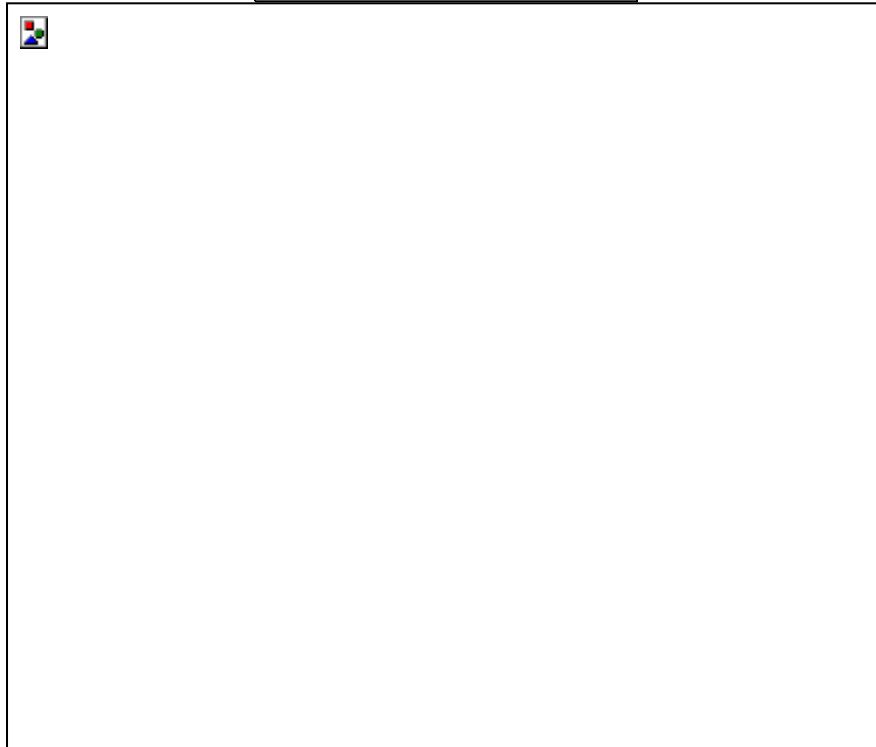
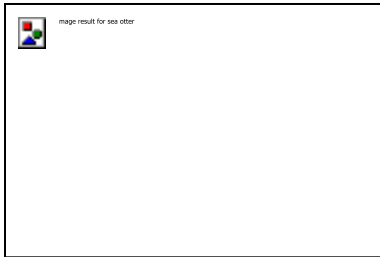


Sea otters

- A keystone species

(What does that even mean?)



Introduction

Sea otter biology (*Enhydra lutris*)

*Sea otters are marine mammals. (Can you name any other marine mammals?)
But otters are in the weasel family (the only marine mammal in the weasel family)

*All marine mammals live their whole life in the ocean, they even give birth to their young in the ocean or on the beach (or ice), and they all suckle their young.

*Water takes away body heat much faster than air. All marine mammals need to keep warm. Seals and whales have blubber (fat) to keep them warm. Polar bears and sea otters have special fur.

*Sea otters have the densest fur of any animal in the world. They have up to 1 million hairs in one square inch of pelt on their backs; that is 17 times the number of hairs on a dog!

*The second way to keep warm is by eating a lot. They burn a lot of food. You will learn at Station I just how much an otter eats.

*Otters can eat over 160 different prey species. At station II you will learn about some of them.

*When the sea otter finds something to eat like a clam or a sea urchin, it puts it in special skin folds under its arm and brings it to the surface. Sea otters often use a rock to crack the shells open.

*They put all the food on their belly, then take out the edible pieces with their hands and eat them.

*Sea otters can also catch fish; they are the only marine mammal to catch fish with their front paws, not in their mouth. The fish are often swallowed under water, which is why people don't see them eating fish very much.

Station I

How much does a sea otter eat?

Adult sea otters eat ~ 1/3 of their body weight every day, that is about 30%!

In comparison, a horse eats about 4% of its body weight per day in grains and an adult human eats roughly 2-3% of their body weight.

We will calculate how much you would have to eat every day if you were a sea otter!

First, check out how much a kilogram (kg) is.

How many pounds (lbs) are in a kg? _____

How many grams are in a kg? _____

Adult sea otters weigh between 20 and 39 kg. To calculate 1/3 of the total weight, use a calculator and enter the total weight in kg, then divide by 3.

Fill in the following table:

1. How much would a 30kg otter have to eat per day?
2. How much did Oswald eat per day (he weighed 36 kg)
3. If you were an otter, how much would you have to eat per day?

	A. total weight in kilogram (kg)	B. 1/3 of total in kilogram (kg)	C. 1/3 of total in gram (g) (= B x 1000)
30 kg otter	30		
Oswald			
You			

There are 1000 grams (g) in one kilogram (kg). To get from kg to g, you have to multiply by 1000. For example: $0.2\text{kg} = 200\text{g}$
How many sea urchins, sea stars, fish, snails, clams, scallops, crabs, or other animals does a sea otter eat every day?

In your group, take one prey item (sea urchin) and weigh it. Make sure to gently put it back in the water.

How much does it weigh?

* _____ grams

How many of these animals would Oswald have to eat per day?

-You know how much food he needs per day (check your table!)

-Divide the amount of food Oswald needs per day by the weight of the prey animal (in grams) to get how many prey animals he needs.

Oswald eats * _____ per day!

If you divide the number for $1/3$ of your body weight by the weight of the prey, you get how many prey items you would have to eat!

I would eat * _____!

Station II

What does a sea otter eat?

Sea otters eat many different animals. Do you know these animals?
What do the animals eat that are prey for sea otters?

Usually, sea otters dive to about 30m (100 feet) to get food. Males dive a little deeper, females with pups shallower. They bring most food to the surface, but they can catch fish with their hands and eat them quickly under water.

1. *Make a list of the animals that sea otters eat. We probably don't have all of them here!

2. *Learn about some key prey species of sea otters: Read the following clues, then draw each animal into the picture (next page!) where you could find it: Use these clues to decide where to draw the animal in its habitat!

Sea urchins-they eat seaweeds, especially bull kelp.

Sea stars-eat clams and mussels and any other small animals they find dead or alive. Can be in shallow or deep water.

Butter clams-filter feeders (eat plankton), live buried in mud or sand in shallow water.

Scallops-filter feeders; they can swim! They lie on top of sandy bottoms in deeper water.

Hairy tritons- predator snails; Eat other snails, mussels and barnacles.

Chitons- graze algae off rocks in the intertidal

Crabs (king crab, tanner crab, kelp crab)- baby crabs are eaten by bigger crabs and by fishes. Where can they hide?

Fish (herring)-Their schools are in the open ocean. But herring come to shore once a year to spawn. Herring like to attach their eggs to seaweeds.

Fish (halibut) -Halibut young live in shallow water but below the tides. They like to bury in the sand so they can't be seen. They eat little crabs, shrimp and worms.

octopus-like to hide under rocks in the water.

Look at your picture:

Sea otters love urchins for food. Urchins eat young kelp plants or gnaw on the bottom of kelp plants. When the otters are gone, there are more sea urchins. What happens to the kelp forest when the sea otters are gone? What does this change mean for other animals such as young rockfish, crabs, or herring?

Summary

When Kodiak was discovered by the Russian explorers, there were many sea otters. In the late 1700's, the Russians settled on Kodiak in Three Saints Bay and began a trading post for sea otter pelts. They hired some of the local native people to help them hunt the otters, then they shipped the furs to Russia, and some to China. A single sea otter fur was worth so much, that a man did not have to work for two years. However, a lot of the trade ships were lost on the journey back to Russia and many people drowned. At this time there were lots of sea otters all along the Pacific from Japan, along the Aleutian Islands, all along the coast to California. Sea otters were hunted so much that by 1900, they were almost extinct. In 1911, the sea otter protection act was passed and sea otters were put on the endangered species list. Today, only Alaskan Natives may shoot sea otters in Kodiak and even they may only take one per year. Slowly, the sea otters are becoming more again.

*Lets see what it looked like when the Russians first came to Kodiak (we will do this together on the board):

I. Many sea otters

What happened to the ocean habitat when the sea otters were hunted to near extinction?

II. No sea otters

What would the situation be today, with sea otters coming back, but their numbers are only 1/5 of they were when the Russians first arrived.

III. Some sea otters