# Cetaceans 4 Grade Curriculum Lesson 2: Cetaceans—What Makes a Whale a Whale?[1]

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## Description

Students will learn about general whale (and dolphin) biology.

## Objectives

By the conclusion of the activities, students will:

- Be able to identify cetacean species that they have some familiarity with, such as bottlenose dolphins and killer whales
- Be able to list at least three differences between toothed whales (odontocetes) and baleen whales (mysticetes)
- Be able to describe basic external anatomy of cetaceans using right whales, humpback whales, and bottlenose dolphins as examples

## What You Will Need

- Copies of vocabulary list—one per student (pages 2–4 through 2–5)
- Copies of vocabulary worksheet—one per student (page 2–5)
- Ability to project PowerPoint presentation
- Copy of *What Makes a Whale a Whale?* PowerPoint presentation
- **Optional:** *Whales—Activities Based on Research from the Center for Coastal Studies* (Scholastic Publishers; ISBN 0-590-49156-3)
- The PowerPoint presentation and book can be downloaded from https://www.flseagrant.org/education/cetaceans/

## Standards

### Florida Sunshine State Standards

#### English Language Arts

- **ELA.4.V.1.3** Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.
- **LAFS.4.RI.2.4** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

## Strategy

1. Explain to the students that they will learn about whale and dolphin biology during this lesson.
2. Give students a copy of the vocabulary list and explain that these words will be used throughout the lesson. To help students with pronunciation, read the words to them and have them repeat the terms to you.
3. Present the PowerPoint using the script below.

- *What Makes a Whale a Whale?* Today we will learn about the group of animals called "cetaceans" [*suh-TAY-shuns*]—these are the whales and dolphins.
- Horses, dogs, raccoons, and humans are all mammals just like whales and dolphins. There are six main characteristics of a mammal. Who can remember one of the characteristics of mammals that makes them different from other groups of animals? [*Students should know characteristics of a mammal from 3rd grade.*]
- Mammals are all warm-blooded; most mammals keep their bodies warm with hair or fat. Many marine mammals have a thick layer of fat or blubber to protect them from the cool ocean waters.
- Mammals have backbones made up of individual bones called vertebrae.

- Mammals breathe air. Whales and dolphins breathe air through blowholes on the tops of their heads, just as cows breathe through their noses.
- Mammals have hair. Whales and dolphins have small areas of hair when they are born. For example, baby dolphins have a line of hair similar to a thin mustache that falls off shortly after birth. Whales, such as right whales, may have sparse hairs on the tip of the chin and upper jaw.
- Mammals give live birth to their young. If you look really hard, you may be able to see lines on this baby dolphin (called a calf) where it was curled up inside its mother.
- Mammals feed milk to their young.
- Marine mammals are those mammals that are well-adapted for life in the ocean. Some marine mammals, like dolphins and whales, spend their entire lives in the water. Others, like polar bears, may spend part of their lives on land but depend on the ocean for food.
- There are several groups of marine mammals. We will be learning more about the cetaceans. This group includes the whales, dolphins, and porpoises. Seals, sea lions, and walruses are in a different group called the pinnipeds. Manatees and their relatives are in the group called sirenians. Sea otters and polar bears are also considered marine mammals. [*Top row: sea lions (pinnipeds), manatees (sirenians), and sea otter; Bottom row: humpback whale (cetacean), beluga whale (cetacean), and walrus (pinniped)*]
- Cetaceans are divided into two groups: toothed whales and baleen whales. Toothed whales, or odontocetes, have teeth. All dolphins and porpoises are included in this group. [*Point out the photo of the dolphin*.] If you look carefully, you can see the dolphin's teeth in this picture. Dolphins have up to 100 cone-shaped white teeth along their upper and lower jaws. Baleen whales, also called mysticetes, do not have teeth in their mouths. Instead, they have special fibrous plates called baleen that hang down from the upper jaw. We will talk more about baleen in a few minutes. [*Point out the photo on the right side of the slide.*] This is a photo of a right whale, which is a type of baleen whale.
- First, let's talk about the toothed whales. Many of the whales that you may be familiar with, and all of the dolphins, are odontocetes. These cetaceans use their teeth to grab prey like fish, squid, and even other marine mammals. [*Point at top left photo.*] Bottlenose dolphins are toothed whales. [*Point at top right photo*.] Orcas are also known as killer whales. Although we call them whales, they are actually the largest type of dolphin. [*Point at bottom photo.*] Other toothed whales are not dolphins. Sperm whales are very deep-diving animals, hunting in 3,000 or more feet of water for their favorite food, the giant squid. There are about 70 different types of odontocetes in the world.
- The sperm whale is the largest member of the odontocetes. Male sperm whales can reach lengths near 60 feet. That's almost as long as two school buses! Mature male sperm whales are called "bulls." Sperm whales are able to hold their breath for more than an hour, which allows them to pursue the giant squid deep in the open ocean.
- In contrast to the sperm whale, some odontocetes are very small. The Hector's dolphin, shown in this photo, only gets to be about five feet long. [*Suggestion—compare that to your height, or possibly the height of students in the class.*]
- This slide shows some of the body parts of a dolphin. The "beak" of the dolphin (and other whales) is called the "rostrum." The forehead is called the "melon." The blowhole, located on the top of the head, is the dolphin's nose. The fin on the dolphin's back is called the "dorsal fin," the side fins are called "flippers," and the tail fin is called the "fluke."
- Echolocation is the ability to produce sound waves and feel the vibration as the waves bounce off prey and other items. Odontocetes use echolocation to find food and to navigate. Odontocetes rely on echolocation when they cannot see. For example, sometimes the water they swim in is not clear, or they may be swimming in very deep water where there is little light. To echolocate, odontocetes produce sound waves from the melon and receive echoes, which they can feel through the lower jaw. Another characteristic of toothed whales is that they have a single blowhole, whereas baleen whales have paired blowholes.
- Dolphins and porpoises are both groups of toothed whales, but they are different from each other. Dolphins tend to have a longer rostrum and cone-shaped teeth, while porpoises have smaller rostrums, a rounded head, and flat teeth. If you look carefully at the two photographs, you may notice that the dolphin has a taller, hooked or curved dorsal fin, while the porpoise has a triangular dorsal fin. Dolphins tend to live in warmer waters, and porpoises often live in colder areas. Dolphins are also more talkative than porpoises.

Dolphins make whistling sounds through their blowholes to communicate with one another underwater. Scientists are pretty sure that porpoises do not do this.

- There are only about 14 species of baleen whales or mysticetes. [*Top left photo*] Gray whales are only found in the Pacific Ocean, so we will not see them in Florida waters. Mother gray whales go into warm lagoons on Mexico's Pacific coast to have their calves. Then they migrate north to Alaskan waters to feed in the summer. These whales can be seen migrating along the California coast in late winter and early spring. [*Top right photo*] Humpback whales are sometimes seen off Florida's coast, but these whales can also be found almost worldwide. [*Bottom photo*] North Atlantic right whales can sometimes be seen off the northeast coast of Florida in the winter months.
- Mysticetes are very large whales. This group includes the blue whale: the largest creature ever to live on our planet. Blue whales can grow up to 100 feet, making them larger than the largest dinosaur. The heart of a blue whale is the size of a small car. Blue whales were nearly hunted to extinction in the early 1900s because whale blubber was a valuable source of oil. Today we get oil from other sources. The blue whale population is slowly recovering and increasing.
- This is a humpback whale, which is a mysticete. Notice this whale has a small dorsal fin. Humpback whales have long flippers and a large tail fluke. They also have throat pleats, or skin folds which allow them to stretch their throat open really wide when feeding. Like all mysticetes, the humpback whale has two blowholes.
- This is a North Atlantic right whale. Unlike the humpback whale, right whales do not have a dorsal fin. Right whales have short flippers. They also have two blowholes located on the top of their heads.
- In some ways, baleen whales are very different from toothed whales. Instead of teeth, they have large baleen plates in their mouth that hang down from their upper jaw. These baleen plates are made of the same material as our fingernails. [*Top right photo*] In this photograph of a right whale skeleton, you can see the dark baleen. The sheets of baleen are frayed on the inside. These hair-like strands are used to trap the tiniest of sea creatures—like zooplankton and small fish—which are then swallowed in very large numbers. [*Top left photo*] In this photo, two right whales are feeding at the surface.
- Baleen whales do not have echolocation. Scientists are still unsure how baleen whales find the dense patches of food they are known to feed on.
- Baleen whales have two blowholes rather than the one found on toothed whale species. [*Left photo*] The blowhole area of a mysticete shows two distinct openings, similar to our nostrils. [*Right photo*] When the whale exhales, water droplets can make its breath visible. This is called the "blow."
- Let's review what we have learned today. What are the two different groups of cetaceans? [*Toothed (odontocetes) and baleen (mysticetes)*]. How are these two groups similar? [*They are whales/mammals; they have flippers, fluke, and dorsal fin, etc*.] How are they different? [*Teeth vs. baleen; one blowhole vs. two; echolocation or no echolocation; different types of food*]

4. Give students the vocabulary worksheet and ask them to complete the puzzles using words from the vocabulary list.
5. **Optional:** *What Is a Whale* activity

- Use the *Whales* activity book (published by Scholastic Press and edited by the Center for Coastal Studies).
- Make one double-sided copy of pages 9 and 10 per student. As noted in the instructions, be careful not to invert the copy on the reverse side as the activity will not work.
- Follow instructions provided on page 8 for this activity. Students will fold the paper as directed to create a mini-book.
- The finished mini-book will reinforce the main points covered in the PowerPoint and give students a project they can take home and share with their family.

6. **Optional:** *Whales: Inside and Out* activity

- Use the *Whales* activity book (published by Scholastic Press and edited by the Center for Coastal Studies).
- Make double-sided copies of pages 11–12 and pages 13–14. Print enough for each student to have their own. Again, be careful not to invert the pages while making the copy on the back of the handout.
- If students hold the whale images (pages 11 and 13) up to the light, they should be able to see a drawing of the skeletal structure within the body of the whale.
- Students can color the whales. The anatomical features listed are the same as those shown in the PowerPoint presentation.

- On the bottom of page 13, there are two questions asking for similarities and differences between the two groups of whales. These can be used to discuss or review the points made in the PowerPoint presentation.

## Vocabulary

Adapted from *The World of North Atlantic Right Whales*, Grades 6–8, pages 26–29. Produced by NOAA Fisheries Service's Northeast Regional Office, Protected Resources Division.

**Baleen (bay-LEEN)—**These are long plates in the mouth of baleen whales (mysticetes) that hang from the upper jaw (these whales do not have teeth). Baleen plates are made of material similar to that in fingernails and are fringed on the edge. The whale gulps water and pushes the water out of its mouth through the baleen with its tongue. After that, it can swallow all the small sea organisms that were caught in the baleen.

**Blowhole—**The nose of a whale. The blowhole is located on top of the whale's head, so the whale can breathe without having to lift its whole head out of the water. Toothed whales (odontocetes) have one blowhole, while baleen whales (mysticetes) have two.

**Cetacean (seh-TAY-shun)—**The scientific word for mammals in the groups that we call whales, dolphins, and porpoises.

**Dorsal Fin—**A triangle-shaped fin located on the back of some types of whales and dolphins. The dorsal fin may help stabilize the body of the whale (or dolphin) during swimming and diving and may help it to regulate body temperature.

**Echolocation (eh-koh-loh-KAY-shun)—**The production of high-frequency sound waves by toothed whales and dolphins (odontocetes). The sound waves bounce off objects and come back to the animal so it is able to "see" through sound. The dolphin receives the sound waves as vibrations through the fat and bone in its lower jaw. This system is very much like sonar used by submarines.

**Flippers—**These are the "arms" of dolphins and whales. They have the same bones in the flippers as you have in your arms and hands. The flippers are located on the sides of the animal and are used to steer, turn, and control its position in the water column.

**Fluke—**The left or right side of the tail of a dolphin or whale. There are no bones in the flukes. The backbone ends where the tail flukes start.

**Krill—**Very small, shrimp-like animals that are important food for baleen whales (mysticetes). The krill are caught on the baleen plates when the whale pushes water out of its mouth with its tongue. Afterwards, the whale can swallow the krill for its meal.

**Mammal—**Warm-blooded animals with backbones (vertebrates) and hair. Mammals also give birth to live young and produce milk to feed their babies. Mammals must breathe air and stay warm to survive. Even though whales live in the ocean, they are not fish at all.

**Marine Mammal—**This is a group of mammals that live in the ocean for at least part of their lives and depend on the ocean for food. Marine mammals include dolphins, whales, seals, sea lions, manatees, walrus, polar bears, and sea otters.

**Melon—**The forehead of a toothed whale or dolphin. The melon is made of fatty tissue and often appears to bulge from the forehead area. It is important for sound production as part of the echolocation system.

**Mysticete (miss-tuh-SEET)—**This is the scientific term for whales that have baleen. These are the largest whales; the blue whale is the biggest animal that has ever lived (it is larger than the largest dinosaur). Mysticetes have two blowholes but no echolocation system. They have baleen plates but no teeth. They feed on tiny organisms like krill and plankton.

**Odontocete (oh-don-toh-SEET)—**This is the scientific term for toothed whales, which includes all of the dolphins. There are more kinds of odontocetes than mysticetes. These animals have one blowhole, use echolocation to find fish and other food items, and use their teeth to catch and hold prey until they can swallow it.

**Plankton—**Plants and animals that drift on ocean currents. Plankton are often very small. These are important food items for mysticetes.

**Prey—**An organism that is eaten by another animal for food.

**Rostrum—**The bony, beak-like structure formed by the upper and lower jaws in some whales and dolphins.

**Zooplankton (ZOH-plank-ton)—**Plankton made up of only animals. This can include creatures like larval fish and krill.

## Vocabulary Worksheet

**Matching:** *Draw a line from the word to the best definition for that word.*

**Echolocation** A group of animals that includes dolphins.

**Flipper** Very small, shrimp-like animals.

**Baleen** The part of a whale that is like your arm.

**Odontocetes** Large structures found in the mouth of mysticetes.

**Krill** A type of navigation used by odontocetes.

**Fill in the Blank:**

The nose of a whale or dolphin is called a __ __ O __ __ O __ __.

Fish are important __ R __ __ for many types of dolphins.

Whales are not fish. They are classified as __ __ M M __ __ S.

The scientific word for the group of animals that includes whales and dolphins is __ __ T A __ __ __ N S.

The triangular structure on the back of a dolphin is a D __ __ S __ __ F __ N.

## Answer Key for Vocabulary Worksheet

**Matching:** *Draw a line from the word to the best definition for that word.*

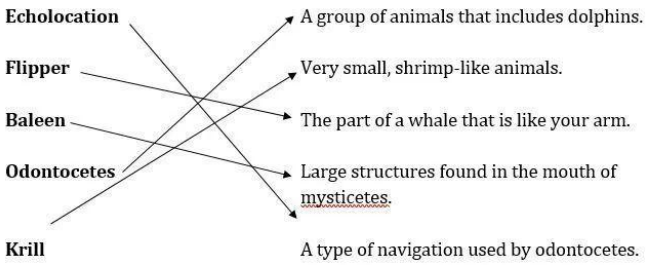



Figure 1.

**Fill in the Blank:**

The nose of a whale or dolphin is called a BLOWHOLE.

Fish are important PREY for many types of dolphins.

Whales are not fish. They are classified as MAMMALS.

The scientific word for the group of animals that includes whales and dolphins is CETACEANS.

The triangular structure on the back of a dolphin is a DORSAL FIN.

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