



Gray Whales on the Move

Students trace the migration route of a gray whale and discover the gray whale's natural history.

SUBJECTS

Science

GRADE LEVEL

Grades 6–8

TIME

60 minutes

OBJECTIVES

Students will be able to

- state when, where and why gray whales migrate.
- plot data of two migrating whales on a map.
- describe the ecosystems to and from which gray whales travel.

MATERIALS

- Atlas (that includes detailed information on Alaskan waters and Baja California, Mexico)
- Computer with Internet access, if available
- Copies of North American Pacific Coast map (provided)
- Copies of blank North American Pacific Coast map (provided)
- Writing and drawing materials, including colored markers or pencils
- Copies of data sheet and questions (provided)

BACKGROUND

Gray whales (*Eschrichtius robustus*) probably migrate farther than any other marine mammal. They journey between feeding and breeding grounds and cross national and international boundaries. California gray whales live off the western coast of North America.

Gray whales spend the summers eating marine worms and amphipods (shrimp-like animals). They strain huge amounts of food from the muddy bottoms of the Bering and Chukchi seas. Most gray whales migrate south in the fall when the Arctic ice pack starts to form. They swim along the North American coastline to Baja California, Mexico -- a distance of more than 6,000 miles (9,656 km). In Baja, the whales give birth and mate in the shallow waters of Laguna Ojo de Libre (Scammon's Lagoon), Laguna San Ignacio and Magdalena Bay. After two or three months, the gray whales travel back up north to the Alaskan Arctic.

In the 19th and early 20th centuries, whalers hunted gray whales to the brink of extinction. After a ban in 1946 on hunting the whales, the population of California gray whales began to recover. Scientists believe that the current population is close to pre-whaling numbers. In 1994, the gray whale was the first marine mammal removed from the U.S. Endangered Species List.

PROCEDURE

1. Explore an atlas

Look at a world map in an atlas. Discuss the values for latitude (horizontal lines) and longitude (vertical lines). What are the latitudes at the poles and the equator? Between which latitudes is the Pacific Coast of North America found? Is this region north or south of the equator?

2. Label a world map

Distribute the blank world map to students and have them label the countries or continents, the ocean basins, the seas, the coastal states, Hawaii, and Baja California, Mexico.

STANDARDS

National Science Education Standards Grades 5–8

(<http://www.nap.edu/catalog/4962.html>)

Unifying Concepts and Processes:

Evidence, models and explanations
Form and function

Science As Inquiry – Content Standard A:

Understanding about
scientific inquiry

Life Science – Content Standard C:

Regulation and behavior

Ocean Literacy: Essential Principles and Fundamental Concepts

(<http://coexploration.org/oceanliteracy/>)

Essential Principle #5: The ocean supports a great diversity of life and ecosystems.

- d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.
- f. Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, that is, it is “patchy.” Some regions of the ocean support more diverse and abundant life than anywhere on Earth while much of the ocean is considered a desert.

3. Plot migration data

Distribute the data sheet showing the dates, latitudes and longitudes for two gray whales migrating along the coast. Distribute the labeled map of the North American Pacific Coast to the students. Have students plot the migration data on their maps using a different color for each whale. Place arrows or other symbols along the migration path to indicate when whales travel south, travel north or are in the area in which they give birth/mate. To complete the map, add a map key and a compass rose and give the map a title.

4. Answer migration questions

As a class or as individuals, use the maps completed in class, the migration data, an atlas and the provided online sources to answer the questions at the bottom of the data sheet. (See the teacher page for answers.) If students cannot answer in class, let them work on the questions as a homework assignment, using the Internet or library to look up more information on gray whales and humpback whales.

5. Discussion

The next day, discuss the answers. Other topics for discussion: In what ways is the ocean environment different near Alaska than it is near Mexico? Why do gray whales and humpback whales migrate? How do they find their way over such a long distance? What other animals migrate? Do humans migrate?

EXTENSIONS

- Complete “Can Crittercam Help Protect Humpbacks?” a National Geographic Xpeditions lesson plan on humpback migration, www.nationalgeographic.com/xpeditions/lessons/18/g68/cchumpback.html.
- Play the Gray Whale Observer Game at pbs.org/oceanadventures/episodes/whales. Track migrating whales and try to catch their adaptive behaviors on film. Use the accompanying lesson plan at pbs.org/oceanadventures/educators/whales to enhance the educational value of the activity.

FURTHER REFERENCES

Additional educator resources for *Jean-Michel Cousteau Ocean Adventures* can be found at pbs.org/oceanadventures.

Also:

- **Alaska Department of Fish and Game**
www.adfg.state.ak.us/pubs/notebook/marine/gray.php
- **National Marine Mammal Laboratory**
Nmml.afsc.noaa.gov/education/cetaceans/baleen1.htm
- **OBIS SEAMAP**
www.seamap.env.duke.edu/species
- **SeaWorld/Busch Gardens ANIMALS**
www.swbg-animals.org/animal-info/animal-bytes
- **U.S. National Marine Sanctuaries**
www.sanctuaries.nos.noaa.gov/

CREDITS

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Gray Whale Migration Data

Whale 1: Pregnant Female

Whale 2: Mature Male

Date	Latitude (North)	Longitude (West)	Date	Latitude (North)	Longitude (West)
Oct. 20	60°N	170°W	Oct. 30	67.5°N	170°W
Oct. 30	55°N	165°W	Nov. 19	55°N	165°W
Nov. 19	57.5°N	150°W	Nov. 29	57.5°N	140°W
Nov. 29	50°N	130°W	Dec. 9	45°N	125°W
Dec. 19	35°N	122.5°W	Dec. 19	35°N	122.5°W
Jan. 8	25°N	112.5°W	Jan. 18	25°N	112.5°W
Feb. 17	25°N	112.5°W	Feb. 17	25°N	112.5°W
Mar. 10	25°N	112.5°W	Feb. 27	40°N	125°W
Mar. 26	40°N	125°W	Mar. 10	50°N	130°W
Apr. 15	55°N	135°W	Mar. 26	57.5°N	150°W
May 5	57.5°N	140°W	Apr. 15	55°N	165°W
May 30	55°N	170°W	May 5	67.5°N	170°W

Questions

1. Why do gray whales migrate each year from Alaska to Baja California, Mexico?
2. Whale 1 reached Baja California, Mexico, earlier than Whale 2 and stayed there longer. What is a possible reason for this?
3. To which breeding lagoon in Baja California, Mexico, have these two whales migrated? To which sea in the Alaskan Arctic has each whale traveled in the summer?
4. What behaviors/habits made gray whales an "easy" catch for 19th- and 20th-century whalers?
5. Another whale that migrates in the eastern North Pacific Ocean is the humpback whale. Where do these populations of humpbacks spend the summer months? Where do they spend the winter months?
6. Gray whales and humpback whales travel through different coastal areas. Are any of these ecosystems protected? How could unprotected areas (those open to shipping and fishing) affect the migration and lives of the whales?

North American Pacific Coast



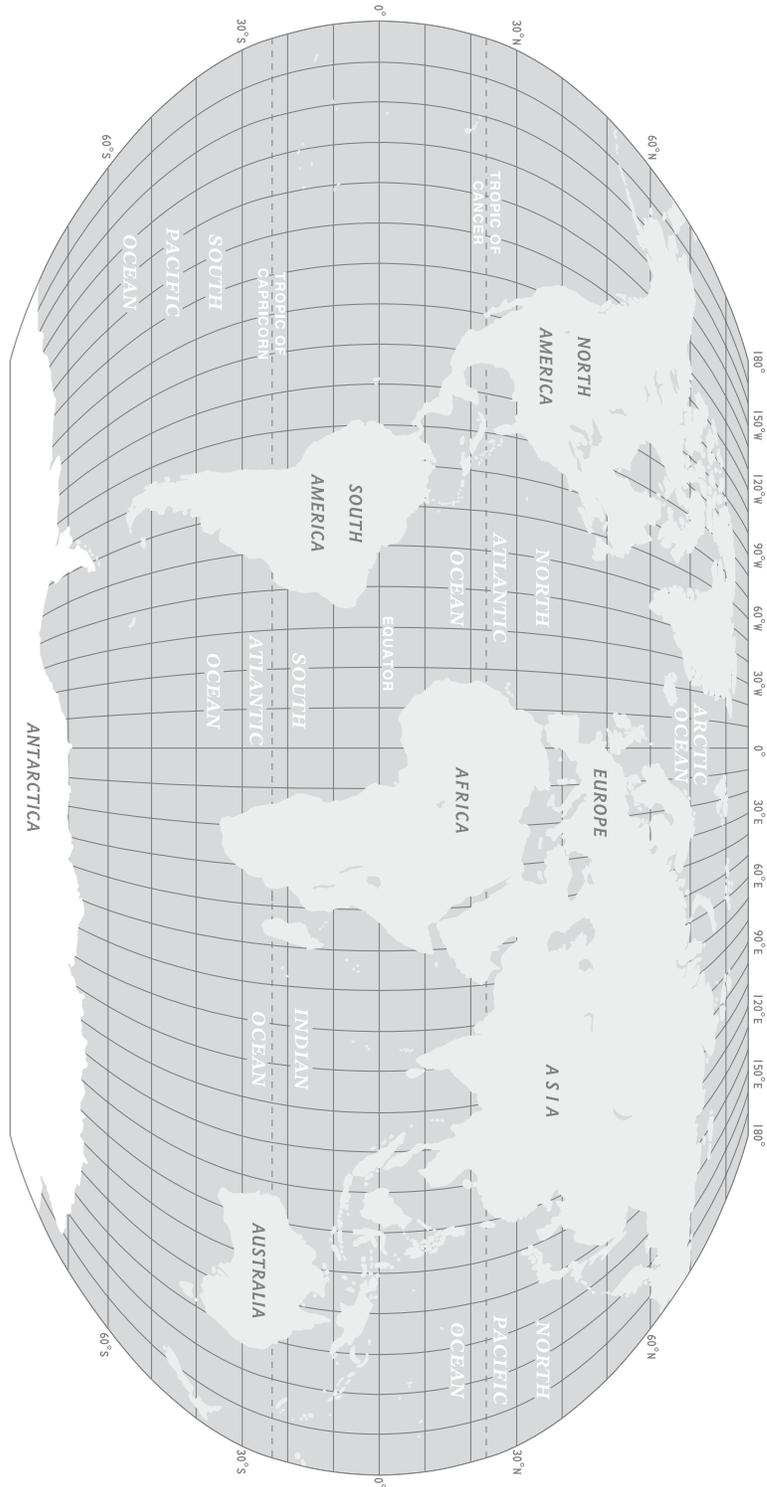
On this map write the names of ocean basins, seas, countries or continents, and states. Also indicate Hawaii; Baja California, Mexico; and Mexico.

Gray Whale Migration



Plot the migration of gray whales on this map.

World Map



Answers to Gray Whale Migration Questions

1. The Alaskan Arctic has large amounts of food (amphipods) for gray whales. Baja California has protected lagoons (calm waters, protected from killer whales), so it is a relatively safe place for the females to raise their calves.
2. Whale 1 gave birth and stayed longer in the breeding lagoon to care for her calf.
3. Both whales migrated to Magdalena Bay. Whale 1 migrated to feeding grounds in the Bering Sea; Whale 2 migrated to the Chukchi Sea.
4. Gray whales were easy to find because of their behavior of staying close to the Pacific coastline during migration. Also, their habit of gathering in lagoons to breed and give birth made it much easier for whalers to locate and catch large numbers of gray whales.
5. Humpback whales in the eastern North Pacific Ocean spend the summer months feeding in the waters off the coast of Alaska, Canada and down to central California. Breeding populations of humpbacks in the eastern North Pacific migrate to the waters of Hawaii and the western coast of Mexico during the winter months (including the tip of Baja California, Mexico, and the Gulf of California).
6. See some of the listed Web sites for information on U.S. National Marine Sanctuaries and threats facing the whales.