all sides can provide a bigger picture of the issues.

It is not the intent of this activity to prescribe right and wrong answers for the students.

Activity:

1. Divide students into groups of four or five.
2. Give each group a dilemma card and have one member read the dilemma and the choices of answers to the rest of their group.
3. Each student in the group should decide on their own what their response would be. Then have each group discuss their choices among themselves. Each student should be able to defend their reasoning.

Summary:

1. Discuss each dilemma as a class. Be sure to remind your students that there are several sides to any issue and usually there isn't only one right answer.
2. Stress the importance of gaining a clear understanding of all positions.
3. Ask the students whether or not it would have helped them make their dilemma choices if they had known more about the issue.
4. Ask them if they think that most people are aware of these issues.
5. What can they do to help more people become aware of human impact on the marine environment?
6. Encourage students to find out more about the issues brought up in their dilemmas. Knowing more will allow them to make more informed decisions.

Extensions:

1. Have students research other issues related to marine mammals discuss them as a class.
2. Discuss how other marine wildlife may also be affected by marine debris, water pollution, commercial fishing, eco-tourism or possible release from a captive situation such as an aquarium.

1.

You just cleaned your basement. On a dusty back shelf you discovered 10 cans of old paint and some very old pesticides and weed killers that you can't use.

What will you do with them?



4.

You were fishing at a secluded lake and caught seven fish this morning. Now, its afternoon and the fishing as been great! You have caught five fish in one hour, all of which are on your string in the water and are bigger than this morning's fish. The law allows you to possess 10 fish per day.

What should you do?



2.

You are walking on the shore with a friend who is visiting you from the Midwest. Your friend sees a purple sea star she thinks is very beautiful. She tells you she wants to go into the tidepool and get it to take it home.

What do you do?



5.

You are on a fieldtrip to the Newport bay front. Although you know it's not a good idea to feed the wildlife, some of your friends are tossing pieces of their tunafish sandwiches to the sea lions.

What should you do?



3.

You are an expert salmon angler. You always know where the BIG ones are. You're standing on the side of a stream where you know the salmon run. On the far side of the stream you see a pool you just know has the BIG one in it, but to get there you must cross the stream. You know this is probably an area with salmon redds (nests), but no one from the Department of Fish and Wildlife is around and you're expected to come home with a fish for dinner.

What do you do?



6.

You're on a charter boat with your family during your summer vacation. Your grandfather, a grumpy, stubborn man, is a heavy smoker and keeps throwing his plastic cigar butts over the side.

What should you do?



4.

- a. Continue to fish and keep all the fish.
- b. Let the smallest fish you caught this afternoon go free and keep the big ones to stay within your limit.
- c. Quit fishing and go for a hike.
- d. Continue to fish but release them.
- e. Other

1.

- a. You know it's illegal, but you simply hide them in your garbage can with your other household waste and have it taken to the county landfill.
- b. Leave them in your basement.
- c. Call the county to find out where to dispose of them safely.
- d. Other

5.

- a. Tell them that feeding the sea lions can harm the animals and ask them to stop.
- b. Report their behavior to an authority on the dock.
- c. Ask the teacher to ask them to stop.
- d. Ignore them.
- e. Other

2.

- a. You notice that there are many sea stars and you think it won't hurt anything to take just one.
- b. Offer to pull it off the rock and suggest you play Frisbee with it.
- c. Explain that this animal won't be able to survive if she takes it home and suggest that she watch it here and then leave it in its habitat.
- d. Yell at her and ask her how she would feel if someone picked her up and threw her out in the ocean.
- e. Other

6.

- a. Yell at him, call him an idiot and ask him if he hasn't heard of the MARPOL Protocol, the law prohibiting the dumping of all plastic wastes from ships at sea.
- b. Ask the captain for a can, give it to your grandfather and politely ask him to use it for his cigar butts.
- c. Do nothing.
- d. Tell your parents to tell your grandfather to quit smoking.
- e. Other

3.

- a. Go to the nearest house and ask to borrow their boat, knowing you'll be in the doghouse if you don't come home with fresh fish.
- b. Put on your best lure, cast as close to the pool as possible and hope for the best.
- c. Carefully walk through the stream.
- d. Go to the fish market for fish for dinner.
- e. Other

1.

There are getting to be too many sea lions near your town. Their pups are starving. Sea lions eat fish – but fishermen need fish too. The sea lions rest on the beach – but people want to sit on the beach too.

What should the people in your town do?



2.

You are on a fishing boat with a friend's family. When the fishing net is hauled in, some of it is torn. Your friend's father cuts the torn part out and throws it overboard. Just then you see some dolphins swimming toward the boat.

What should you do?



3.

You are out on the beach with your friend and you find a seal pup. No one else is around.

What should you do?



4.

You work at an oceanarium that might be able to return a whale to the wild. Here are some facts to consider:

- You have been treating the whale for a possibly contagious disease. The disease seems to be gone.
- The whale has begun to feed on its own, but you don't know if it will be able to find food in the wild.
- It has not been with others of its own species for most of its life.
- Whales swim with their own pods but you don't know if its pod can be found or if they will accept it.
- This species of whale is not endangered.

Make your decision based on what is best for this whale and for whales in the wild.

What should you do?



2.

- a. Move quickly and try to pull the net out of the water.
- b. Tell your friend's father that it is against the law to throw plastics overboard. Tell him also that marine mammals die from getting tangled in nets.
- c. Try to scare the dolphins away.
- d. Don't say anything but report him to the Coast Guard when you get to the dock.
- e. Do nothing
- f. Other

1.

- a. Take some of the sea lions to live in another place. This would mean fewer sea lions near your town. (Keep in mind that the ones you move might not live or they might come back.)
- b. Let nature take its course and let the sea lions starve.
- c. Catch the pups and let your local aquarium take care of them, if they can. When the pups are older, set them free.
- d. Hire a biologist to determine the actual effect of the sea lions on the fishing industry
- e. Let licensed hunters control the sea lion population.
- f. Other

4.

- a. Go ahead and release it and hope it will socialize and feed on its own. You hope to use radio-tracking equipment to follow its progress in the wild.
- b. Since your whale seems healthy, capture other whales in an ocean pen. Introduce your whale to them. If your whale hunts and eats on its own and gets along with the other whales, then release it
- c. Keep the whale in the oceanarium for educational purposes and for study since you can not prove it is healthy.
- d. Other

3.

- a. Take it home and care for it in your bathtub.
- b. Leave the pup alone. Call the State Police and tell them the pup is on the beach. Stay to keep people away from it until they arrive.
- c. Pet the pup, although you know it's against the law. Then return it to the water.
- d. Do nothing
- e. Other

5.

You are the owner of a large factory. The water that your factory drains into the river nearby is polluted, but it is within legal limits. Fish and marine mammals in your area are getting sick from the pollution. Some are dying. The equipment to reduce the pollution. Some are dying. The equipment to reduce the pollution is expensive. If you buy it, you can't give your employees raises this year.

What should you do?



6.

You are the owner of a small aquarium. You are going out of business because not enough people are coming to see your exhibits. Your seals are healthy but old. Other aquariums might not want to adopt them, and you might not be able to get permits to turn them loose. You are not sure if they can live in the wild after 25 years in your aquarium. These seals are not an endangered species.

What should you do?



7.

You are a researcher on a small tropical island. The people of this island hunt dolphins for food. They travel in canoes and use spears to kill the dolphins. Each year a small number of dolphins is injured but not captured. Some of these injured animals may not survive.

What should you do?



8.

You are a humpback whale photographer. You always know where you can find the whales. You are out in your boat and see a mother humpback whale and her calf. To get the photograph you want, you must be at least 20 feet from the pair. You know this is against the law, but no one from the government is around. Your magazine has to have the photo.

What should you do?



6.

- a. Ask other aquariums if they can take the seals. Keep at it until someone says yes, or until you run out of possibilities.
- b. Ask an animal rights group to try to force the government to let you release the seals.
- c. Load the seals in your truck and release them without the permits. Deal with the law later.
- d. End the seals' lives.
- e. Other

5.

- a. Since you are within legal limits, wait a while to see if the cost of the equipment will go down.
- b. Do nothing.
- c. Store the water until the laws change or until you have extra money to spend on the equipment.
- d. Add the equipment, because you know that the chemicals will work up the food chain and affect even more animals. Your employees may be unhappy, but everyone will lead healthier lives.
- e. Other

8.

- a. Stop your engine and hope that the whales will come closer so that you can get your photograph.
- b. Keep following the whales at a legal distance and hope you get your picture. (Keep in mind that you may be tiring the calf.)
- c. Chase them down and take your picture.
- d. Forget taking a picture of this pair of whales. Look for another photo opportunity, even though you feel sure you'll never get one as good as this.
- e. Other

7.

- a. Give the people motor boats to increase their speed. This might improve their aim.
- b. Give them guns to reduce the suffering on the part of the dolphins. This will also increase their hunting efficiency.
- c. Do nothing. This tradition has gone on for hundreds of years and hasn't seemed to hurt the dolphin population.
- d. Bring in another food source so the people don't have to eat dolphins.
- e. Other