



## Marine Mammals in Our Backyard

### **Background:**

(excerpted/adapted from [http://cet.uscd.edu/voicesinthesea\\_org/education.html lesson 2](http://cet.uscd.edu/voicesinthesea_org/education.html lesson 2))

All mammals, including marine mammals, have five key traits in common. These are:

- Breathe air
- Give birth to live young
- Nurse their young
- Warm-blooded
- Have hair (baby whales and dolphins actually have small hairs on their rostrums (nose) when born and it eventually sheds away leaving behind small follicles)

These mammalian traits are a large contrast to fish. Bony fish, like rockfish, and cartilaginous fish, like sharks and rays, obtain oxygen directly from the water through their gills. Fish are cold blooded and have protective layers of scales.

The marine mammals in our backyard fall into two categories: cetaceans (whales, porpoises, and dolphins) and pinnipeds (seals, sea lions, and walrus). There are more than 70 species of cetaceans and more than 30 species of pinnipeds worldwide, but in general, you might find the following species off of Cape Cod:

- North Atlantic right whale – most commonly seen in February, March, and early April
- Humpback whale – most abundant in spring, summer and fall
- Fin whale – seen year round with peaks between spring and fall
- Minke whale – tends to be seen in spring, summer, and fall
- Blue whale – rarely sighted here because it likes deeper water
- Sei whale – rarely sighted here because it likes deeper water
- Atlantic white-sided dolphin – common in spring
- Atlantic pilot whale –these dolphins are usually found close to shore and are abundant
- Harbor porpoise – most common from December - June
- Gray seal – mostly seen in winter and spring
- Harbor seal – most commonly seen between late September and early spring

Some species, like the humpback whale, tend to be seen in our waters spring through fall while feeding and then go south to have their young. Other species, like the blue whale, are seen here rarely because they generally prefer deeper water. Although the seal species are around all year, they may be easier to spot in the winter as many move north prior to pupping in mid-May.

Cetaceans are broken up into two suborders based on whether they have teeth or not:



- 1) **Odontocetes** (toothed whales) are whales, dolphins and porpoises with teeth. Odontocetes use their teeth to grasp prey and swallow fish or squid whole. Some toothed whales, like killer whales, dismember their prey by shaking it violently. Most toothed whales, with a few exceptions like the sperm whale and killer whales, are relatively small compared to baleen whales.
- 2) **Mysticetes** (baleen whales), like the right whale, don't have teeth at all. They have unique structures in their mouths called baleen. Baleen is made of a protein called keratin, which is the same substance that makes up our hair and fingernails. Mysticetes have hundreds of long, flat plates of baleen suspended from the top of their mouths. These plates are stacked next to each other, where teeth would have been, with a small space between each plate. The inside edge of each baleen plate is hairy or fringed, like a broom, and these baleen hairs crisscross to form a net. This makes them experts at filter feeding. All the local species of whales mentioned above are baleen whales.

There are three methods that different types of baleen whales employ for catching their food:

- *Skim feeding*: Right and bowhead whales swim along the surface and trap slow-moving plankton (tiny, free-floating organisms) against the hairy linings of their baleen while water flows out of the sides.
- *Bottom or Pit Feeding*: Gray whales move along the muddy bottom on one side of their body, scooping up mud. They also will position themselves vertical in the water with their head burrowing into the mud. These techniques allow them to strain their crustacean prey out with their baleen. Gray whales are the only baleen whale that feeds using this method.
- *Lunge Feeding*: Humpback whales (baleen whales with throat pleats like the blue, fin, sei, Bryde's, minke, and rorqual whales), lunge forward quickly, taking hundreds of gallons of water into their mouths along with a school of small fish. The pleats expand making room for the large volume of water. The whales close their mouths partway and force the water out through the baleen. The baleen hairs trap small fish and plankton inside.

The second activity is about North Atlantic right whales. These baleen whales are skimmers that eat zooplankton and live to be about 50 years old. They were named the right whale by whalers because their thick layer of blubber makes them float on the surface of the water when dead, making them the "right" whale to hunt. They are the rarest of the large whale species and one of the rarest of marine mammal species. With less than 500 animals in the population, they are highly endangered. Most of the animals in the North Atlantic population winter and calve in coastal waters off the southeastern United States. They then migrate north to New England waters, the Bay of Fundy, and Scotian Shelf for summer feeding and nursery.



An endangered classification means “any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.”

There are only about 450 North Atlantic right whales left. Many scientists who study whales use photo identification as many whale species have distinctive markings. Specifically, right whales have distinctive callosities (rough patches of skin) on their head regions. No two right whales have the same callosity pattern, just like no two humans have the same fingerprint. Scientists will take pictures of the individual right whales they see and then compare those photographs with a catalog of known whales. This will allow them to figure out where and when that whale has been seen in the past. Doing annual surveys of the whales allows scientists to monitor population size, ocean habitat usage, individual whale health, and reproduction information. All this information can then be used to identify problems with the population and assess how best to conserve this highly endangered population of whales. This information is also used to think about the entire ecosystem and understand how everything is interrelated. More information on the North Atlantic right whale can be found at: [http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale\\_northatlantic.htm](http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm)

## **Lesson:**

Introduce yourself as a representative of NOAA and PSB. Show students (**slide 1**) where we are located in Woods Hole.

### **Introduction (5 minutes):**

Questions to ask while showing the slideshow intro (\*\*Always ask the questions, generate answers on the board, and THEN show the slide with information\*\*):

- (a) What is a mammal? Show **slide 2** to give them ideas. After you have called on 2-3 students show **slide 3** and go over the 5 characteristics of mammals.
- \*\*For younger children you can use props and call students up to represent each characteristic. Have one student hold a snorkel to represent lungs (even marine mammals need to go to the surface to breath as they have lungs designed to get oxygen out of air and not water), one student holds a stuffed seal with pup (demonstrates live young), one holds an empty carton of milk (demonstrates mammary glands), one holds something with hair or fur like a jacket ruff (demonstrates all mammals have fur or hair), and the last students holds a thermometer (demonstrates warm blooded).



NOTE: There are multiple activities listed here; identifying mammals and marine mammals, how big is it, and right whale id. NOAA scientists may not have enough time to get to all of them because we have artifacts to show as well. We recommend doing the right whale id and then choosing one of the other activities. The ropes are good for younger students as they are active. Classroom teachers with less time constraints may be able to do all the activities.

## Activity 1

### IDENTIFYING MAMMALS AND MARINE MAMMALS

#### Goals:

- To learn the characteristics of mammals.
- To learn how to distinguish a marine mammal from a mammal.

#### Concepts:

- Mammals share 5 traits that distinguish them from other animals.
- Marine mammals are mammals that live in the ocean and rely predominately on the ocean for their food.

#### Materials:

- 15 bags labeled animals. Each bag contains 5 mammals and 5 non-mammals.
  - 15 bags labeled mammals. Each bag contains 5 terrestrial mammals and 5 marine mammals.
  - Bag containing 3 stuffed mammals, 1 insect, 1 bird, and 1 reptile.
1. Explain that today we will be classifying our animals. We will be sorting our mammals from our non-mammals. Ask the classroom teacher to split the students up into groups of 2.
  2. To demonstrate the activity, pull the stuffed animals out of their bag one at a time, asking the students to decide whether it's a mammal versus non mammal. Ask them how they decided.
  3. Give each group a bag of animals and ask them to sort them, trying to identify all the mammals in the bag. If groups finish early you can ask them to sort their mammals or non-mammals in a different way. If they need suggestions you can ask if the animal lives in the water or not, what color are they, etc.
  4. When the students are done have everyone hold up one of their mammals and call on 2-3 students to share which mammals they are holding up.
  5. Collect the bags and ask them, what is a marine mammal? You may read the book, [A Whale of a Tale](#) (p.6-13) if you are working with young children. You can tell the children that they can find



this book at a local library if they want to read all of it. Show **slide 4** and go through each category of marine mammal asking the students if we find those marine mammals in our local water. (For example, I ask if we find polar bears in the water off Falmouth. They all say “NO”! I say, “That right! If you see a polar bear you should call the zoo because one of their animals must have gotten out. Polar bears live in the far north in the Arctic, not Falmouth.”

6. Give each group a bag of mammals and ask them to sort them, trying to identify all the marine mammals in the bag.
7. When most, or all, of the students have finished ask them all to hold up a marine mammal. Call on 2-3 students to tell you what marine mammal they are holding up.

**Discussion:**

1. How are mammals different from other animals? How are they the same?
2. Is a shark a marine mammal? Why or why not?
3. Show them the real artifacts from marine mammals in our backyard: sperm whale teeth, minke and fin whale baleen, sperm whale vertebrae, harbor seal pelt, harbor seal skull, and sperm whale rib. For perspective, have one student hold the human rib and have 5 hold the sperm whale rib (this is a great photo-op for the classroom).

**Alternate Activity 1****HOW BIG IS IT ACTIVITY****Goals:**

- To learn the characteristics of mammals.
- To gain perspective on the size of various marine mammals.
- To compare and contrast marine mammals with more familiar terrestrial mammals and an average elementary school student.

**Concepts:**

- Mammals share 5 traits that distinguish them from other animals.
- Marine mammals are mammals that live in the ocean and rely predominately on the ocean for their food.
- Marine mammals are some of the largest living mammals.
- Marine mammals can be compared to land mammals and measured in “student units”.

**Materials:**

- Laminated number cards.



- Laminated animal picture sheets including: North Atlantic right whale, blue whale, Asian elephant, common dolphin, harbor seal, and lion (any species can be used here including those in your locality)
  - Bag of labeled measured ropes for each animal. These are based on average lengths. You can also use one long rope that has tape at intervals based on the length given here. (North Atlantic right whale – 54 ft, blue whale – 81 ft, Asian elephant – 18 ft, common dolphin – 9 ft, harbor seal – 4.5 ft, lion – 4.5 ft)
  - Six yellow “student length” ropes (4.5 ft)
1. Start by reviewing what a mammal is. Use the bag of stuffed animals to “quiz” the students. Tell them to give you a thumbs up if you pull out a mammal and a thumbs down if it is not a mammal. As you pull the animals out remind the students to think about whether the animal has live young (miniatures of itself) or eggs. Does it have hair, etc. Put the stuffed animals into mammal versus non mammal piles.
  2. Remind them that today we are going to talk about marine mammals! You may read the book, [A Whale of a Tale](#) (p.6-13) if you are working with young children. You can tell the children that they can find this book at a local library if they want to read all of it. Show **slide 4** and go through each category of marine mammal asking the students if we find those marine mammals in our local water. (For example, I ask if we find polar bears in the water off Falmouth. They all say “NO”! I say, “That right! If you see a polar bear you should call the zoo because one of their animals must have gotten out. Polar bears live in the far north in the Arctic, not Falmouth.”)
  3. Show them the real artifacts from marine mammals in our backyard: sperm whale teeth, minke and fin whale baleen, sperm whale vertebrae, harbor seal pelt, harbor seal skull, and sperm whale rib. For perspective, have one student hold the human rib and have 5 hold the sperm whale rib (this is a great photo-op for the classroom).
  4. Tell the students that today we are going to measure some marine mammals. Pick out a student to be your unit of measurement. Today, we are not going to measure in terms of inches or feet. Our unit of measurement is going to be a first grader (whichever grade you are in) and specifically units of “Roberts” (whichever student you chose). The yellow ropes are equal to 1 first grader or 1 Robert.
  5. Then ask them to guess how many Roberts long they think the lion is? Once you have taken 2-3 guesses lay the rope out and have students lay down along it. You should only need 1 student for the lion. Put the lion image at the top of the rope and a big 1. The lion is 1 Robert or 1 first grader long.



6. Repeat step 5 with the dolphin, harbor seal and North Atlantic Right Whale (the ropes are labeled at their ends). If you have time you can also measure the elephant and blue whale. I usually do the NARW in the hallway or outside.

**Discussion:**

1. How did the marine mammal sizes compare to the terrestrial animals? In general were they bigger? Smaller?
2. What unit of measurement did we use? What was the biggest animal we measured? (Tell them the blue whale is the longest living animal in the world. If you didn't have a chance to measure the blue whale you can simply show them the coiled blue rope.) What else could we have used to measure the animals?

**Activity 2**

## RIGHT WHALE ID

**Goals:**

- To learn about right whales.
- To learn how to sort and identify right whales.

**Concepts:**

- Right whales are endangered.
- Pictures are valuable tools to document individual animals and track populations.

**Materials:**

- Right whale picture sheets, one picture per pair of students (degree of difficulty starts with 1 being the easiest).
- Answer key to the pictures sheets for the teachers. Students should NOT be given the answer key.
- Right whale photo id book

1. Today we are talking about marine mammals in your backyard. Where is your backyard? Where do you go to sleep, play, eat, etc.? (Use Google Earth to show their school, grocery store, and NOAA – **slide 5** reminds you)
2. Explain that today we are going to be talking about the highly endangered North Atlantic right whale. There are only about 450 of these animals left in the world.
3. Pretend you are a North Atlantic Right Whale (**slide 6**). Where is your backyard now? Where do we sleep, play, eat, etc.? (Use Google Earth to show the North Atlantic right whale's "backyard" – **slide 7** reminds you) If you are a teacher you can use Google Earth to show that right whales



feed in the Bay of Fundy and Cape Cod Bay in the summer and migrate to the coast of Florida (near Jacksonville) to have their calves in the winter.

4. How is your backyard different from the North Atlantic right whale's?
5. (**Slide 8**) Explain that the students are no longer right whales but are now the scientists that study them. They need to take pictures of North Atlantic right whales from ships and planes and then come home and identify the animals. They must compare their photos to drawings and identify the animals they saw. Show them the photo ID book or online catalog (<http://rwcatalog.neaq.org/Terms.aspx>).
6. Explain that today they will be identifying North Atlantic right whales by looking at the pattern of their callosities (explain the term callosity). Use the stuffed whale to demonstrate. Why would you want to identify individual animals?
7. Divide the students up into pairs.
8. Demonstrate the activity using **slide 9**. You must look at the callosity pattern on the whale photograph and determine which individual drawing it matches.
9. Using the same pairs, give each pair of students a right whale ID page. Depending on the grade, you can start with a different level. Level 1 is the easiest and should be used for kindergarten. There are several different sheets for each level. You can start all grades off with an easy one and move up in difficulty as they identify their right whale.
10. Set up the right whale ID sheets into piles on a table or on the ground. Each level is color coded. All the green dots are level 1, yellow- level 2, blue- level 3, and red- level 4. When they have a match they should ask the teacher or you to check that it is correct. Tell them to take another whale ID sheet from level \_\_\_\_.
11. Allow them to do this for about 5-10 minutes.

### Discussion

1. Was this harder or easier than you expected? What did you look for to help you identify your right whale?
2. How is it possible that we have pictures of ALL the North Atlantic right whales?



3. How can scientists protect North Atlantic right whales? Show them the Right Whale Listening Network (**slide 10**). Tell them that they are looking at buoys that listen for North Atlantic right whales. Ship Captains can put the whale alert app on their Smartphone so they know whether there are endangered right whales around and when and where they need to slow down to avoid collisions.
4. Scientist Spotlight (**slide 11**): Allison Henry flies in a plane looking for North Atlantic Right Whales. She takes pictures of the whales she sees for photo identification. She also counts the whales and records their location so they can warn shipping vessels to slow down.

### Conclusion:

1. What marine mammal species do you think we would find in the water around Falmouth? Use **slide 12**, click on the picture of the pilot to link to PSB's sounds page: <http://www.nefsc.noaa.gov/psb/acoustics/sounds.html>. As the students name local species you can show them the animal picture and play the animal's vocalization for them.
2. How can each student help protect the marine mammals in our backyard? (**slide 13**) Click on any of the yellow words to show a quick conservation video clip.

### Lesson Links to Next Generation Science Standards

\*All of the lessons reinforce the scientific method by asking students to observe, predict, hypothesize, participate in an experiment or activity, sort/classify, and make conclusions.

- a. K-ESS3-1 - Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. This lesson uses google earth to illustrate how the students meet their needs and how local marine mammal species cover a larger geographic area to meet their needs.
- b. 1-LS3-1 - Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. In this lesson students discover how individual North Atlantic right whales can be photo identified by comparing their callosity patterns.
- c. 2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats. In this lesson students compare the species found in their "backyard" (both aquatic and terrestrial).