

Whale Traveling Trunk

Cape Lookout National Seashore



HOW TO USE THIS TRUNK:

This traveling trunk is designed to be used in the classroom to introduce students to whales. It is intended to be used for grades 3 through 6. The activities in this book are designed to fulfill some of the goals of the North Carolina Standard Course of Studies. In the back of this book is a curriculum index that shows which goals of the Standard Course of Study each activity will fulfill.

The first section in this book contains background information for teachers to use in order to introduce the subject to students. It is followed by activities that can be done with the students in class. The materials needed for these activities are located in the trunk. The final section of this book contains student activity pages. These can be photocopied and given to the students to work on in class or at home. Please keep all of the originals in the book.

You will find an inventory page inside the trunk. Please be sure that everything is back in the trunk before returning it to the National Park Service.

Please complete the evaluation form contained in this trunk if you have any comments or suggestions for the Cape Lookout National Seashore Traveling Trunk Program. You can also feel free to contact the park's interpretive division at:

Cape Lookout National Seashore
131 Charles Street
Harkers Island NC 28531
252-728-2250



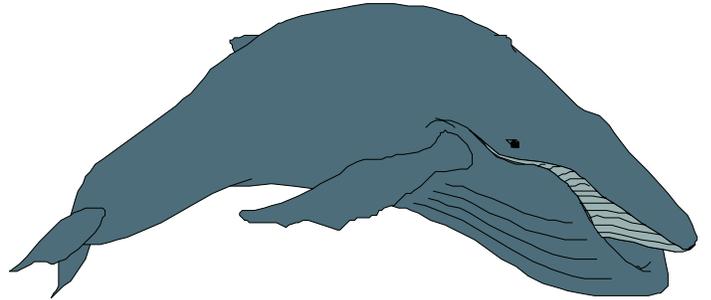
Whale Traveling Trunk



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WHALES

Whales are intelligent and interesting creatures that inspire the imagination and draw the interest of students of all ages. This trunk introduces students to the biology and interesting behaviors of whales.



Whales, dolphins, and porpoises are part of an order of mammals called **Cetaceans**, which evolved from land mammals millions of years ago and have adapted to life in the sea. Like all mammals, whales breathe air with lungs, have bristle-like hair, and maintain a constant body temperature. They bear live young and nurse them with milk.

Whale Anatomy:

There are two types of whales; **toothed and baleen:**

Toothed whales include pilot whales, beaked whales, narwhals, orcas, and sperm whales, as well as dolphins, which are actually small toothed whales. Teeth allow these whales to feed on fish, squid, and marine mammals.

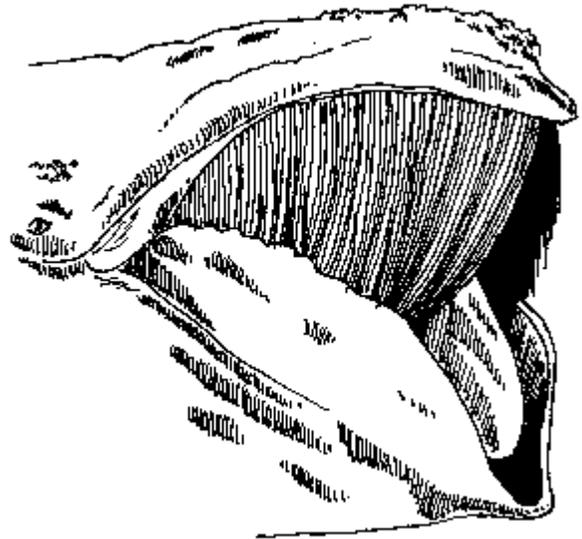
Most toothed whales are darker colored on top and lighter underneath, making them harder to see in the water. This is called **countershading**. A whale uses countershading to sneak up on its prey.

Baleen whales are among the largest mammals alive, yet they eat some of the world's smallest creatures known as **plankton**. Instead of teeth, baleen whales have fringed sheets of baleen that hang down from their upper jaw. Baleen looks like a flexible, fringed comb made of the protein keratin; the material of which hair, whiskers, claws and hoofs are made. Examples of baleen whales include blue whales, humpback whales, right whales, fin whales, and bowhead whales.

Some baleen whales feed by filling their mouths and throats with large amounts of water. This water is then forced out and strained through the baleen. Plankton, small crustaceans, and tiny fish are trapped on the baleen. The whale can then wipe the baleen with its tongue and swallow these small creatures whole. These whales are called **gulpers**, and include the blue whale, fin whale, and humpback.

Other baleen whales are known as **skimmers**. These whales feed by sifting plankton directly out of the water. They swim along the surface with their mouths open, allowing the plankton to float in and get caught in their baleen. Bowhead and right whales are examples of skimmers.

Baleen whales usually have folds or grooves along the throat and chest that stretch out when they gulp up water. This greatly increases the amount of water a whale can take in, thereby increasing the amount of food it can trap.



Right Whale showing baleen plates

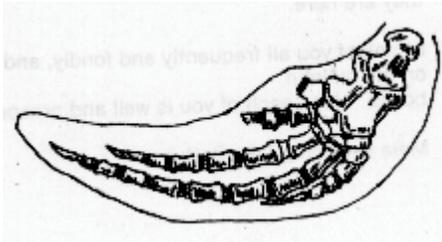
How do whales keep warm living in cool water? Whales have a heavy insulating layer of fat below the skin called **blubber**, which is useful as stored food energy. Whales can store energy in the form of fat during times of plenty and live off their blubber when food is scarce. They eat great amounts of food for energy. Some whales avoid cold water while others, like the beluga whale, live all year in cold waters.

How do whales breathe? Like all mammals, whales breathe air through their lungs. Whales get their air through blowholes. The blowhole is in the top of the head so the whale won't have to come very far out of the water to breathe. Toothed whales have one blowhole, while baleen whales have two. The blowhole can be kept closed while underwater. When the whale surfaces, it lets out its breath, sending a spout of air and water several feet into the air.

Some whales can dive over 1,000 feet under water and hold their breath for up to 40 minutes. During diving, a reflex response causes the whale's heartbeat to slow

and shuts off blood flow to non-essential areas, saving oxygen-rich blood for the brain.

How does a whale swim? Whales have paddle-shaped flippers that have evolved from mammalian forelegs. The bones in a whale's flipper look very much like the



bones in your fingers. Flippers are used for steering and balance. Deep inside the muscles near the tail are two small bones that are not connected to the rest of the skeleton. These bones are all that are left of the whale's legs.

Whale flipper showing bone structure

Whales use their flattened tails, or **flukes**, to propel them through the water. As their tails move up and down, the whales are pushed through the water. Since all of the pushing power comes from the tail, the tail muscles are the largest in the whale's body. The flukes are made of cartilage, the same material that our noses are made out of. This makes them extremely strong. Most whales are **fusiform** (cigar or torpedo shaped), offering them little resistance to the water as they swim.

Whale Senses:

How does a whale communicate? Whales are very intelligent animals that communicate with each other by voice. They can make noises by forcing air through nasal passages. The very low-pitched sounds of blue whales can travel hundreds of miles through the water. Whales make a variety of sounds; chirps, whistles, clicks, rumbles, and groans. A repeated pattern of sound that may last for up to 30 minutes is called a song. Whales may use songs to attract mates.

Whales hear through ears that are tiny openings about the diameter of a pencil. A long canal stretches from the outer ear hole to the inner ear. This canal is blocked by a wax plug that keeps water from getting in.

The great splashes whales make when they **breach** (leap up out of the water) make loud sounds that carry for many miles. Imagine the sound of the splash that a 150 ton blue whale can make. This may be a form of communication. The splash can be

heard for great distances underwater, making the whale's presence known to others in the area. Some scientists believe that whales may breach for other reasons: perhaps to help remove parasites; to get a view above water to locate feeding, resting, or breeding areas; or maybe just for fun.

Spyhopping is when whales stick their heads out of the water and appear to be taking a look around. They can see in the air as well as in water. No one is certain how well whales can see but they seem to have good vision. Whales have glands that oil their eyes to protect them from salt in the water.

How do whales navigate? Many whales have a system of **echolocation**, or **sonar**, which can be used to locate food or obstacles. They can locate objects by sending out sound waves and then listening for the returning echoes. The sounds are emitted from the head and focussed from the **melon**, or forehead. The echo is passed through a special sound conducting tissue in the lower jawbone to the inner ear. Echolocation is extremely sensitive. Dolphins in captivity have been able to distinguish objects the size of a B-B pellet and a kernel of corn from 50 feet away. Scientists believe that almost all toothed whales use echolocation.

Many scientists believe that whales have a magnetic sense. Many animals can detect the earth's magnetic field. Birds are believed to use this sense to migrate. Scientists have found crystals of magnetite in the brains of whales that may be used to sense the magnetic field of the earth.

Life Cycle:

How do whales reproduce? Like all mammals, whales are born live, not from eggs. They are born tail first. Whales normally have one baby, or calf, every other year. The newborn calf will have very soft, rubbery flippers and flukes. The mother will nurse the calf for at least one year. A sperm whale may nurse for two years or more.

After a young whale is old enough to find its own food, it will be another ten years before it is mature and can mate. Scientists can tell the age of a whale by cutting open its tooth. The teeth grow in layers like a tree. The age of the whale can be told by counting these layers.

Many whales migrate from cold water to warmer waters so their young can start life in warm water, since the calves can not keep warm as easily as the adults. Mothers are very strongly attached to their offspring. They will protect them with their flippers or use distraction display techniques to draw the attention of a predator away from the calf.

Many whales live in family groups called **Pods**. This may be a means of protection, since many predators such as sharks and killer whales will attempt to feed on whale calves.

Why do whales beach themselves? Scientists don't completely understand why whales get **stranded** or beached. Most stranded whales are already dead or very ill. Often times, whales will die of natural causes, and the tide will wash them ashore.

Some scientists think that whales may strand themselves intentionally to rest or to rub their skin. Others believe that the whales may get disoriented in shallow water or they even may be suffering from parasites in their inner ear.

Occasionally entire groups of whales beach themselves in mass strandings. This usually leads to the death of the entire group.

Conservation:

Whales have been hunted in North Carolina since the early days of the colony. They were hunted for their oil, baleen, and bone. Whalebone was used to make corset stays, hoops, umbrella ribs, and buggy whips.

At Cape Lookout in the 18th century, right whales were the most frequently hunted whales. A right whale, 40 to 60 feet long, could yield \$1200 to \$1500 worth of oil and whalebone. Each whale could yield up to 1800 gallons of oil and 550 pounds of bone.

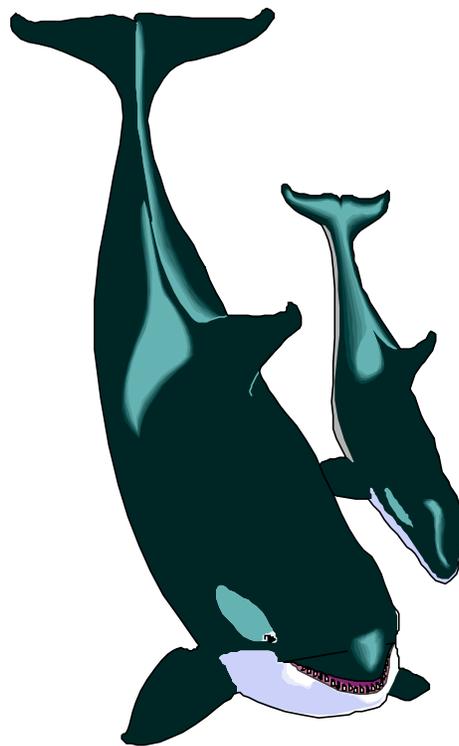
Because of commercial whaling throughout the world, many whale species were on the verge of extinction, and some remain severely depleted today.

Today, whales still face many challenges to survival, including pollution, habitat

degradation, loss of prey species, collisions with ships, and entanglement in fishing gear. The degradation of marine habitats may be the biggest threat to the survival of whales today. Wastewater, silt, and pollution that run off into the ocean can affect the health of whales as well as the food they eat. Toxins that build up in the tissues of whales can cause serious health problems. Habitat degradation and over-fishing has also resulted in smaller populations of animals that whales prey on.

Many oversea navigation routes overlap the habitat of whales. Whales resting or feeding near the surface are often hit by ships. Some scientists think that noise from ship traffic may affect a whale's ability to communicate. When whales become entangled in fishing gear, they may not be able to eat or breathe. Many whales show scars from rope and net cuts.

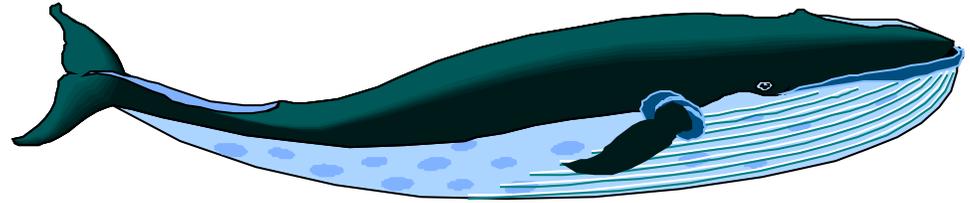
What can we do? Although many of the threats listed above may be out of our range of control, there are many simple things that we can do to insure a healthier environment for whales. We can keep our water clean by reducing the amounts of pesticides and fertilizers we use and by reducing the amount of trash we throw away. We can fish responsibly and keep trash out of the water.



Baleen Whales



BLUE WHALE



Blue whales are the largest animals on earth, weighing from 130 to 150 tons (4 times heavier than any dinosaur that ever roamed the earth). They are blue-gray in color with long, streamlined bodies that can be 100 feet long (the length of three school buses). Blue whales are strong swimmers, capable of reaching speeds up to 30 miles per hour.

Blue whales are baleen whales that feed on tiny shrimp-like creatures called **krill**. They stay primarily in cold waters where krill are plentiful. Because krill are found in the top 300 feet of water, blue whales rarely dive deep to search for food. During the summer feeding season, a blue whale can consume over 4 tons of krill in a single day. During feeding, pleated grooves in the whale's throat can expand to take in large volumes of water. As the mouth closes, water is pushed out through 260 to 400 overlapping baleen plates, which trap the food near the tongue so that it can be swallowed.

Blue whales are usually seen alone or in pairs. They are found in all of the world's oceans, primarily along the edge of **continental shelves**. Blue whales feed in the high latitudes and migrate to the tropics to breed.

Mating begins when a blue whale is between 5 and 10 years old. Calves are born every 2 to 4 years, after a 12 month pregnancy. While nursing, calves can consume 100 gallons of milk and gain up to 200 pounds each day. Scientists are not sure how long a blue whale will live, but estimate that they live for at least 50 years.

At one time blue whales were near extinction due to over-hunting; however, recent protection has enabled their numbers to increase. The International Whaling Commission banned the hunting of blue whales in 1966 and gave them worldwide protection. At one time there were an estimated 200,000 to 300,000 blue whales. There are presently about 6,000 to 10,000 worldwide.

RIGHT WHALE

Right whales are baleen whales that can grow to be up to 60 feet long and weigh up to 55 tons. Their heads are covered with **callosities** (horny growths). They are sparsely distributed throughout the Indian, Pacific, and Atlantic Oceans.



Right whales are surface feeders that feed on **copepods** and krill, which they strain from the water with their long, fine baleen. One whale can eat several tons of krill in a day.

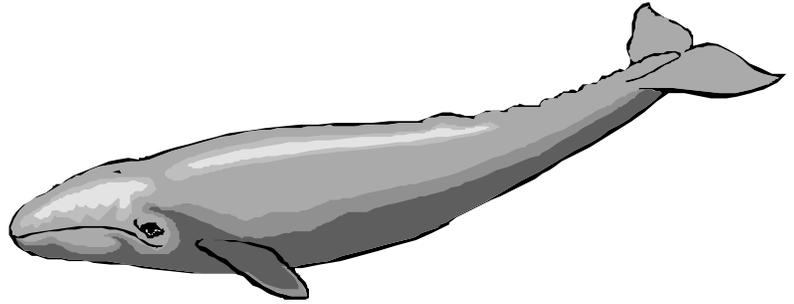
Mating begins at about 8 years old with females giving birth every 3 to 5 years. A newborn calf is about 14 feet long and weighs about 2000 pounds. Newborns have almost no blubber to keep them warm, so the whales migrate to warmer waters before giving birth. Most births occur in early winter.

It is believed that right whales live for at least 50 years although it is difficult to tell their age since they are baleen whales and have no teeth.

Right whales are so named because they were the "right" whales to hunt in the days of whaling. They produced plentiful amounts of oil, bone, and baleen, which was used in the manufacture of corset stays, umbrella ribs, buggy whips, and other products. The right whale is slow moving, so it was easy to kill, and its body floated when dead, making it simple to retrieve after a hunt.

By the 1860's right whale populations were so severely depleted that they were no longer profitable to hunt. They were given worldwide protection in 1935, after their numbers were significantly reduced by over-hunting. Today, there are less than 3,000 right whales left in the world.

GRAY WHALE



Today, gray whales are found only in the Pacific Ocean. It is estimated that there are about 17,000 to 23,000 left. They were once found in the North Atlantic Ocean, but became extinct in the 17th century due to over-hunting. Another population off the coasts of Korea and Japan is close to extinction, with only about 50 individuals left.

Gray whales are medium-sized baleen whales that reach up to 50 feet in length and weigh about 36 tons. They are a mottled gray color with white patches of barnacles and parasites on top of the head and on the back.

Gray whales are a coastal species that generally stay around the **continental shelf**. They are famous for having one of the longest migrations of any mammal. Each fall pods of gray whales migrate from the Arctic to Baja California, a distance of over 6,000 miles each way. In the spring they migrate back up to the food-rich waters of the Arctic.

While migrating, gray whales will eat small fish and mysids (small shrimp-like animals). In the Arctic they feed primarily on **amphipods** and other bottom dwelling animals. Gray whales are bottom feeders. They swim along the ocean bottom on their sides, sucking up small animals and filtering them through baleen plates.

Gray whales reach sexual maturity at 5 to 11 years old. Females give birth every 2 to 3 years, after a 12 to 13 month gestation period. Newborn calves are 12 to 15 feet long and weigh about 1,500 pounds. The mothers and calves will stay together for about a year. The calves will nurse for about 7 or 8 months. During this time, they will drink 50 to 80 pounds of milk per day. They have a life expectancy of 50 to 60 years.

Gray whales were hunted extensively in the 1800's and again in the early 1900's. They were hunted to near extinction with possibly less than 2,000 individuals left. They gained protection in 1946, and since that time the population has grown to over 21,000. They were removed from the endangered species list in 1994.

FIN WHALE

Fin whales are secondary only to blue whales in size. They can grow to be 85 feet long and weigh 75 tons. They are among the fastest whales, capable of traveling at speeds of up to 23 miles per hour.



Fin whales are baleen whales that feed mainly on krill and occasionally herring. They have an average of 85 throat grooves to allow the throat area to expand during feeding.

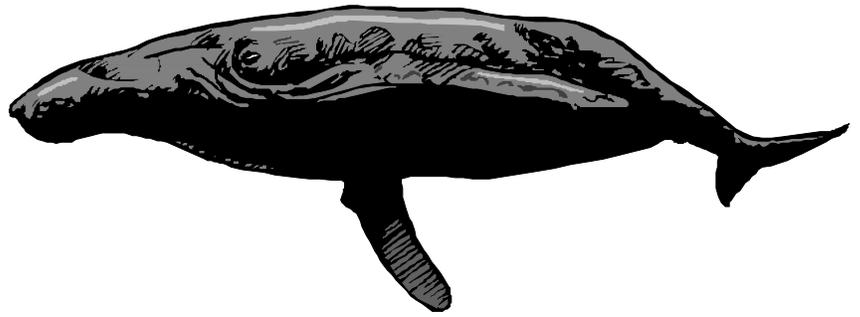
Fin whales are mainly seen alone or in pairs. Pods of 6 or 7 individuals are common, and groups of up to 300 have been observed migrating together. Spring and summer are spent in cold Arctic or Antarctic waters, while in the fall they migrate back to warmer waters for the winter breeding season.

Females reach sexual maturity between 6 and 10 years old, and they give birth every 2 to 3 years. Mating occurs during winter, and the young are born about 12 months later. Newborn fin whales can be 14 to 20 feet long and weigh about 2 tons. The calves will nurse for 6 to 7 months, and travel with their mothers to the winter feeding grounds.

Present numbers of fin whales seem to be declining. Populations have been severely depleted by the whaling industry. Pre-whaling populations are estimated to have been at 300,000 to 650,000 individuals. There are an estimated 80,000 left in the world today.

HUMPBACK WHALE

Humpback whales are widely distributed in all of the world's oceans. They inhabit warm waters in the winter and migrate to cold polar waters, where there is an abundance of food in summer. They can be seen off the coast of Cape Lookout in the winter months.



Humpbacks can grow to over 40 feet long and weigh up to 45 tons, with 14 foot long flippers. They are mostly black or gray in color, with white undersides.

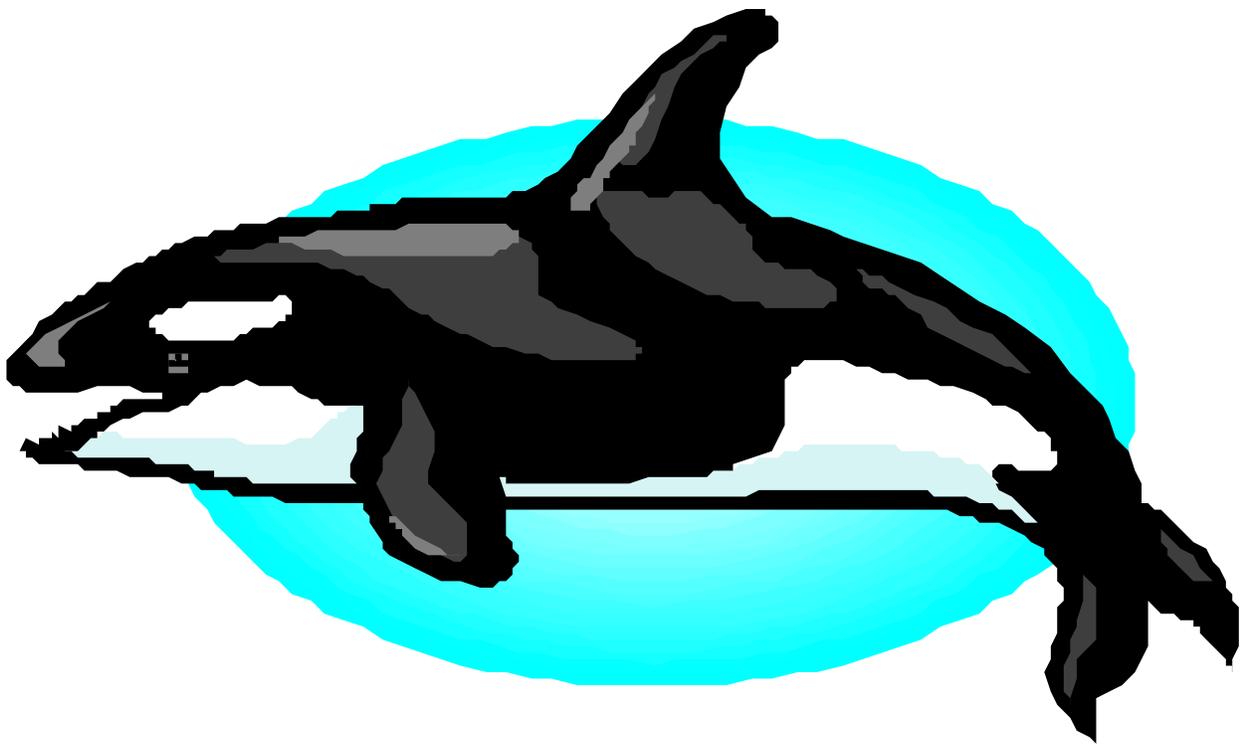
Like all baleen whales, humpbacks filter their food through baleen plates. They like to eat krill, anchovies, sardines, mackerel, and other small schooling fish. Humpback whales have a rather unusual method of catching their food. They sometimes use an underwater "bubble net" to catch small schooling fish and krill. One or two whales will swim in a circle around a school of fish, blowing bubbles as they swim. The bubbles frighten the fish and cause them to flee to the center of the bubble circle. The whale can then swim up the middle of the bubble net and swallow the fish.

Humpback whales begin to mate at about 7 years of age. Females give birth every 2 to 4 years, after an 11 to 12 month pregnancy. Calves can grow about 1½ feet per month while nursing. They will stay with the mother for at least 2 years. Humpbacks have rather complicated courting behaviors. Many males will compete by lunging and bashing into each other to see which one can get close to the female.

The life span of a humpback whale is believed to be between 40 and 95 years. Many show scars from encounters with killer whales who sometimes prey on the young or weak.

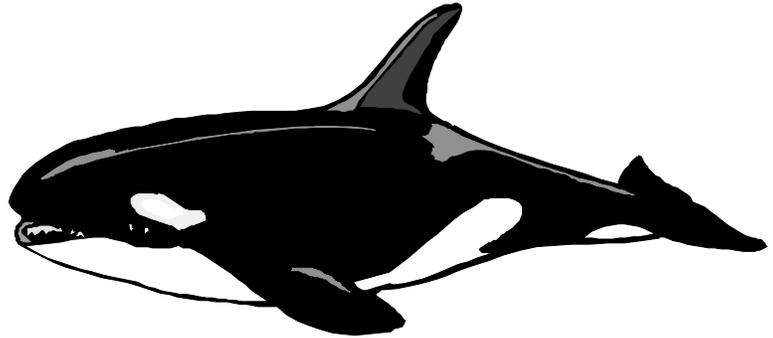
Humans commercially hunted humpback whales from the 17th to 20th centuries. Today they are considered an endangered species with approximately 6,500 to 7,000 remaining in the world.

Toothed Whales



ORCA

Orcas, or killer whales, are fast, powerful, intelligent whales that can grow to 30 feet and weigh 4 to 6 tons. To maintain their size and high level of activity, they require a large amount of food each day. An average orca will eat 550 pounds of food in a single day.



Orcas are very social animals and will hunt in groups, enabling them to kill animals larger than themselves. They are toothed whales that eat several different species of fish including tuna, as well as squid, marine birds, dolphins, seals, sea turtles, and baleen whale calves. Occasionally, orcas are seen attacking humpback whales. Some have even been known to slide up onto the beach to catch a seal.

Orcas are among the fastest of marine mammals. They are capable of swimming at speeds of up to 30 miles per hour and are extremely agile and maneuverable in the water. They have an acute sense of hearing, as well as excellent vision both in and out of the water.

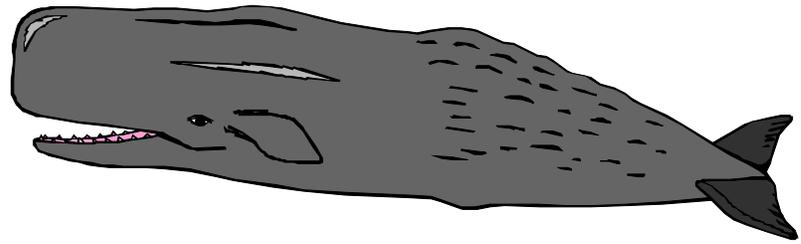
Female orcas give birth every 3 to 10 years, after a 17 month pregnancy. Calves are born about 8 feet long. Breeding may occur in any season, but is most common in summer.

Orcas have been found in the North Atlantic from the polar regions south to Florida and the Gulf of Mexico. They are usually spotted in groups of 25 to 30 individuals, although groups of 150 have been reported.

Killer whales have no natural enemies, and can live for 50 to 80 years. Because of their comparatively small size, they were not hunted nearly as extensively as other whales.

SPERM WHALE

Sperm whales are the largest of the toothed whales, growing to be 35 to 60 feet long and weighing up to 50 tons. They live in temperate, ice-free oceans.



Sperm whales will dive very deep (over 3,300 feet) and stay underwater for more than an hour in search of their preferred food, the giant squid. They also will eat octopus, fish, shrimp, and deep-water fishes.

Male sperm whales have 20 to 25 large, conical teeth in the lower jaw, and up to 10 in the upper jaw. The female's teeth are smaller, with 20 or less in the upper jaw and none in the lower. Sperm whale teeth were used by sailors and artisans for scrimshaw (ivory carvings).

A sperm whale's most noticeable feature is its huge square head that takes up about one-third of its total length. The massive head is filled with a wax-like oil called spermaceti. This oil solidifies in cold water encountered during dives, which helps to reduce the whale's buoyancy.

Breeding occurs during the summer. Females reach sexual maturity at 7 to 13 years of age. They give birth to 12 to 13 foot long calves after a 12 to 14 month pregnancy. Calves will nurse for 2 years or more. Sperm whales live for 50 to 70 years.

Sperm whales were heavily hunted in the 18th, 19th, and 20th centuries. They were hunted primarily for their special spermaceti oil, which even today is used as a high grade lubricant. The worldwide population of sperm whales has been reduced by whaling. Scientists are not sure exactly how many are left. They are now protected throughout most of their worldwide range.

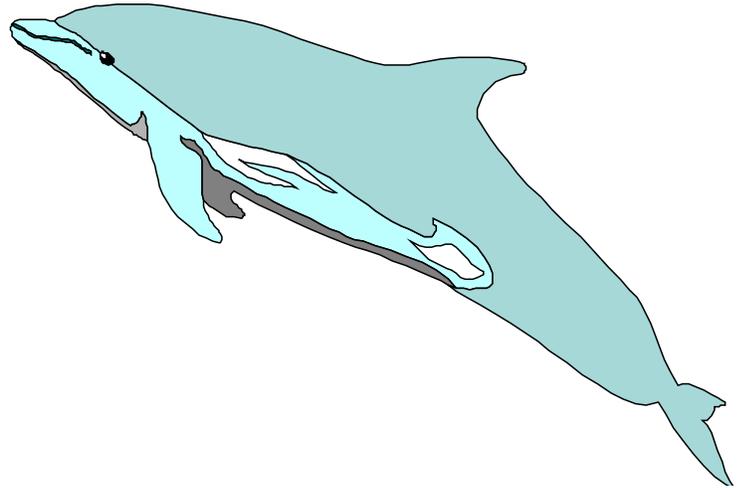
BOTTLENOSE DOLPHIN

Bottlenose dolphins are small toothed whales. They are the most common dolphin along the Atlantic coast, usually being found within 50 miles of shore. They travel in groups of 10 to 15 individuals.

Bottlenose dolphins can be up to 12 feet long. They are a grayish color, with a short beak. They have 18 to 26 small, sharp teeth on each side of their upper and lower jaws.

Bottlenose dolphins eat a wide variety of fish, squid, and crustaceans. They use their teeth to grip food, then swallow it head first. This is so the spines on the fish they eat won't get caught in their throats. A bottlenose dolphin will eat about 25 pounds of fish in a day. They sometimes hunt in groups to herd fish together.

Mating takes place in May to June. They give birth to one calf every 2 to 4 years with a gestation period of 10 to 12 months. Calves are about 3 to 4 feet long and nurse for more than a year after birth. They will live for 30 to 50 years.



AMAZING WHALE FACTS

- A large blue whale can eat over 9,000 pounds of food per day. Every time it swallows, over 100 pounds of food can go down its throat.
- A killer whale weighing 12,000 pounds can jump over 20 feet in the air.
- A sperm whale has the largest brain of any animal that ever lived. It can weigh up to 20 pounds, which is 4 times larger than a human brain.
- Sperm whales are the deepest divers, reaching depths of 3,500 feet or more. They can hold their breath for over 1 hour.
- There are over 70 species of cetaceans. Fifty of these are dolphins, which are actually small toothed whales.
- Some newborn whales can weigh up to 2 tons.
- A humpback whale's flippers can be 14 feet long.
- A whale's tooth grows in layers like a tree. Scientists can slice a tooth in half and count the rings to tell how old a whale is.
- The blubber of a sperm whale can be up to 20 inches thick.
- A blue whale's tongue can be 15 feet long and weigh about 4 tons.
- The northern right whale can eat more than 4 tons of plankton in a day.
- A hungry blue whale calf can drink as much as 84 gallons of milk in just one day. It can gain 9 pounds in an hour and grow more than one inch in a single day.
- A blue whale's heart is the size of a Volkswagen Beetle. Its aorta is large enough for a man to walk through.

WHALE ACTIVITIES



Here are some activities that can be done in the classroom. Some of the activities will use materials enclosed in the trunk, while some can be done without.

ACTIVITY 1: HOW BIG IS A WHALE?

OBJECTIVES: Students will learn how large whales are.

BACKGROUND: One of the most frequently asked questions by students is “how big are whales?” The answer depends on the species of whale. The largest whale is the blue whale. It can grow to be 100 feet long and is the largest animal on earth. This activity will allow students to discover just how big whales are.

MATERIALS:

Stranding reports (in trunk)
Grid paper (copy laminated sheet in trunk)
Colored strings on green winders (in trunk)
Metric conversion chart (in trunk)
String
Paper
Pencils

PROCEDURE:

1. Assign students to research the length of a whale such as the blue whale. After the lengths have been determined, ask students to measure and mark a straight line on the playground or somewhere where there is enough space for each whale length. The class can then stand shoulder to shoulder along each length. If a camera is available, photograph each line of students along each length.
2. Enclosed are stranding reports from Cape Lookout National Seashore. The reports give various measurements of the whale's bodies from snout to flipper. Some of the measurements are in centimeters or feet. Have the students convert the measurement into inches. Then have the students sketch out the size of the sections on paper or on the playground with markers or chalk. In the trunk is a whale tail that has been drawn approximately to scale of a humpback whale that stranded (on two bed sheets). This can be laid out in the classroom and the students can see the size of the fluke (tail) of this whale. Have students lie on the sheet to give them an idea of how large the tail is.
3. The following activity is taken from Project Wild (Aquatic). For this activity you may want to divide the class into teams. This activity requires the students to draw life size whales on the surface of the schoolground.
 - a. Assign each team a whale and have them research the length and weight of their whale. (NOTE TO TEACHER: Typical lengths and weights for mature whales are listed below).

1. Humpback whale: 50 feet 35 tons
2. Sperm whale: 55 feet 47 tons

3. Gray Whale : 40 feet 35 tons
4. Finback Whale: 70 feet 50 tons
5. Right Whale 55 feet 47 tons
6. Blue Whale 100 feet 75 tons

b. Once the size and weight have been researched, students should learn how to use grids to draw the whale to scale. (A laminated sheet of one-inch grid paper is in the trunk. This can be copied.) Have the students make a drawing of the outline of their hands. Once they have finished drawing the outlines of their hand have them make grids on a much larger paper (for example, a flip chart or butcher paper). If there is a local newspaper in your community, they may have a supply of spare paper left over from printing and may be willing to donate some for the project. On the larger paper, have the students draw grids with squares three to four inches on a side. Once the students have drawn a larger grid, have them transfer the small drawing of their hands to the larger paper.

c. Tell the students that they will use the same method to draw whales on the schoolground. On the schoolground the squares will be ten feet on each side. First the teams must make drawings of their whales on one-inch grid paper. For this drawing it helps for the students to pretend that the one-inch squares are ten feet on each side. For example, a blue whale is ninety feet long. On the one-inch grid the drawing will be nine squares long. When the one-inch drawing is transferred to the schoolground, the squares will be ten feet on each side!

d. The most difficult part of this activity is likely to be the transfer of the one-inch grid to the ten-foot grid. Although it may appear to be somewhat difficult, the process is fun and rewarding. Transferring the whale image from the one-inch grid to the ten-foot grid may be made easier by the following:

- *Use two or three long strings with markers every ten feet. (Knots, short strings tied to the main string, or magic marker spots at the ten foot intervals all work well.)
- *If available use a carpenter's chalkline.
- *Make sure to number the squares on the drawing and have them numbered the same on the schoolground.
- *The schoolground grid does not have to be exactly square, so don't let this part of the process become burdensome.

e. When the grid is transferred to the schoolground, the whale drawing transfer can begin. It is during this transfer that having the grid squares numbered is helpful. Have the teams begin their transfer of the whale drawings. Depending upon how large the schoolground is, the class may be able to do only one whale at a time. If this is the case, make enough copies of the one inch grid drawing of the selected whale so that each team will have their own copy. Each of the teams can then select or be assigned a section of that whale and then transfer that section. Collectively, then, the teams will accomplish the transfer.

f. Have the entire class gather around the image of the whale. Invite the class to join hands and see if they can make a continuous chain that surrounds the whale. Ask them to stand inside the outline of the whale. How many people fit inside the whale drawing? How many classes could

fit inside the whale drawing? How many school buses could park inside the drawing of the whale?

g. Another option is to have a team of students do more detailed research on their whale to learn more about it, and then have the group present their report while the class is sitting inside their whale. Repeat the process for each whale.

h. Summarize the purpose of the activity. This is an attempt to allow the students to gain awareness and appreciation of the variety, including the great size, of some of the earth's unique creatures.

****OPTION:** See if the whole school could stand inside the outline of the largest whale. Take a picture and put it on the bulletin board or enclose the photo to return with the trunk for the education staff at Cape Lookout to post!

4. In the trunk are colored strings that are wrapped around green winders. The winders are numbered 1 - 5. Each is the length of a whale. Students can unroll the string and measure it out and determine from the length what species of whale it is. This can be used with the activity above.

Key:

1. Right	55 feet
2. Finback	70 feet
3. Sperm	55 feet
4. Humpback	50 feet
5. Blue	100 feet

ACTIVITY 2: INSULATION

OBJECTIVE: Students will learn how a whale can survive in cold water.

BACKGROUND: Many whales spend portions of their lives in cold water. Even for those that live in warmer waters, maintaining a warm body temperature requires special adaptations. Whales have a layer of fat under their skin called blubber. In some whales this blubber layer is over 20 inches thick.

MATERIALS:

2 buckets
Crushed ice
1 large can shortening (Crisco)
Thermometer (in trunk)
Plastic gloves (in trunk)
Clock or stopwatch (included in the trunk).

PROCEDURE:

1. Fill both buckets with equal amounts of ice and water so they are 3/4 full. Take the temperature in each bucket to be sure they are both similar.
2. Select 2 students and have each put a plastic glove or bag over their right hands.
3. Have one student put a thick coating of shortening over his gloved hand while the other student keeps his glove hand as is.
4. Let the students immerse their gloved hands in the ice water. Instruct them to remove their hand from the water when they become uncomfortable. Time how long each can keep their hands in the water.
5. Discuss the following questions:
 - Which student kept his hand in the water longest? Why?
 - Why don't fish need a blubber layer?
 - Why do whales have blubber instead of fur to keep them warm?
 - Why do whales migrate between cold Arctic waters and the tropics?
 - Do you think their blubber might keep them too warm in the tropics?
 - How might they overcome this problem?

ACTIVITY 3: THE SOUNDS OF WHALES

OBJECTIVE: Students will learn how whales communicate with each other.

BACKGROUND: Whales use a variety of sound to communicate with each other, and to navigate or find food. This activity will illustrate how whales respond to, trace, and locate various sounds.

MATERIALS:

Whistle (in trunk)
Bandana blindfolds (in trunk)
Objects to make various tapping sounds
Recording of whale sounds (in trunk)
Paper and pencils

PROCEDURE:

1. Use a whistle to produce a variety of sounds. Play pairs of notes; long/short, high/low. Have the students try to repeat the sounds with their voice. Ask the students to identify and describe the difference between the sounds.
2. Blindfold two students. Ask a third student to walk quietly from one part of the room to another, stopping occasionally to tap objects. After each tapping sound, ask each blindfolded student what the source of the sound is. Then ask what object was hit to produce the sound. Are each of the students hearing the same thing? Why or why not?
3. Play the recording of the whale sounds. Ask the students to trace with their hands in the air the rise and fall of the whale sounds. Then give them a blank piece of paper and have them record the whale sounds on the paper with a pencil or crayon.
4. Divide the students into groups and choose a leader for each group. Blindfold the other students in the group. Have the leader demonstrate a sound that he or she can use to attract the other members of the group. Scatter the students and the leaders. Have each group try to locate their leaders through the sound the leaders produce (clapping, horn, whistle, bell etc.)

ACTIVITY 4: WHALE DIETS

OBJECTIVE: Students will use mathematical exercises to learn about the food consumption of whales.

BACKGROUND: How can a whale like the humpback survive on small creatures such as krill? During summer months the krill, or zooplankton, become so numerous that there actually may be miles and miles of krill in the feeding grounds of whales.

MATERIALS:

Calculator
Paper and pencils

PROCEDURE:

Have the students figure out the answers to the following mathematical problems:

To give some idea of how many krill there are during summer, here are some mathematical estimates of the number of krill eaten by blue whales. Assume that 50 blue whales will spend the summer near Cape Lookout. Assume that a blue whale will eat up to four tons of krill in a day.

1. How many tons of krill are eaten in a day by all of the blue whales?
2. How many pounds of krill are eaten in a day (2,000 pounds = 1 ton)
3. The Blue Whales will remain near Cape Lookout from February 1 to April 15. How many tons of krill are eaten in the season by the whales?
4. How many pounds of krill are eaten in a season by all of the whales?
5. There are roughly 100 krill/pound. How many krill are eaten by blue whales in one season?
6. What would happen to the whales if the population of krill were decreased?

ACTIVITY 5: YOU CAN BECOME A WHALE

OBJECTIVE: To turn students into a marine or ocean animals. Students will learn what characteristics make a mammal a mammal, and how whales adapt or adjust to survive in their environment.

BACKGROUND: Mammals are vertebrates with 5 special characteristics that distinguish them from other animals. Mammals: 1) have hair or fur 2) are warm blooded, 3) bear live young 4) produce milk for their young and 5) breath air through their lungs. Mammals are also distinguished by their relatively large brain size and different tooth sizes and shapes.

According to evolutionary theory, the ancestors of marine animals once lived on land. So marine mammals are mammals that have adapted or adjusted to a new, marine environment.

MATERIALS: (all items are found in trunk)

Wet suit
Flippers
Goggles
Snorkel
Picture of flukes (on bed sheet)
Strainer

PROCEDURE:

1. Introduce the background information using questions like: How are we different from birds or fish? Are we covered with feathers or scales? Why do some mammals need a thick coat of fur? Do mammal babies hatch from eggs? What do all newborn mammal babies need from their mothers to survive? Why can't mammals stay under water forever?

2. Now begin to turn a student into a whale. Ask for a volunteer. Get lots of class participation by asking questions such as: Humans do well on land, but what adaptations would we need to survive in a marine environment?

Adaptation

Blubber to keep warm
Fins/Flipper
Flukes
Blowhole
Specialized eyes
Eating/Baleen

Visual Demo

Wet Suit
Flippers on their hands
Bedsheet with tail drawn on it
Snorkel
Goggles
Strainer

3. Ask the following questions that refer to the different adaptations whales use to survive. While asking the questions have a student in front of the room dress up in the wet suit and other gear.

- The student will need to keep warm in the cold waters. What do you need to stay warm? (wet suit)
- We do well walking on land, but what may you need to make your way through the ocean waters? What will you use to steer? (flippers)
- Where will you get power to propel yourself through the water? (picture of fluke)
- The student will need to surface for air. What could we use to make it a little easier to take a breath? (snorkel)
- Have you ever noticed when we open our eyes under water things are distorted? They don't look the same. So we will need some specialized eyes to help find our way.(goggles)
You can now talk about whale sonar.
- How will you eat? You will have to have a specialized mouth and teeth to eat. (strainer)
You can talk about toothed whales vs. baleen whales.

While discussing these things have the student dress by putting on the wet suit, and other gear.

Courtesy: The Marine Mammal Center

ACTIVITY 6: WHALE TEETH

OBJECTIVE: Students will learn how baleen and toothed whales differ. Students will learn how whale teeth and human teeth differ.

BACKGROUND: Some of the largest whales do not have teeth. These whales use baleen to filter tiny plankton from the water. Other whales have teeth. They may eat larger animals like fish, squid, seals, or sea birds.

MATERIALS: (in trunk)

Piece of baleen
Whale tooth
Human jaw replica with teeth
Dolphin skull
Sea Turtle Skull
Shark Tooth

PROCEDURE:

1. Introduce the background information by showing baleen to students and asking them what part of the whale they think it is. Explain that it is the "food catcher" for the baleen whale.
2. Pass around the whale tooth and ask the students what a whale could eat with teeth like that. Explain that toothed whales like orcas eat squid, seals, and other animals. You can also show the students the dolphin skull, so they can see the tooth sockets.
3. Pass around the replica of the human jaw and teeth. You may want to discuss how humans use their teeth for tearing and chewing.
4. Pass around the shark tooth and the sea turtle jaw. Ask the students to compare these to the whale tooth.
5. Discuss the following things with the students:
 - Baleen is made of material much like our fingernails. It is found in the whale's mouth in a series of plates rooted in the roof of the mouth.
 - The outer edge of the baleen is smooth; the inner edge is fringed, and consists of a series of bristles or hairs, which differ, in appearance and number, depending on the specie of the whale. The type of baleen can be used to identify the whale.
 - Baleen plates are arranged like teeth in a comb: one row on each side of the mouth. Inside the mouth the bristles intertwine to form a sieve or mat.
 - Baleen whales feed in 3 ways:

- a.) by gulping
- b.) by swimming with their mouths open
- c.) by using suction by pressing their tongue against the plate to draw water and food into the mouth.

Toothed whales:

- Teeth may have curious shapes like tusks. (narwhal)
- Whale teeth wear down like human teeth and may be gone in older whales.
- If a whale eats a squid diet it may have a few teeth.
- If a whale eats more of a fish diet the whale has a long snout and lots of teeth.

6. Have the students complete the worksheet on the following page.

ACTIVITY 6: STUDENT WORKSHEET:

1. Name the largest toothed whales. _____

2. Name the largest baleen whale. _____

3. What do baleen whales feed on? _____

4. What do toothed whales feed on? _____

5. Compare the whale tooth with the human teeth.

List 3 differences between the whale tooth and human teeth:

a. _____

b. _____

c. _____

6. Compare the whale tooth with the shark's teeth.

List 3 differences between the whale tooth and shark tooth:

a. _____

b. _____

c. _____

7. Compare the whale's tooth to the loggerhead turtle jaw.

List three differences between the whale tooth and turtle jaw:

a. _____

b. _____

c. _____

ACTIVITY 7: INTERVIEW WITH A WHALE

OBJECTIVE: To introduce students to the different types of whales, and orient them to research procedures.

BACKGROUND: There are many different species of whales, each having unique characteristics.

MATERIALS:

Notebook
Pen or pencil

PROCEDURE:

1. Divide the students into pairs and a) assign them a whale, b) let them select a whale, or c) let them draw a whale out of the hat.
2. Have the students conduct research about the whale. They will need to draw up a set of questions that they would like to learn about the whale. Then they can begin their research.
3. When the research is completed, they will role-play a reporter and the whale being interviewed. One student be the reporter and ask the questions, while the other will be the whale and answer the questions. This can be done in small groups or in front of the class.

ACTIVITY 8: BECOME A BALEEN WHALE

OBJECTIVE: Students will learn how different species of whales use baleen to catch their food.

BACKGROUND: The largest whales in the world feed exclusively on some of the smallest creatures in the ocean. Baleen, growing down in parallel plates from the top of a whale's mouth, allows it to feed on schooling fish, krill and zooplankton. Overlapping fibers of the baleen are specially designed to allow water to pass back through while trapping food inside the whale's mouth.

MATERIALS:

Plastic tubs (in trunk)
Styrofoam pieces (in trunk)
Comb (in trunk)
Plastic sandwich bags
Paper towels
Straws

PROCEDURE: Have students in the class demonstrate how different baleen whales eat by doing the following activities:

SKIMMERS: The right whale is an example of a baleen whale that feeds by skimming the surface of the water with its mouth open.

To simulate a right whale feeding, fill one plastic tub full of water. Crumble up the styrofoam pieces and place them in the tub, which will represent the ocean. The styrofoam pieces represent food items (small fish, krill, or zooplankton). The comb can represent the skimmer. Move the comb slowly in the water and through the krill as if the skimmer were skimming. Remove the krill from the baleen and dry it on a paper towel.

- How much krill did the skimmer collect?
- Does this seem to be an efficient way to collect food?

GULPERS: The blue whale, fin whale, and sei whale are all examples of "gulpers". Each has a pleated throat pouch that can expand to bring in huge mouthfuls of water.

To simulate a gulper place more krill in the water. Take out a plastic sandwich bag to represent the throat of a gulper. Move the bag through the water filling it with water and krill. Next place the comb in front of the open end of a sandwich bag. The comb represents baleen. Position the baleen so that it traps the krill inside the throat. Squeeze the water out of the bag as if the gulper were closing its pleated throat. Remove the krill from your baleen and record the amount collected using this method.

- How did it compare to the amount collected by the skimmer?

BUBBLERS: Humpback whales have a very unique way of catching food. Known as bubble netting, humpbacks will swim in circles, exhaling and blowing bubbles. These bubbles concentrate fish in the center of the net they have created. This method of corralling fish gives the whale more food per mouthful.

Add more krill to your water and give a straw to each student. Have the students simulate bubble netting by blowing bubbles into the water with their straws. Try to work as a group to move the food to the center of the tub. Bring your baleen up from the bottom of the tub through the center of the concentrated food.

- How much krill was collected by using the bubble net method?
- Which method worked best?

ACTIVITY 9: WHALE THREATS

OBJECTIVE: Students will learn about the threats to the survival of whales, and what possible solutions may exist.

BACKGROUND: Whales were hunted by humans to the point that many species were near extinction, and many remain severely depleted today. There are still many threats to the survival of whales.

MATERIALS:

Copies of the whale threats worksheet (following this page)

Pencils

PROCEDURE:

1. Divide the class up into groups of 4 or 5 students per group. Give each group a copy of the whale threats worksheet.
2. Have the students read each of the threats listed on the worksheet. They should first decide if these are natural or human caused threats. They can then brainstorm to see if they can come up with some possible solutions to these threats.
3. There are 3 empty rows at the bottom of the worksheet. See if the students can come up with any other threats to the survival of whales.
4. Have each group report to the class on its results. Have the rest of the class comment on the solutions presented by each group:
 - Are the solutions realistic? Why or why not?
 - Will they affect other species of animals?

WHALE THREATS WORKSHEET

Threats	Natural threats	Human-caused threats	Possible solutions
Over-hunting			
Pollution			
Loss of prey species			
Collisions with ships			
Entanglement in fishing gear			
Habitat degradation			

ACTIVITY 10: ENDANGERED SPECIES

OBJECTIVE: Students will understand the meanings of the terms: threatened, endangered, and extinct. They will be able to list factors involved with extinction. They will be able to determine solutions for the recovery of endangered species.

BACKGROUND: Species of plants and animals are disappearing all over the world. Some may become extinct before we have a chance to know them.

MATERIALS:

Paper and pencils

PROCEDURE:

1. Discuss with the students the meaning of the terms: threatened, endangered, and extinct:
 - **Threatened:** a species whose numbers are low or declining. Although they are not in immediate danger of extinction, they are likely to become endangered if not protected.
 - **Endangered:** a species in danger of becoming extinct because there are so few of them left.
 - **Extinct:** when there are no individuals of a plant or animal species left on earth.
2. Read the following statistics to the class:
 - Most extinctions are caused by humans.
 - Since Columbus, over 500 species of plants and animals have become extinct in the U.S.
 - Over 4,000 species are listed as candidates for the Endangered Species list.
 - Listing a species as endangered takes about 1 year from start to finish.
3. Have the students get into groups of three or four. Let each group choose from the list of endangered species following this page an animal that they would like to support.
4. Each group will choose a spokesperson and a note taker. The spokesperson will give information to the rest of the class at the end of the activity; the note taker will write down the information for the group.
5. Each group will try to determine the following:
 - Three reasons for your specie becoming endangered
 - Three ways humans can help the specie regain a healthy population

Although the students probably will not know a lot of specific information about these species, they can theorize about the reasons for their becoming endangered.

6. Have each group's spokesperson stand and tell the class what they determined.

LIST OF ENDANGERED SPECIES:

(T) = Threatened

(E) = Endangered

California Condor (E)

Whale Shark (E)

Basking Shark (T)

Green Sea Turtle (T)

Whooping Cranes (E)

Desert Tortoise (T)

Sperm Whale (E)

Black-footed ferret (E)

Kemp's Ridley Sea Turtle (E)

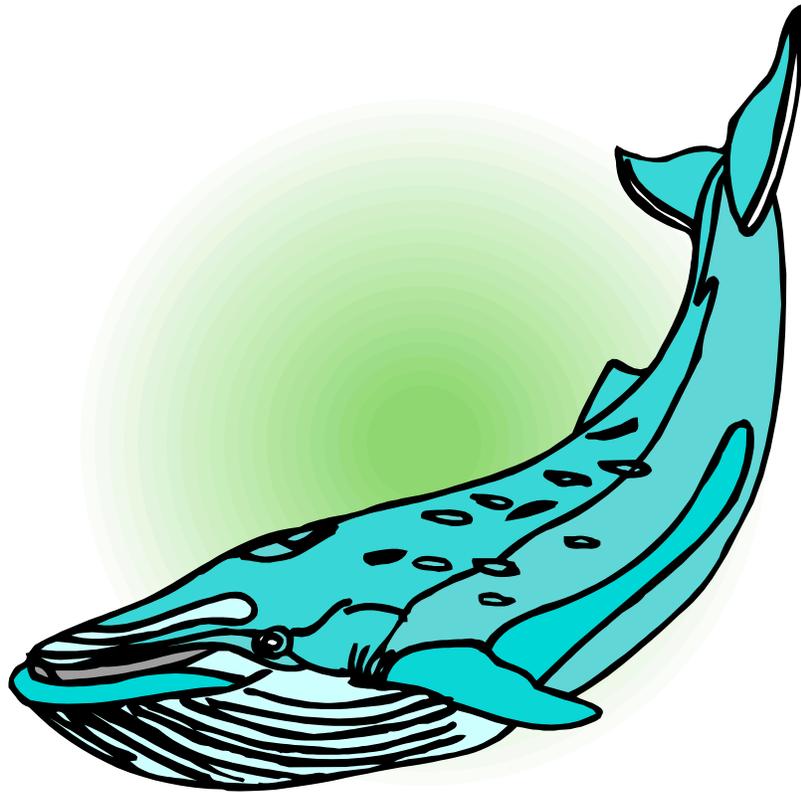
Humpback Whale (E)

Loggerhead Sea Turtle (T)

Hawksbill Sea Turtle (E)

Mountain Gorilla (E)

STUDENT ACTIVITY PAGES



These activity pages can be given to the students to work on in class or at home.

FILL IN THE BLANKS

Use the words at the bottom of the page to fill in the blanks.

1. Whales use _____ to keep warm in cold water.
2. A _____ is a group of whales.
3. The two types of whales are _____ and _____.
4. Some whales use _____ to locate food and to navigate.
5. Whales are _____ that live in the water.
6. When a whale jumps out of the water it is called _____.
7. A _____ whale is the largest toothed whale.
8. The largest animal in the world is the _____ whale.
9. The _____ are the order of mammals that whales belong to.
10. Whales use their _____ to propel themselves through the water.
11. Toothed whales have one _____ while baleen whales have two.

Baleen
Blowhole
Blubber
Blue

Breaching
Cetaceans
Echolocation
Flukes

Mammals
Pod
Sperm
Toothed



FILL IN THE BLANKS ANSWER SHEET

Use the words at the bottom of the page to fill in the blanks.

12. Whales use **blubber** to keep warm in cold water.
13. A **pod** is a group of whales.
14. The two types of whales are **toothed** and **baleen**.
15. Some whales use **echolocation** to locate food and to navigate.
16. Whales are **mammals** that live in the water.
17. When a whale jumps out of the water it is called **breaching**.
18. A **sperm** whale is the largest toothed whale.
19. The largest animal in the world is the **blue** whale.
20. The **cetaceans** are the order of mammals that whales belong to.
21. Whales use their **flukes** to propel themselves through the water.
11. Toothed whales have one **blowhole** while baleen whales have two.

WHALE QUIZ

1. Whales belong to a marine mammal group called the _____
2. There are two types of whales: _____

3. A family of whales is called _____
4. _____ is a sonar system used by whales for finding their prey and for navigation.
5. Baleen whales have two _____ and toothed whales have one.
6. Name 3 Baleen whales _____,
_____, _____.
7. Name 3 toothed whales _____,
_____, _____.
8. Name the largest whale _____.
9. Name the largest whale with baleen plates _____
10. Name the whale with the longest teeth _____
11. Another name for the whale's tail is _____
12. When a whale "jumps" out of the water it is called _____
13. What keeps a whale warm in the cold water _____

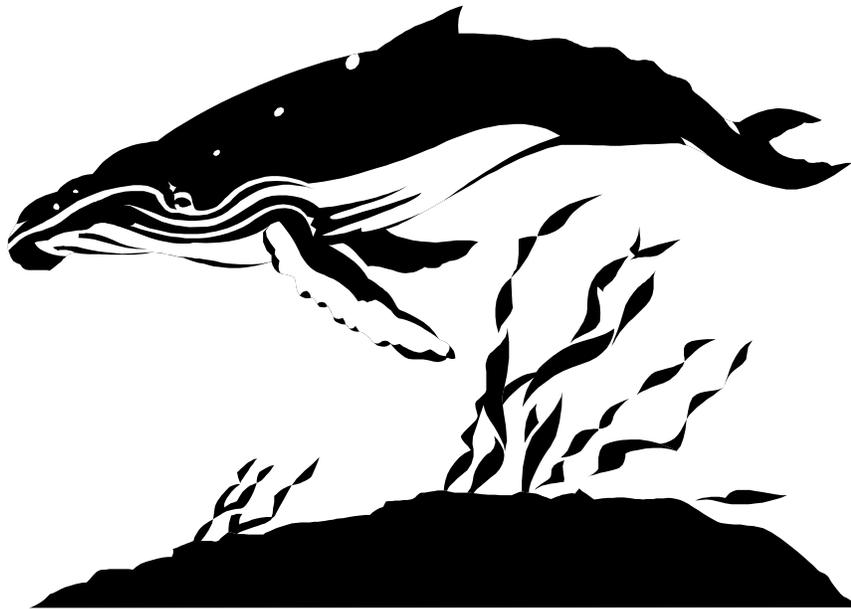
WHALE QUIZ (Answer key)

1. Cetaceans
2. baleen, teathed
3. pod
4. Echolocation or sonar
5. blowholes
6. any 3 such as Blue, Humpback, Fin etc.
7. any 3 such as Sperm, Orca, Pilot etc.
8. Blue
9. Bowhead or Gray
10. Narwhal
11. fluke
12. breaching
13. blubber

WHAT AM I?

See if you can identify the whales in each of the following paragraphs:

1. I am a baleen whale. I can grow to be 40 feet long and weigh 45 tons. I sometimes use a "bubble net" to catch schooling fish. I am a _____.
2. I am a toothed whale. I can grow to be 35 to 50 feet long. I can dive extremely deep and stay under water for over an hour. I like to eat squid. I am a _____.
3. I am a baleen whale. I am the largest animal on earth. I can grow to be 100 feet long. I am a _____.
4. I am a baleen whale. I can grow to be 60 feet long and weigh 55 tons. I am a rather slow swimmer. I am a _____.
5. I am a toothed whale. I am fast, powerful, and intelligent. I like to eat seals, sea birds, and dolphins. I am an _____.



WHAT AM I? – ANSWER PAGE

1. humpback whale
2. sperm whale
3. blue whale
4. right whale
5. orca

WHALE WORD SEARCH

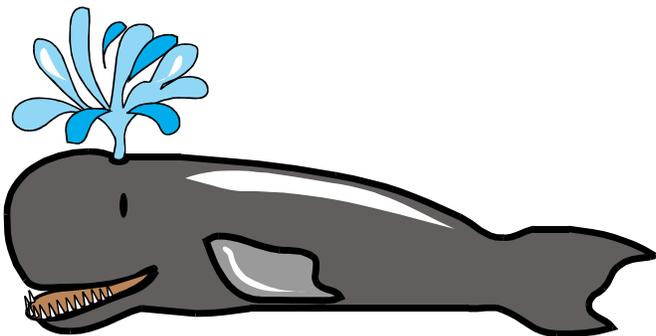
All of the words listed below have to do with whales. See if you can find and circle all of these words. They can be found positioned forward, backwards, up, down, or diagonally.

baleen
blowhole
blubber
breaching
cetacean

echolocation
flipper
fluke
humpback
krill

orca
plankton
pod
spyhopping
whale

F A N S R A V L L I R K L E T
O K D S B R E A C H I N G H W
A V S E B L K R I L W E I U H
C E S P Y H O P P I N G K M A
B H I O S U B W R D S A M P E
E L A H W M L Y H I R E I B L
F L I P X P U T P O D R T A E
L L D F B B B U C R L E B C T
U D I J A A B K N C U E O K Y
K C A P I C E J M A K Z R C U
E T A K P K R C E T A C E A N
E C A L E E A I I P N B V A N
V N I O T R R N N E E L A B Z
A S N O I T A C O L O H C E W
D Z C V P L A N K T O N M O P



GLOSSARY:

Amphipods	a group of crustaceans that includes beach hoppers and sand fleas
Baleen	sheets of fringed material (keratin) used for feeding; some species of whales use this instead of teeth
Baleen whales	whales that sift organisms from the water using their baleen plates
Blowhole	a nostril on the top of the head of the whale
Blubber	a thick fatty layer of tissue used for keeping warm; found in most marine mammals
Breaching	a word used to describe how whales leap out of the water
Calf	a baby whale still being fed milk by its mother
Callosities	a series of horny growths; found on right whales
Cetaceans	the order of mammals that whales belong to
Continental shelf	the seafloor adjacent to a continent; extend from shore to a point of rapid increase in slope
Copepods	small crustaceans; important members of the zooplankton
Countershading	a form of camouflage where the top of the whale is darker than the bottom
Cow	an adult female whale
Dorsal Fin	the fin on a whale's back
Echolocation	the emission of sound waves under water by marine animals. The

returning sound wave helps the animal identify the size and location of an object

Fluke	a whale's tail
Fusiform	stream lined; tapering towards each end
Gulpers	whales that feed by filling their mouths with large amounts of water and forcing it through their baleen
Krill	shrimp-like animals that live in the ocean waters
Lungs	used by whales to breathe
Mammal	a warm-blooded animal with a backbone that gives birth to live young and produces milk to feed its newborn
Melon	the bulging forehead found in toothed whales, often contains oil
Plankton	small aquatic organisms that float at the mercy of the current or have limited swimming abilities
Pod	a small group of social Cetaceans
Skimmers	whales that feed by sifting plankton directly out of the water
Spermaceti	waxy substance found in the head of a sperm whale
Spyhopping	when a whale sticks its head out of the water
Stranding	when whales beach themselves by swimming ashore

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Wexo, John Bennett; *Whales: Zoobook*; Wildlife Education Ltd; 1983

CURRICULUM INDEX

This index shows which of the goals of the 1999 North Carolina Standard Course of Study can be met by each of the activities in this traveling trunk.

ACTIVITY 1: HOW BIG IS A WHALE?

- Mathematics Grade 3: #2: Spatial Sense, Measurement, and Geometry
 - 2.6 Estimate and measure length, weight, and capacity using appropriate tools and units.
 - 2.7 Model and compare units within the same measurement system.
 - 2.13 Solve problems using measurement concepts and procedures. Explain the solutions.
- Mathematics Grade 4: #4: Data, Probability, and Statistics
 - 4.2 Display data on charts and graphs: picture, bar, and line plots.
 - 4.4 Read and interpret graphs and charts as sources of information; identify main idea, draw conclusions and make predictions.

ACTIVITY 2: INSULATION

- Mathematics Grade 3: #2: Spatial Sense, Measurement, and Geometry
 - 2.12 Read Celsius and Fahrenheit thermometers; relate temperatures to everyday situations.
- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.1 Relate structural characteristics and behavior of a variety of animals to the environment in which they are typically found.
 - 1.2 Determine animal behaviors and body structures that have specific growth and survival functions in a particular habitat.
 - 1.3 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).
- Science Grade 6: #4: Characteristics of energy transfer
 - 4.2 Analyze heat flow through materials or across space from warm objects to cooler objects until both objects are at equilibrium.
 - 4.4 Evaluate data for qualitative and quantitative relationships associated with energy transfer and/or transformation.

ACTIVITY 3: THE SOUNDS OF WHALES

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.1 Relate structural characteristics and behavior of a variety of animals to the environment in which they are typically found.
 - 1.2 Determine animal behaviors and body structures that have specific growth and survival functions in a particular habitat.

ACTIVITY 4: WHALE DIETS

- Mathematics Grade 5: #1: Number Sense, Numeration, and Numerical Operations
 - 1.1 Use place value through millions in real-world situations including reading, writing,

- estimating, and comparing numbers in a variety of forms.
- 1.2 Estimate products; multiply any whole number by a 2- or 3-digit factor.
- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.3 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).
 - Science Grade 5: #1: Understanding of the interdependence of plants and animals
 - 1.1 Assess a variety of ecosystems.
 - 1.2 Determine the function of organisms within the population of the ecosystem.
 - 1.3 Evaluate the variety of organisms an ecosystem can support.
 - 1.6 Assess the interaction of organisms within an ecosystem.
 - Science Grade 6: #2: Characteristics of matter and energy flow through an ecosystem
 - 2.2 Differentiate between the interconnected terrestrial and aquatic food webs.
 - 2.3 Describe the ways in which organisms interact with each other and with non-living parts of the environment (limiting factors, coexistence, cooperation, competition, symbiosis).
 - 2.4 Evaluate the consequences of disrupting food webs.

ACTIVITY 5: YOU CAN BECOME A WHALE

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.1 Relate structural characteristics and behavior of a variety of animals to the environment in which they are typically found.
 - 1.2 Determine animal behaviors and body structures that have specific growth and survival functions in a particular habitat.
 - 1.3 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).

ACTIVITY 6: WHALE TEETH

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.1 Relate structural characteristics and behavior of a variety of animals to the environment in which they are typically found.
 - 1.2 Determine animal behaviors and body structures that have specific growth and survival functions in a particular habitat.

ACTIVITY 7: INTERVIEW WITH A WHALE

- English Language Arts Grade 3: #3: Reading Comprehension
 - 3.1 Reads literary, informational, and practical text.
 - 3.10 Summarizes and records information. Notes and charts detail.

ACTIVITY 8: BECOME A BALEEN WHALE

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
 - 1.1 Relate structural characteristics and behavior of a variety of animals to the environment in which they are typically found.
 - 1.2 Determine animal behaviors and body structures that have specific growth and

survival functions in a particular habitat.

1.3 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).

ACTIVITY 9: WHALE THREATS

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
1.4 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).
- Science Grade 6: #2: Characteristics of matter and energy flow through an ecosystem
2.3 Describe the ways in which organisms interact with each other and with non-living parts of the environment (limiting factors, coexistence, cooperation, competition, symbiosis).
- Social Studies Grade 4: Geography
5.3 Analyze causes and consequences of the misuse of the physical environment and propose alternatives.

ACTIVITY 10: ENDANGERED SPECIES

- Science Grade 4: #1: Understanding of Animal Growth and Adaptation
1.2 Evaluate living and non-living things that affect animal life (other animals, plants, climate, water, air, location).
- Social Studies Grade 4: #5: Geography
5.3 Analyze causes and consequences of the misuse of the physical environment and propose alternatives.

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