

Learning About Whales

Learning about Whales | Grades 2 & 3

Exhibits and participatory investigations assist students in comparing and contrasting whales to humans.

Learning standards will be met, as students:

- Determine the ways in which a mammal's habitat provides for its basic needs
- Discuss the role of the whaling industry in bringing together people from various countries
- Use cardinal directions to map the migration of the North Atlantic Right Whale as it travels along the eastern coast of the United States
- Make observations about the sensory perceptions of a whale
- Discuss various ways they can help protect whales today

Jacobs Gallery (under skeletons)

- What kinds of whales are hanging from the ceiling above you? (see attached sheet for information on the skeletons)
 - How old are they?
 - How long are they?
 - How did they die?
 - Why does the Museum have them now?
 - What is dripping from KOBO?
 - How big do whales actually get?
- How long do whales live?
 - It is believed that most whales can live up to 70 years or more (same as humans)
 - Bowhead whales can live up to 200 years or more. Several bowhead whales have been found recently with harpoon tips dating back to the late 1800s.
 - Oldest human ever? 122 years old, passed away in 1997. Oldest alive? 115 year old woman in Japan (Misao Okawa).
- Show students the image of blue whale skeleton inside body with the blue whale & humpback whale figurines.
- Pass around the cast of one of KOBO's finger bones. Compare it to the first bone in the students' ring fingers.
 - You can also compare it to the hand on the human arm model
 - Show students the rib and vertebra casts, also from KOBO.
 - Compare with vertebra model from human skeleton
- What are the two types of whales? (baleen and toothed, or mysticetes and odontocetes)
Show students the right whale baleen, pass around the sperm whale tooth
- What is baleen? What is its purpose? How do whales feed? Discuss the different ways of filtering
- Use the book and laminated image to explain how baleen works
 - Rorqual ("ror – kwal") whales (such as blue and humpback) have throat grooves that allow the throat and mouth to expand during feeding (rorqual comes from Norwegian word meaning "furrow whale")
 - Right whales feed by allowing the water to enter through the front of the mouth and as the water exits the sides the copepods are trapped in the baleen

- What is bubble net feeding? What whales use this method to feed? (humpbacks)
- Pass around a jar of krill. Blue whales eat up to 40 million of these (up to 4 tons) each day!
- But what about babies? What do they eat?
 - Blue whale babies drink about 100 gallons per day (perhaps as many as 130)
 - If a human baby drinks about 3 cups per day, how many days would it take a human baby to drink as much as a blue whale calf does in one day?
 - There are 16 cups in a gallon, so...
 - It takes 5 days for a human baby to drink a gallon of milk
 - $100 \text{ gallons} * 5 \text{ days} / \text{gallon} = 500 \text{ days}$
- If a human baby started drinking the milk today, he or she wouldn't finish until spring 2016!
- Rope activity to demonstrate length of blue whale infant (25 feet) and human infant (20 inches)
 - The blue whale grows 1½ inches per day and gains 200 pounds per day as an infant. How tall would the students be next Wednesday if they grew like a blue whale? (12 inches taller – use ruler with a student). A newborn blue whale weighs approximately 3 tons (6,000 pounds); a newborn baby human weighs approximately 7-10 pounds

Jacobs Balcony (Limpet)

Ask students if they can identify the five senses: sight, sound, smell, touch and taste. Talk about where the whale's eyes are located. Discuss how whales see.

- Use Limpet to illustrate the size and location of a whale's eye and ear. Ask a student to find Limpet's eye. Use the teacup to show students that the eye is roughly the size of a teacup. Explain that whales only see peripherally (mirrors). What factors make it difficult for whales to see under water?
- Ask one student to find the opening of Limpet's ear. Use a pencil to illustrate that the ear opening is approximately the size of a pencil eraser. Do the students think whales have good hearing? Explain how/what whales hear under water. Does sound carry better in water or air? (water!)
 - A blue whale generates the loudest animal sound on earth (louder than a jet engine)
 - It can communicate with other blue whales hundreds of miles away
- What makes a whale a mammal? (some are listed below)
 - Babies drink mother's milk (mammary glands)
 - Regulate body temperature. Reptiles and fish, on the other hand, rely on temperature around them to regulate body temperature.
 - Three middle ear bones – reptiles and fish do not have these
 - Most mammals also have a belly button
- Why is there a net on Limpet?
 - At least 70% of all North Atlantic Right Whales have scars from fishing equipment
 - Separate approximately 70% of students from the group to provide a concrete depiction of what that would be (5 out of 7 = 71%, 6 out of 8 =

75%, 7 out of 9 = 78%, 7 out of 10 = 70%; **this math is for you, not the students)**

- Discuss the whale density illustration for Boston Harbor. What does this show us? What changed as a result of this research?
- Fargo, the scat-sniffing dog – conservation efforts – how do we track whales now? (image is in protected sheet in Limpet chest)

Either before reaching Limpet or before entering the Sperm Whale Gallery, be sure to bring the students to the display by the elevator with the teeth, brain, eye, etc. Use the images on the wall to help explain the difference between toothed whales and baleen whales.

Sperm Whale Skeleton (adaptations, more comparative anatomy, oils, echolocation)

- Go to where the students can see the lower jaw. How is this whale's jaw different from the jaw of the right, blue or humpback whale? (Teeth, narrow bottom jaw)
 - If you are starting at this stop, point out KOBO's jaw as you come up stairs/elevator
- Walk the students around the Sperm Whale Skeleton asking them to look carefully at the bones. Ask the students to identify the bones they see in the whale skeleton that are like a human's bones (ribs, bones of the flippers, vertebrae, jaw, etc.).
- Have students feel their own bones as you discuss the bones of the sperm whale. Use the human skeleton as much as you can.
- How deep do sperm whales dive (nearly 2 miles)? How long can they hold their breath (approximately 90 minutes)? What about humans? (Average is about a minute. Have the students try it if you have time)
- How does echolocation work? Why do sperm whales need to rely on echolocation instead of sight?
 - You can use the analogy of bouncing a ball off a wall from different distances, or you can have the students do the 'wave' with different numbers of students (left to right for sound waves, left to right then back to left for echolocation)
- What are some adaptations for deep diving?
 - Flexible ribcage allows lungs to collapse to avoid buildup of nitrogen
 - Thick layer of blubber to protect against cold temperatures
 - If you were to stick your hand in snow, it would get cold really fast. But what if you have a thick glove or mitten on?
 - Echolocation for navigating in dark ocean
 - Ability to store oxygen in muscles and blood (instead of lungs)
 - Spermaceti may play role in buoyancy
 - If you put a tube of spermaceti in cold water, it sinks. If you put it in warm water, it floats.
- Show students the sperm whale teeth, giant squid beak and other artifacts in the case in the display case. Giant squid may reach 35-60 feet in length and have hundreds of suckers with teeth that can scar the whale.
- Blue Chest – oils and ambergris

Lagoda

- Take the students aboard the *Lagoda*

- Describe the different parts of the ship as you take them on a quick tour around the model
- Gather the group back together near the carpenter's bench for a discussion about any or all of the following as time allows: What are the different parts of the ship? How did this ship move through the water (what “powered” it)? Who lived aboard this ship and what types of work did they do?
- Focus on the lives of whalers, perils at sea, where they would travel, how the ship operated, where the whalers came from before living in New Bedford, etc.(try not to spend too much time on actual process of whaling)

Braitmayer Gallery (Mapping)

Mapping activity

Ask the kids which organisms migrate.

Harboring Hope (Paddles)

- Pass out paddles (carefully).
- Tell the students that we will compare and contrast whales (mammals) and fish. Ask them to raise the whale paddle whenever the characteristic describes a whale, and the fish paddle whenever it describes a fish.
 - This animal moves its tail vertically, or up and down, to move through the water (whale)
 - This animal moves its tail horizontally, or side to side, to move through the water (fish)
 - This animal breathes through gills (fish)
 - This animal breathes through blowholes (whale)
 - This animal has lungs (whale)
 - This animal has scales (fish)
 - This animal has a belly button (whale)
 - This animal lives on land (neither)
 - This animal takes care of its young for a long period of time (whale)
 - This animal lays eggs (fish)
 - This animal can communicate by sound over long distances (whale)
 - This animal lives in the ocean (both)
 - This animal used to live on land (whale)

Can the students think of any other traits of whales and/or fish?

Whale Skeletons

Humpback Whale (*Megaptera novaeangliae*)

Name: Quasimodo

Sex: Male

Died: 1932 (natural causes), washed ashore on Nomans Land (island near Martha's Vineyard)

Hanging: 1936

Estimated Age: 3 years old (not 10-13 as we originally thought)

Length: 37 feet

Adult length: males are 40-48 feet, females are slightly larger (42-50 feet)

Baleen whale, feeds mainly on small fish such as sand lance, capelin, and herring

Note: Quasimodo first hung in Lagoda room, moved to link in 1984 for about 12 years, moved to JFG in 2000

Current population estimated at 30,000-40,000

Blue Whale (*Balaenoptera musculus*)

Name: KOBO (King of Blue Ocean)

Sex: Male

Died: 1998, struck in North Atlantic by a vessel, pushed south to coast of RI, USCG tug towed him ashore in March of 1998

Hanging: 2000

Estimated Age: 4-6 years old

Length: 66 feet

Adult length: 75-80 feet in Northern Hemisphere, 90-100 feet in Southern Hemisphere

Females are slightly larger than males (longest on record was a female from S. Hemisphere, just shy of 110 ft)

Baleen whale, feeds mainly on krill (up to 4 tons, or 40 million krill, per day)

Note: Heart is as big as a VW Beetle and weighs 1,300 pounds, 2 full grown elephants can fit into an adult blue whale's mouth, throat is no bigger than a basketball

Current population estimated at 3,000-4,000 in Northern Hemisphere, 6,000-12,000 in S. Hemisphere

North Atlantic Right Whale (*Eubalaena glacialis*)

Name: Reyna

Sex: Female (fetus is also female)

Died: 2004, struck by vessel along Virginia Coast, washed ashore in NC Outer Banks

Hanging: November 2008

Age: 15 years old

Length: 49 feet

Adult length: 45-55 feet, females are slightly larger than males

Fetus: 10 months into 12 month pregnancy (also a female)

Baleen whale, feeds mainly on copepods

Note: NARW are considered the most endangered of the great whales. Population estimated at 509 in 2012

Sperm Whale (*Physeter macrocephalus*)

Name: Does not have a name at this time

Sex: Male

Died: 2002, washed ashore on Nantucket Island, cause of death unknown

On display: Spring 2005

Estimated Age: 30

Length: 48 feet

Adult Length: Males up to 62 feet, females up to 36 feet

Toothed whale, feeds mainly on squid, octopus and fish

Teeth: lower jaw, average of up to 46; teeth in upper jaw rarely erupt

Current population estimated at 360,000