Whale Reading Assignment

To do before the field trip in class

1. **Students will read NOAA Kids' Times: Gray Whale.** The reading is available in this guide and online at oceanconnectors.org/resources.

   The reading contains new vocabulary, **indicated in bold**, so it is best if teachers read the material in advance and prepare to work through it with the children. A glossary of terms that may be unfamiliar to students is contained at the end of the reading. It may be helpful to review these terms together in advance and to write a summary of the most important details.

2. **Students respond to questions inside their journals** using complete sentences.

3. Please review the answers together in class.

4. This lesson covers 5th grade Common Core State Standards in ELA/Literacy, and Next Generation Science Standard 5-ESS3-1.

5. **Critical Thinking Extension: Have students pair up and discuss the following questions with a classmate.**

   - While it is illegal to hunt whales in U.S. waters, other countries continue to hunt whales. Why do you think humans in some countries still hunt whales?
   - What is being done to protect whales?
   - If you were in charge of balancing the needs of humans and whales, what would you do?

6. Have students start an **Experience Diagram** in their journals:

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Answer in your journal with complete sentences.

1. How did the gray whale get its name?

2. Why do gray whales have light patches and white marks on their bodies?

3. What is baleen and how does it work?

4. Describe whale breaching.

5. How can scientists identify individual whales?

6. Why are some whales in trouble? List 3 reasons.

7. What is the Marine Mammal Protection Act?

8. Think back to your Ocean Connectors presentation: How does choosing "safe" seafood at the grocery store help protect whales from bycatch?

9. What are the predators of baleen whales? List 3 predators.

10. What is whaling?

Whale Reading Assignment

Answer Key

1. How did the gray whale get its name?
The gray whale gets its name from its mottled gray body color. Calves are a darker color.

2. Why do gray whales have light patches and white marks on their bodies?
Gray whales have dark gray skin with lighter gray patches and white marks because they have barnacles and whale lice living on their bodies, especially on their heads.

3. What is baleen and how does it work?
Baleen is a straw-like material called keratin, which hangs from a baleen whale's mouth in long flat plates in place of teeth. When baleen whales feed, they take ocean water into their mouths then push the water back out through the baleen plates. Their prey is trapped and filtered out of the water by the baleen, and the whales scrape the prey off using their tongue.

4. Describe whale breaching.
When whales breach they jump partially or fully out of the water and then fall back in at an angle, which creates a large splash and a loud noise. Breaching may help clean off some of the barnacles and whale lice that attach to their skin, or it may be a form of communication.

5. How can scientists identify individual whales?
Like a fingerprint, each whale's fluke (tail) is unique, which helps scientists identify them.

6. Why are some whales in trouble? List 3 reasons.
Some whales are in trouble due to hunting by commercial whalers (in some countries), collisions with ships, entanglements in fishing gear, noise in the ocean, and pollution.

7. What is the Marine Mammal Protection Act?
The Marine Mammal Protection Act sets rules and gives a level of legal protection to all marine mammals in the oceans surrounding the United States.

8. Think back to your Ocean Connectors presentation: How does choosing "safe" seafood at the grocery store help protect whales from bycatch?
Choosing safe seafood at the grocery store allows consumers to avoid contributing to whale entanglements in fishing gear. Safe seafood logos, such as the Marine Stewardship Council logo, indicate that care was taken by the fishermen to avoid harming whales and other non-target species during the capture process, thus reducing the amount of bycatch.

9. What are the predators of baleen whales? List 3 predators.
The predators of baleen whales include killer whales (orcas), large sharks, and humans.

10. What is whaling?
Whaling is the hunting of whales by humans, often to extract meat and oil from the whale's body. Whaling is less common today but still takes place today in some countries.

NOAA's National Marine Fisheries Service, Office of Protected Resources

The Kids' Times:

Volume II, Issue 4

Gray Whale

NMFS File Photo

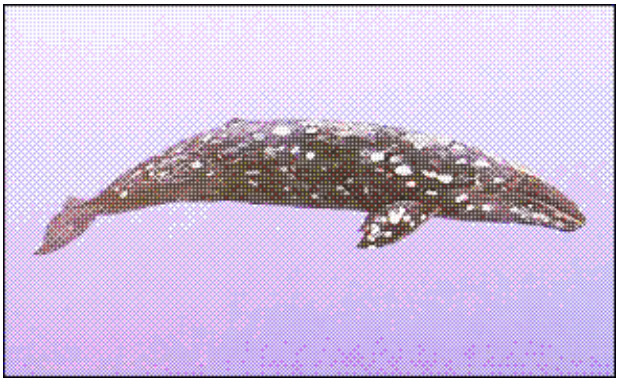
The gray whale will **spyhop** to look at its surroundings.

How did the gray whale get its name?
The gray whale gets its name from its mottled gray body color (**calves** are darker). The scientific name, *Eschrichtius robustus*, comes from the last name of a Danish zoology professor (Eschricht) and the Latin word for "strong" or "oaken" (robustus). **Whalers** often called the Gray whale "devilfish" because the whales fiercely defended themselves and their calves against whalers. Today the whale is known for its curiosity.

What do they look like?
The gray whale has a large body and a narrow head that tapers to a blunt point when seen from above. They have paddle shaped flippers with pointed tips and no dorsal fin. They have a hump followed by 8 to 14 "knuckles" along the top of the **caudal peduncle**. Gray whales have dark gray skin with lighter gray patches and white spots. These patches are **barnacles** and whale lice and are easiest to see on the head. Adult Gray whales reach a maximum length and weight of about 48 feet (14 m) and 80, 000 lbs (about 40 tons), respectively. Gray whale calves are, at most, 16 feet long (5 m) when they are born and can weigh up to 1,500 lbs (three-quarters of a ton).

Gray whales are baleen whales. **Baleen** are long flat plates, made of fingernail-like material called **keratin**, that hang from a whale's mouth in place of teeth. Gray whales have 130-180 pairs of baleen plates that are approximately 10 inches in length. Instead of the ventral grooves most baleen whales have, the Gray whale has 2-7 longitudinal creases underneath the head. These creases allow the mouth to expand to accommodate large amounts of water. When baleen whales feed, they take ocean water into their mouths, then push the water back out through the baleen plates. The prey is filtered out by the plates and the whales scrape the food off the plates with its tongue.

Gray whales have two long, narrow **blowholes** that are side-by-side near the top of their heads. They exhale through these blowholes. At rest, a gray whale will spout 2-3 times per minute. Their spouts rise 10-13 feet in the air and can be heard half a mile away! The blow of a gray whale can go straight into the air like a column, like other whales, but can also be low and wide. Having two blowholes, versus the one most whales have, allows for the change in blow.



Drawing courtesy of Sea Grant

The white patches are caused by barnacles and whale lice.

Where do they live?
Gray whales only live in the northern Pacific Ocean. There is evidence that Gray whales lived in the Atlantic Ocean as recently as the 1700s, but no one is sure why that **population** went extinct. Today, the two remaining western populations of Gray whales are in the eastern and western north Pacific. The western population, called the Korean stock, is very small. They spend summers in the Sea of Okhotsk where they feed off of northeastern Sakhalin Island. The migration route of these Gray whales is unknown, but they most likely travel south to warmer waters off southern China during the winter.

The eastern population is much larger and inhabits the west U.S. and Canadian coastlines between the Bering, Chukchi, and western Beaufort Seas (in the summer) to the winter breeding and calving areas off of Baja California in Mexico. They spend 2-3 months in Baja California mating and calving and then return to the Arctic for the next summer. This is one of the longest migrations of mammals, totaling 10,000 or more miles (16,000 km) round trip!

How long do they live?
Gray whales live more than 40 years.

What do they eat?
Gray whales are **benthic** feeders, meaning they feed on the bottom of the ocean. Gray whales dive to the bottom, roll onto their side, and then suck bottom sediments and water into their mouths. Gray whales eat tube worms found in bottom **sediments**, **plankton**, **mollusks**, and small **crustaceans** by feeding this way.

How do they behave?
Gray whales are often found alone or in small groups that do not stay together very long. During feeding and mating season, they can come together in larger groups, but these are only temporary.

Gray whales are predictable when they migrate between feeding and mating grounds. They move in one direction, diving and breathing in regular patterns. Radio tracking by scientists has shown that the whales swim faster as they approach the summer feeding grounds.

Gray whales are very agile swimmers. They usually swim 2-6 miles per hour (mph) (3-10 km/hr), but can make up to 10-11 mph (16-18 km/hr) bursts if they are in danger. When feeding, they swim much slower, usually between 1 and 2.5 mph (1.6 and 4 km). Gray whale dives most often last 3-5 minutes, but can last up to 30 minutes. They will dive up to 500 feet (152 m) deep.

Gray whales are often seen breaching and **spyhopping**. When gray whales breach they jump partially out of the water and then fall back in at an angle. This creates a large splash and a loud noise. The behavior may help clean off some of the parasites (barnacles and whale lice) that attach to gray whales' skin or may be a form of communication. No one knows for sure.

During spyhopping, a gray whale will poke its head up out of the water and then turn slowly around to get a good look at its surroundings. Gray whales are also very curious about boats, which makes them popular for whale watching cruises.

Gray whales generally reach sexual maturity when they are between 6 and 12 years old. After that they begin mating and calving. A female will give birth to a single calf every 2-3 years, on average. Gray whales mate during the winter or early spring. The gestation period is between 12 and 13 months, but scientists believe the calf does not grow any more in the last month before it is born. The calves are born in winter and are independent of the mother after only 7-9 months. The calves will drink 50-80 lbs (22-36 kg) of the mother's milk every day!

NMFS File Photo

All whales need to come to the surface of the water to breathe.

What sounds do gray whales make and why?

Gray whales are not typically known for making a wide range of sounds, but they do make some fairly simple vocalizations. Their calls are best described as knocks, grunts, and pulses. As many as seven different kinds of sounds are produced by gray whales, ranging from less than 100 Hz to 2000 Hz. However, most of them are concentrated between about 300 and 900 Hz; this is a fairly low sounding "pitch", but one that you could clearly hear with your own ears. The hollow-sounding knocking sounds, most commonly recorded on summer feeding grounds, are relatively quiet compared with some of the sounds produced by other baleen whales. Pulses may be repeated in series of 2-30 and are more common during the winter when the whales are breeding. Gray whales are most vocal during this time of the year. Individual gray whales may be able to communicate with one another with their low frequency calls over distances of a mile or more. Scientists still do not know the use of the sounds made by these animals.

(Contributed by Dr. Brandon Southall and Logan Southall)

Gray whale sounds can be found on the web at the following sites:
http://newport.pmel.noaa.gov/whales/graycall.html ,

http://www.dolphinear.com/de500/samples-gray.htm , or

http://www.geocities.com/RainForest/Jungle/1953/101.html

Who are their predators?

Killer whales, large sharks, and humans are the predators of the gray whale.

How many gray whales are in the ocean?

The eastern North Pacific population (from Canada, along the U.S. west coast, and into Mexico) is estimated at 26,000 individuals. This population has made a great recovery from its previous endangered status. This population of whales was protected starting in 1937, and it recovered so well that, by 1994, it no longer needed the protection of Endangered Species Act in the U.S. The western North Pacific Gray whales are not doing as well. There may be as few as 100 animals left there!

Originally, gray whales were over-hunted by commercial whalers. The north Atlantic population was hunted to extinction, and the north Pacific populations came close to the same fate. There was a peak in hunting of the eastern north Pacific whale in the 1850s when the calving lagoons were discovered and again in the early 1900s when floating factories (factory ships) were introduced allowing whales to be processed aboard the ship. Previously, the whaling ships had to haul the entire whale to shore and then to a factory for processing. The factory ships thus allowed more whales to be taken from the oceans. Today, gray whales are still threatened by collisions with ships, entanglement in fishing gear, noise in the ocean, and pollution.

What is being done to help them?

Gray whales were given partial protection from the International Whaling Commission in 1937 and then full protection in 1947. The eastern north Pacific population also received protection from the Endangered Species Act until 1994. Now they are still protected under the Marine Mammal Protection Act. This act gives a level of protection to all marine mammals in the oceans surrounding the United States (U.S. waters).

www.pacific-currents.org

Each whale's fluke is unique, which helps scientists identify individuals.

Glossary:

Baleen: Overlapping plates made of keratin that hang from each side of the upper jaw of certain whales

Barnacle: Marine animal with hard shells that attach to surfaces under water

Benthic: Having to do with the bottom of the ocean

Blowholes: Holes on the top of a whale, dolphin, or porpoise through which it exhales breath

Breach: Partial jump out of the water; whale falls back at an angle

Calf: Young whale

Calving: When a female whale gives birth

Caudal peduncle: Area on the back of a whale between the dorsal fin or hump and the fluke

Crustacean: Marine animal with a segmented body, shell, and jointed legs

Dorsal fin: Fin on a the back of a whale, dolphin, porpoise, or fish

Fluke: End of the tail of a whale

Gestation period: Time a baby spends in the mother's womb before birth

Keratin: Fingernail-like material

Mollusks: Large invertebrates (animals without backbones) that live in the ocean

Plankton: Tiny plants and animals that can only be seen through a microscope

Population: Distinct group of animals within a species that mate only within their group

Pulse: A short sound that is regularly repeated

Sediment: Fine material at the bottom of the ocean

Spout: Exhalation from a whale

Spyhop: Behavior where a whale pokes its head out of the water and slowly turns around to view the surroundings

Ventral grooves: Grooves along the throat area that allow the mouth to expand when the animal is taking in large amounts of water to feed

Ventral Pleats: An adaptation of baleen whales to allow them to take in large amounts of water to filter feed. The pleats run from the lower jaw back toward the tail.

Vocalization: Sound made with the voice

Whaler: A person who hunts whales

NOAA's National Marine Fisheries Service
Office of Protected Resources
www.nmfs.noaa.gov/pr/
Molly Harrison, 2005