

# OCEAN CONNECTORS

WHALE ACTIVITY GUIDE



ART BY EMMA PARKER



## About Ocean Connectors

Our mission is to use migratory marine life to educate, inspire, and connect youth with the Pacific coastal environment. Ocean Connectors was created to address pressing community needs related to environmental awareness, coastal access, and outdoor education. A central aspect of our work is *Connecting Youth for Conservation*, leading to meaningful outcomes for local schoolchildren and the health of the Pacific Ocean. Ocean Connectors is a fiscal sponsorship project of The Ocean Foundation, a 501(c)(3) nonprofit corporation.

## About the Author

Galena Robertson grew up in San Diego, CA with a dedication to protecting the environment. While achieving a Bachelor's of Science Degree in Wildlife, Fish, & Conservation Biology at UC Davis, Galena had the opportunity to intern with Ocean Connectors summer camps. During this internship, her passion for wildlife and environmental education developed even further, and she was tasked with creating a tool to educate students about whale conservation. She hopes this activity book will foster young environmental stewards around the world and help raise awareness about whales and the threats they face.

2019 edits and added pages by Anna Mar.

Cover art by Emma Parker.

## Acknowledgements

The creation and publishing of this book would not have been possible without the help of many special groups and individuals.

I would firstly like to thank Frances Kinney, Ocean Connectors Executive Director, whose vision for this book helped make it a reality.

A huge thank you to the author of the Turtle Talks Activity Book, Zander Srodes, our inspiration.

And most of all, thank you to *you*, our readers, students, and educators, who share a love for whales, wildlife, and conservation.

## References

American Cetacean Society ([www.acsonline.org](http://www.acsonline.org))

Laguna San Ignacio Ecosystem Science Program ([www.sanignaciograywhales.org](http://www.sanignaciograywhales.org))

The Marine Mammal Center ([www.marinemammalcenter.org](http://www.marinemammalcenter.org))

National Geographic ([www.nationalgeographic.com](http://www.nationalgeographic.com))

NOAA Fisheries Service ([www.noaa.gov](http://www.noaa.gov))

Viva Vaquita ([www.vivavaquita.org](http://www.vivavaquita.org))



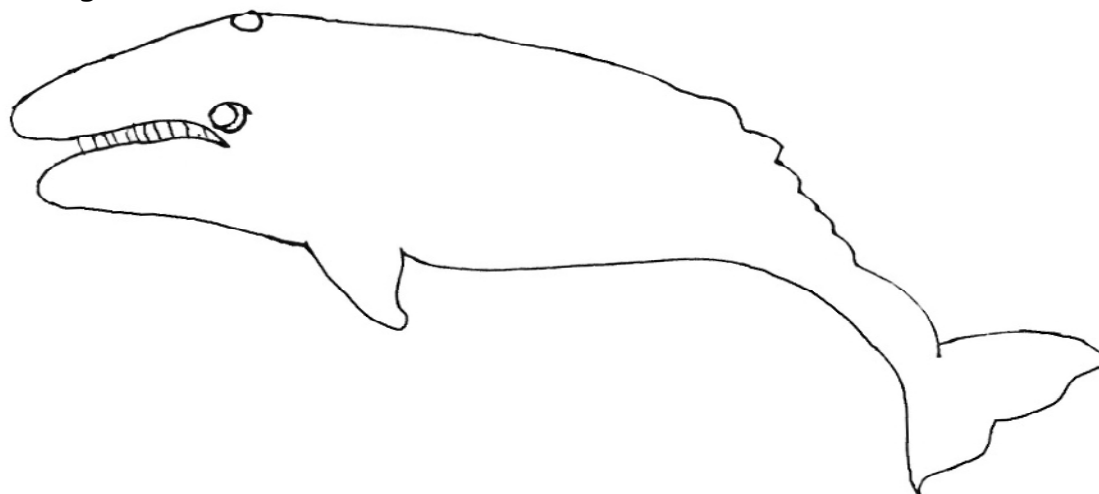


...gray whales can have 100 pounds of barnacles and whale lice living on them at one time!


# Gray Whale

*Eschrichtius robustus*

The gray whale gets its name from its gray body color. Though this whale is mostly dark gray, **barnacles** and whale lice that live on its body leave white and light gray patches. Unlike most whales, the gray whale lacks a **dorsal fin**, and instead has dorsal knuckles. Gray whales can grow to be about 50 feet long. That's about as long as a school bus! The gray whale is a **baleen** whale, meaning that instead of teeth, they have overlapping plates made of **keratin** that look just like straw. Gray whales have 130 to 180 baleen plates on each jaw. The gray whale rolls onto its side and uses these plates to capture and eat small crustaceans that live in the mud on the ocean floor, meaning that the gray whale is a **benthic** feeder. Gray whales can sometimes be seen **breaching**, or throwing themselves out of the water and coming back down with a big splash! The average lifespan of the gray whale is unknown, but some female gray whales have lived to be about 75 years old. Their natural **predators** are killer whales and large sharks, but humans can also threaten these whales. Gray whales were once hunted to near **extinction**, and they are still threatened by ship strikes, bycatch, and pollution. Thankfully, the Eastern Pacific gray whale has made an impressive comeback. Around 20,000 gray whales can now be found **migrating** between their feeding and birthing areas in coastal waters of the Pacific Ocean.



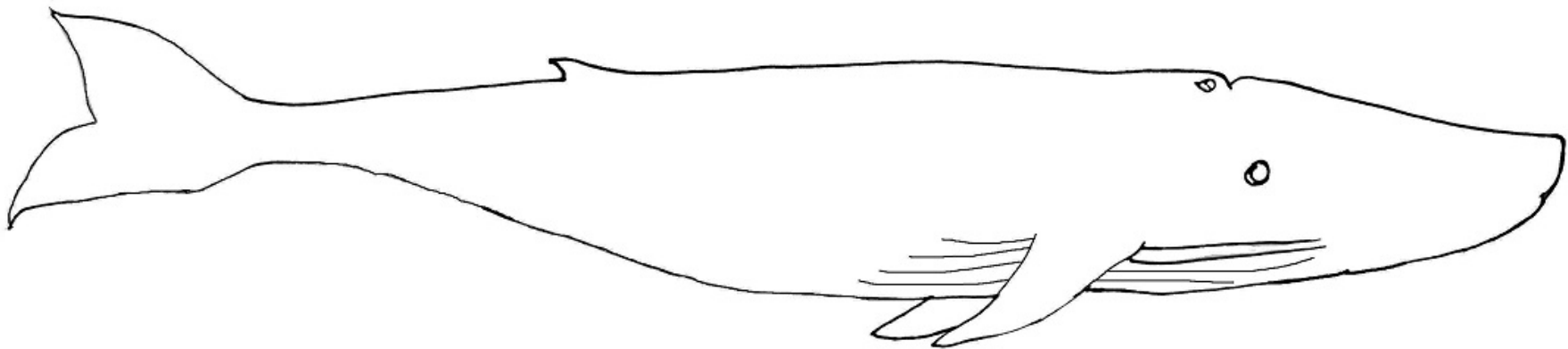
Color the gray whale!  
Don't forget to add  
Barnacles and whale lice!

 **Whale Wisdom** ...a blue whale's heart is as big as a small car!

# Blue Whale

*Balaenoptera musculus*

The blue whale gets its name from its bluish-gray body color. Though the blue whale has a relatively slender body compared to other whales, it is the largest animal ever to have lived on earth, even bigger than the dinosaurs! The largest blue whale ever recorded was 108 feet long, which is longer than two school buses! An adult blue whale weighs more than 25 full-grown elephants! Despite its enormous size, the blue whale is a **baleen** whale that feeds almost exclusively on **krill**, one of the world's smallest creatures. A blue whale can eat 8,000 pounds of krill each day during the summer feeding months. The blue whale travels toward the poles to feed, and **migrates** towards the equator to breed in warmer waters during the winter. Scientists believe that the blue whale inhabits all of the planet's oceans and can live to be about 80-90 years old, but the exact location of blue whale breeding grounds is still a mystery. Due to its large size, this whale has no natural **predators**, but humans nearly hunted the blue whale to **extinction** in the early 1900s. Today, the blue whale is still classified as **critically endangered**, which means there are very few left.



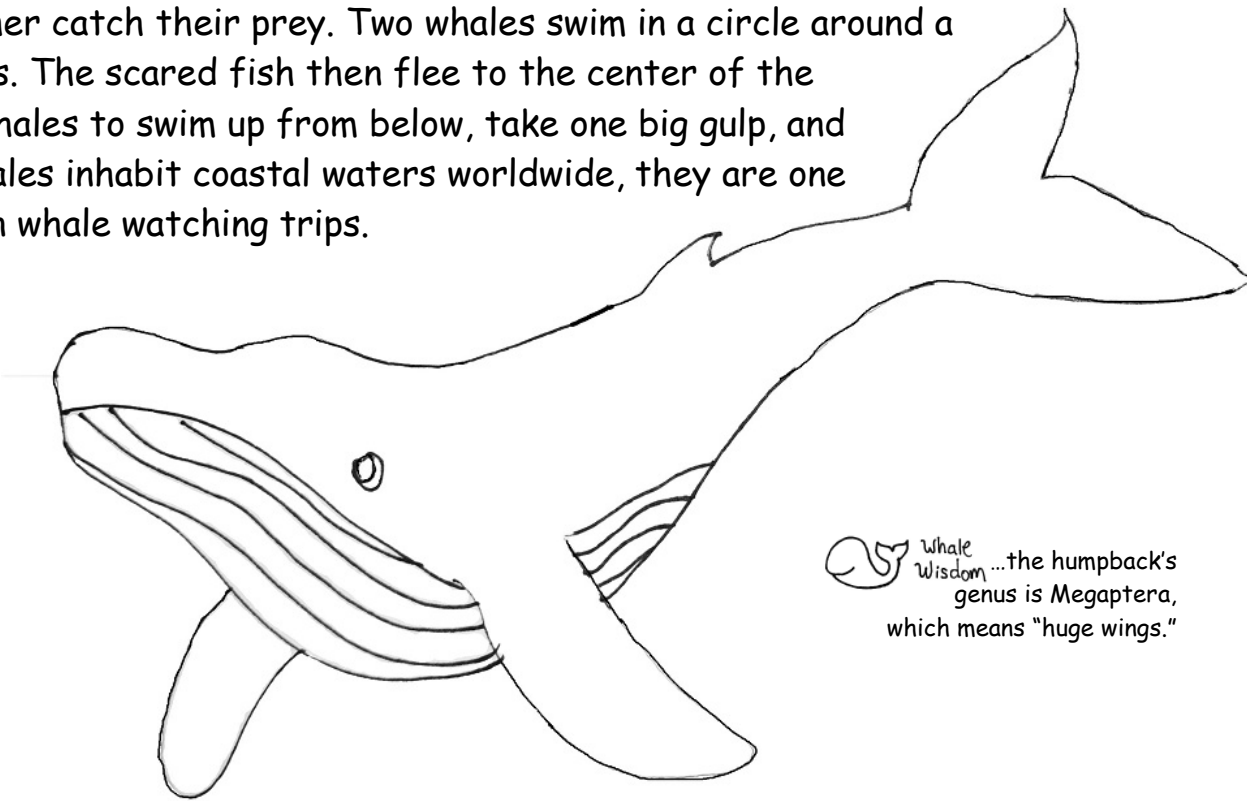
# Humpback Whale

*Megaptera novaeangliae*

An irregularly shaped **dorsal fin** atop a large hump gives the humpback whale its name. The humpback has a black back with a black and white underside, and large bumps along its head and jaw that help it sense vibrations in the water. A humpback can reach about 60 feet in length. The humpback whale has the largest **pectoral fins** relative to body size of any whale—their fins can be up to one third of the whale's total body length! The humpback whale is known for amazing displays of **breaching**, which is when the whale throws its whole body out of the water. As a **baleen** whale, the humpback eats mostly **krill** and small fish, and is one of the only whales known to help each other catch their prey. Two whales swim in a circle around a school of fish while blowing air bubbles. The scared fish then flee to the center of the "**bubble net**", making it easy for the whales to swim up from below, take one big gulp, and eat all the fish! Because humpback whales inhabit coastal waters worldwide, they are one of the mostly commonly seen whales on whale watching trips.

This is a hungry humpback!

Draw a bubble net here ↘



Whale Wisdom ...the humpback's genus is *Megaptera*, which means "huge wings."

# Sperm Whale

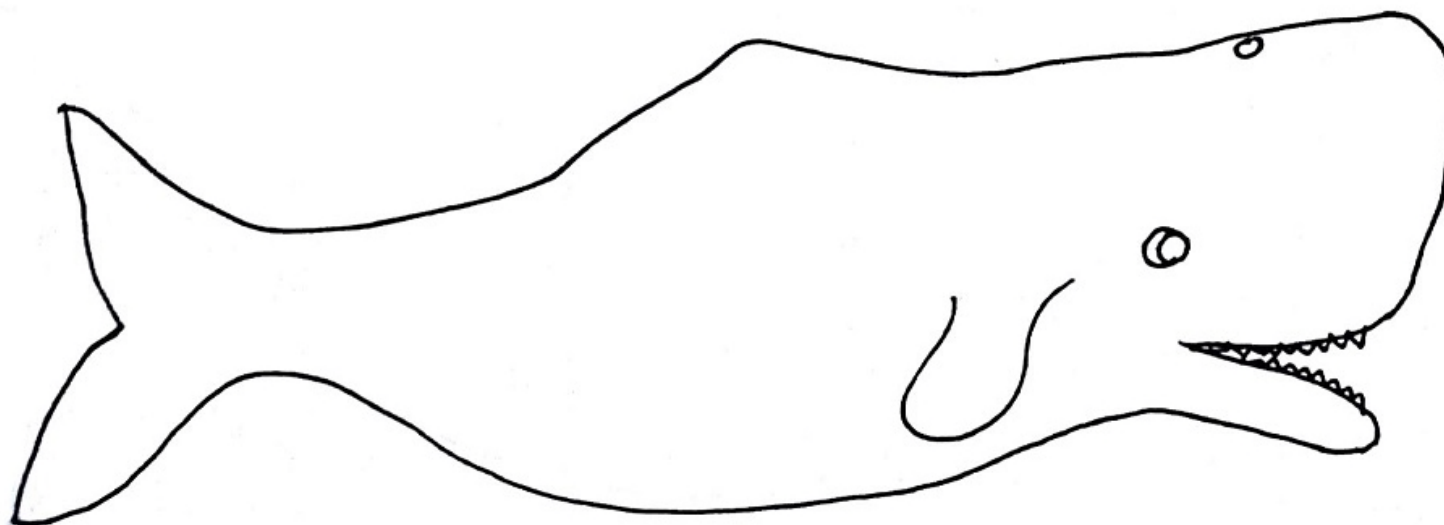
*Physeter microcephalus*



...a sperm whale's brain can


weigh up to 20 pounds!

The sperm whale is the largest of the **odontocetes**, or toothed whales. A sperm whale has about 40 teeth in its bottom jaw, and no teeth in its upper jaw! Instead, they have holes into which their bottom teeth fit. They use their teeth to eat squid, octopus, rays, fish, and even small sharks. They travel in groups called **Pods** of up to around 50 whales. Because the sperm whale likes to dive very deep into the ocean, where it can hold its breath for several hours, it uses **echolocation** to sense its surroundings. This means that the whale emits a sound that bounces off of underwater objects and travels back to the whale. The sound gives the whale information about its surroundings, even when it is too dark to see! Sperm whales are dark gray in color and can reach about 60 feet in length. About one third of the sperm whale's length is its head, which contains the largest brain of any animal! Sperm whales have a lot of oil inside their head, and in the 1900s humans would hunt the whales to use this oil as fuel to light lamps. Because sperm whales were heavily hunted in the past, they are still recovering and are **endangered** today.



Draw what a sperm whale might use echolocation to find in dark, deep waters.

# The Life Cycle of the Gray Whale

 Whale Wisdom...some newborn whale calves can weigh up to 2,000 pounds!

It all begins when the mother gray whale **migrates** from the cold Arctic waters to warm tropical lagoons in Mexico to give birth. When it's time, she swims close to the water's surface so that her **calf** can easily gulp its first breath of air into its lungs. After taking its first breath, the calf will feed on its mother's milk, which is very high in nutrients and fat. Gray whale milk is so dense that it's as thick as toothpaste—it is one of the richest milks in the animal kingdom. A gray whale calf can drink up to 50 gallons of milk in a single day! This helps the calf form its first layer of **blubber**, a thick layer of fat that helps it stay warm and store energy. A newborn calf is already very large, usually about one fourth of its mother's body length and weighing about a ton. Mother gray whales usually give birth to only one calf at a time, every other year or two. While still very young, the calf will learn important lessons from its mother, such as how to feed, migrate, communicate, and survive. In the summer, whales can eat thousands of pounds of **prey** every day! It takes a lot of food to make a whale happy. They have to eat enough in the summer to help them survive through the winter, when most gray whales go several months without eating. Eventually, the calf will grow up and become comfortable being away from its mother. The growing whale will eventually start to accompany other whales on annual migrations to their breeding grounds. When gray whales get to be around 6 years old, they are ready to have calves of their own. They migrate toward the equator and find a mate. The gestation period for gray whale mothers is about a year. The mother whale will return to the same tropical waters to give birth, and the life cycle of the gray whale starts again.

Draw an adult whale in the WINTER here.  
Does this adult have a calf?


Draw an adult whale in the SUMMER here.  
What is this whale eating?

# Gray Whale Migration Challenge

The California gray whale participates in one of the longest known **migrations** of any marine mammal. After feeding near Alaska during the summer, the gray whale begins its journey south to warm waters surrounding the Baja California peninsula in Mexico. The migration takes several months. They swim day and night, usually at speeds of only 2-6 miles per hour. Their **blubber** provides the energy they need, as gray whales usually don't feed during migration. The whales arrive to Mexico between December and January each year, where they give birth in shallow coastal **lagoons**. After spending the winter in these tropical waters, gray whales return to the Arctic to feed. In one year, a gray whale can travel over 10,000 miles!

Can you help this gray whale migrate south for the winter?



 whale wisdom...scientists sometimes use satellite transmitters to track whales on their migrations.



# Whale Anatomy

Can you label this whale's anatomy? Use the word bank and descriptions of each body part to help you fill in the blanks.

**WORD BANK:** Baleen, Fluke, Dorsal Fin, Throat Grooves, Blubber, Pectoral Fins, Blowhole

\_\_\_\_\_ This enables the whale to breathe. Baleen whales have two of these.

\_\_\_\_\_ Whales use this for stability and steering. Remember, gray and sperm whales do not have one!

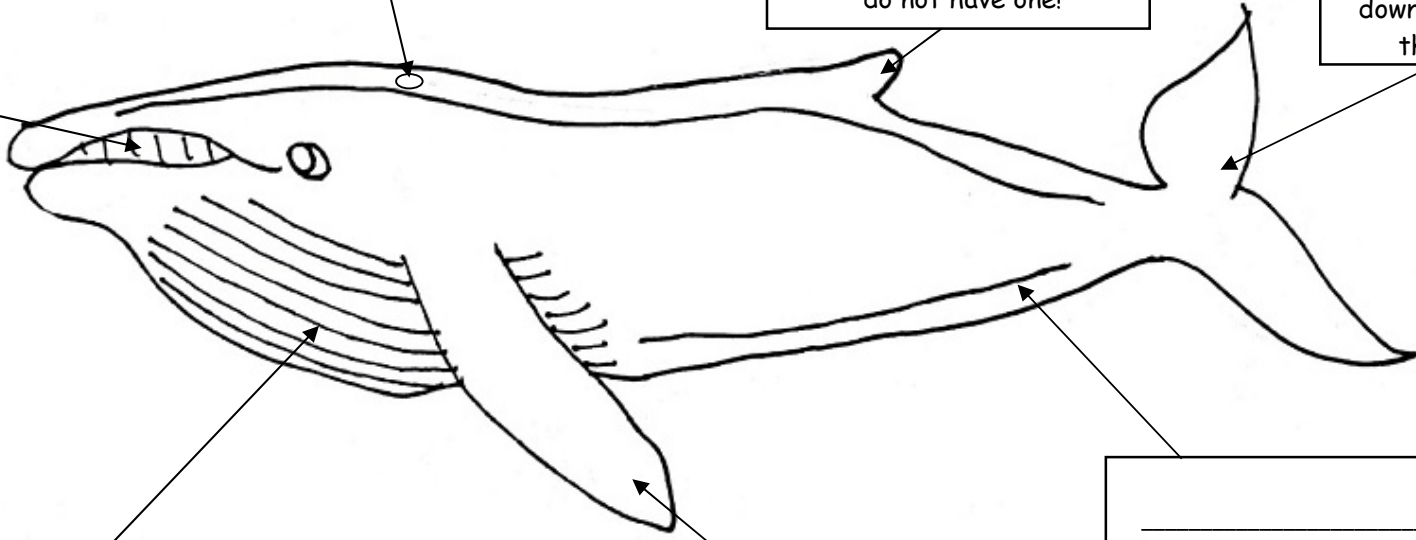
\_\_\_\_\_ When moved in an up and down motion, this propels the whale forward.


\_\_\_\_\_ This is what traps the whale's food. Toothed whales do not have this.

\_\_\_\_\_ These help whales open their mouth as wide as possible when they feed.

\_\_\_\_\_ Whales use these for stability and turning while they swim.

\_\_\_\_\_ This thick layer of fat keeps the whale warm and stores energy.



 *Whale Wisdom* ...the blubber of some whales can be about 2 feet thick!

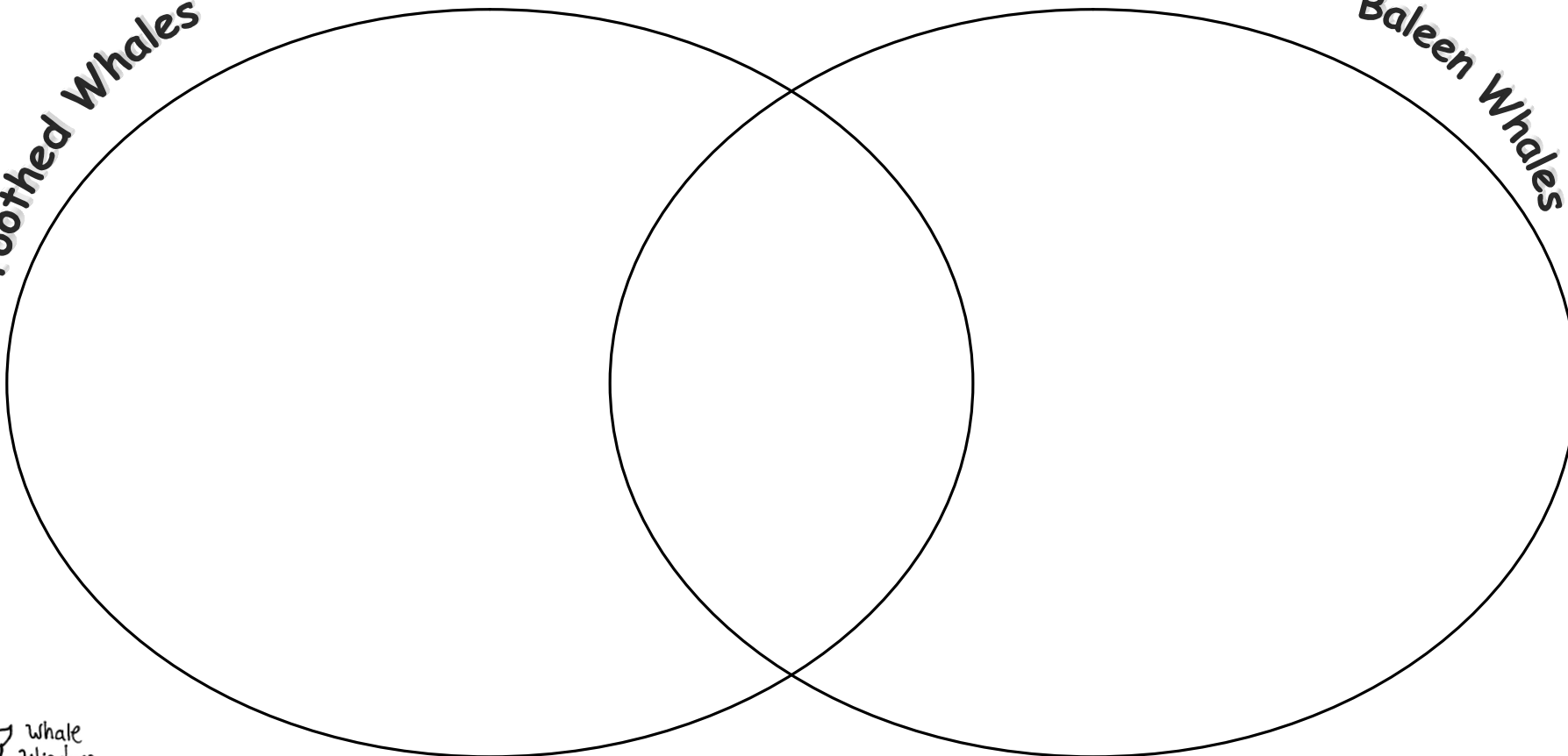
# Toothed vs. Baleen

Can you tell the difference between toothed and baleen whales? Use the words in the word bank to fill in the Venn diagram. Put toothed whale characteristics on the toothed whale side, baleen whale characteristics on the baleen whale side, and characteristics that both share in the overlapping middle section.

eat mostly krill	mammal	females larger than males	one blowhole	have baleen
breathe air	have teeth	males larger than females	eat fish and squid	two blowholes
warm-blooded	have hair	largest animal	have blubber	give live birth

Toothed Whales

Baleen Whales



...scientists can tell how old toothed whales are by the size of their teeth!

## Whales vs. Other Marine Mammals

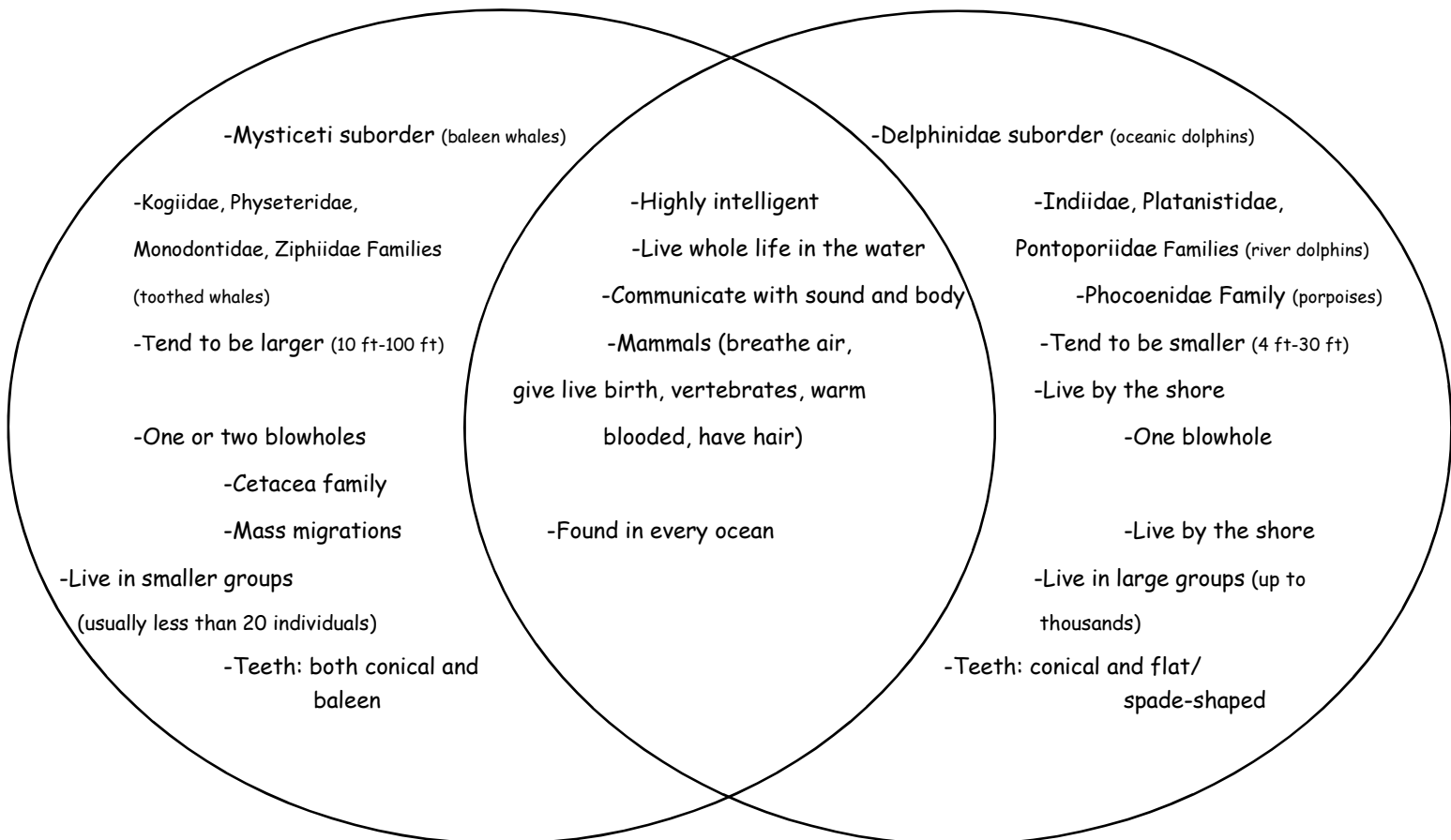
There are many different types of marine mammals living in the oceans—whales, seals, sea lions, dolphins, sea otters, and porpoises. While there is a great diversity amongst them, they are all incredible creatures that have managed to adapt and thrive in the ocean.

In San Diego, California, we can see many types of pinnipeds resting on our local beaches, such as California sea lions and harbor seals. There are currently no sea otters living in Southern California because they were hunted for their fur in the 1800s. These small, furry marine mammals once had a range covering the entire west coast of North America but are now only found in Northern California, Alaska, and Russia. Thankfully, they are slowly making a comeback!

While it's easy to see that whales don't look like seals, sea lions, and sea otters, it's a bit harder to tell the difference between dolphins and porpoises. Learn more in the diagram below!


### Whales

### Dolphins/Porpoises



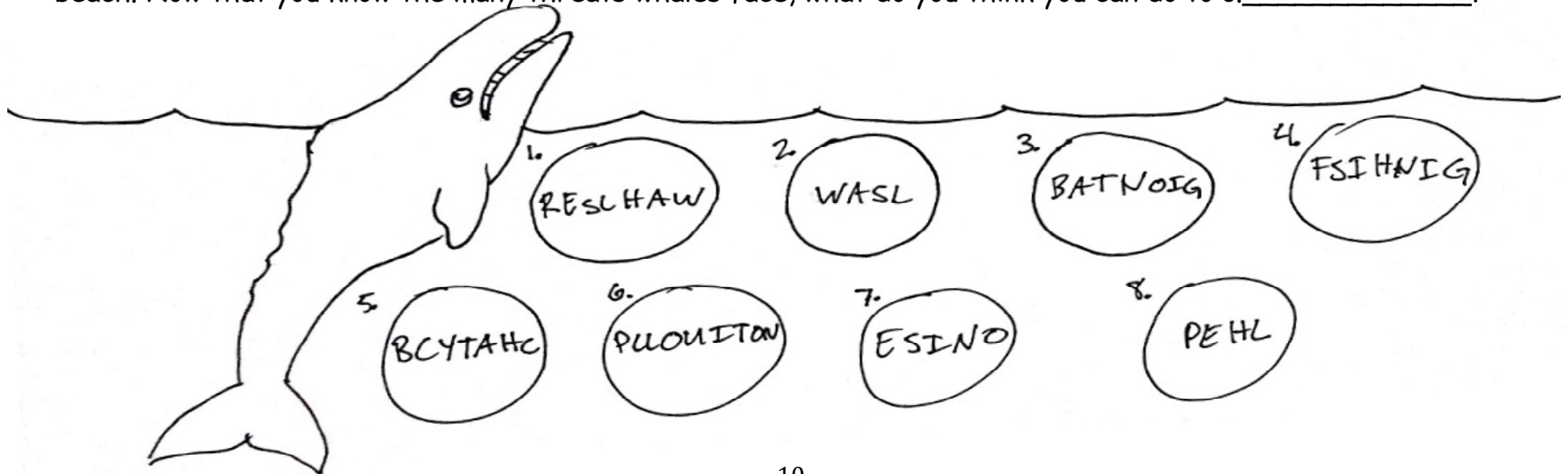
 Whale Wisdom ...there are over 80 different cetacean species!


# Spyhop Scramble

 *Whale Wisdom* ...some fishermen use harmful nets that can drown whales.

Gray whales are known for spyhopping, which means they poke their heads out of the water to view their surroundings. Whales face many dangerous threats in the ocean. What kinds of things do they need to watch out for? Unscramble the words in the bubbles below to help you fill in the blanks in the paragraph.

During the 1800s and early 1900s, whales were in danger of being hunted by 1. \_\_\_\_\_, who nearly depleted the populations of many whale species. While today hunting whales is illegal in most places, some countries are trying to pass 2. \_\_\_\_\_ that will allow the hunting of a certain number of whales each year. Whales are also threatened by 3. \_\_\_\_\_ collisions, because being hit by large ships can injure or even kill whales. Some boats are part of the fishing industry, which causes additional problems for whales. Whales must watch out for 4. \_\_\_\_\_ nets and lines, in which they can easily become tangled and caught as 5. \_\_\_\_\_. Habitat degradation due to 6. \_\_\_\_\_ in the form of chemicals and trash may harm whales as well. When people make a lot of loud underwater 7. \_\_\_\_\_, it can interfere with whale communication and possibly make whales stray from their natural migration routes and strand on the beach. Now that you know the many threats whales face, what do you think you can do to 8. \_\_\_\_\_?



 Whale Wisdom ...in the 1700s, some people would pay \$1,500 for whale oil and bones.

## Whales Need YOUR Help!

Many people don't know that whales have already overcome many obstacles in the past. Hundreds of years ago, **whaling** was as common as fishing. People used whale **blubber** and oil to make wax and to light lamps and candles. Whale **baleen** was made into corsets for women to wear, and whale teeth were commonly carved into chess pieces or piano keys. Some people even killed whales for their meat. Over 200 years of hunting whales for these reasons nearly caused the **extinction** of many whale species, some of whose populations have been reduced by 95%. Today, it is illegal to hunt whales in many countries, and we have substitutes for the products whales were once killed for. Though the threat of hunting is reduced, whales still face other dangers, such as ship strikes, pollution, and entanglement in fishing gear (known as **bycatch**). Since you know that some whales are still in jeopardy, you can help them! The best thing you can do is to be educated and spread the word to your friends and family. If more people understand the threats to whales, more people will be willing to help. You can also reduce pollution by recycling, reusing, and trying not to use a lot of plastic. Below, write three things you can do to help whales and three things you can tell other people about whales. When you get home, share these ideas with your family!

What can you do to help whales?

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

What can you tell others about whales?

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

# Conservation Discussion

Estimates of extinctions per year range from 200-2,000 different species. There are many different reasons species become extinct—poaching (illegal hunting), bycatch, habitat loss, ship strikes, plastic ingestion, and other types of pollution. While it may seem that all is lost, there is still hope!

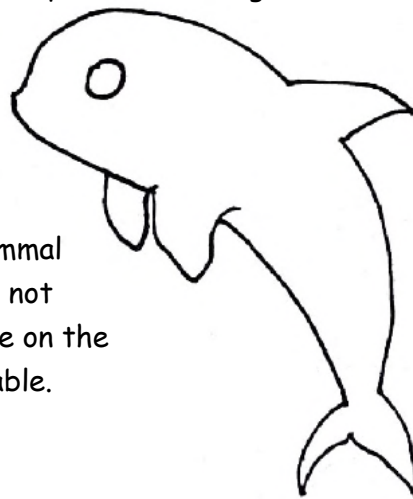
## Gray Whale

There have been three species of gray whales on earth that we know of. The North Atlantic (extinct), Western North Pacific (critically endangered), and those off the coast of California, the Eastern North Pacific (ENP). The ENP gray whale was hunted almost to extinction in the 1950s. Whalers were able to follow their predictable migration pattern, and sold their blubber, oil, and meat for a lot of money. It wasn't until the 1970s, when the U.S. government placed them under the protection of the Endangered Species Act and the Marine Mammal Protection Act that their populations finally started to recover.

Through the efforts of the U.S. government and other countries, educators, law enforcement, and scientists, the gray whale was taken off the endangered species list in 1994. They are now at a much healthier population of about 20,000 individuals. This is considered a big win in the field of conservation!

## The Vaquita

The vaquita is a porpoise and the world's most endangered marine mammal (2019), with less than 20 left in the wild. Vaquita means "little cow" in Spanish and they are less than 5 feet in length. They have gray bodies with dark eyes and are sometimes called "pandas of the sea." Vaquita are endangered because they get trapped in gillnets in their habitat, the Gulf of California. Gillnets are an illegal way to fish in some parts of Mexico but fishermen are willing to risk it in hopes of catching a totoaba fish for its swim bladder, highly sought after in Chinese medicine with an average value of \$5,000-\$30,000 per swim bladder. Sadly, the vaquita is likely to be the second functionally extinct marine mammal within our lifetime, the first being the Yangtze river dolphin. We do not know exactly what effects the disappearance of the vaquita will have on the Gulf of California but we do know that their extinction was preventable.



**Group Discussion Questions:** Is there any way to save the vaquita now? What could have been done 10 years ago? 20 years ago? Should it be the U.S. government's job to step in and protect wildlife like we did for the gray whale, or the Mexican government, or both? What can individual people do to help marine mammals? How do you feel about marine mammals being in captivity?

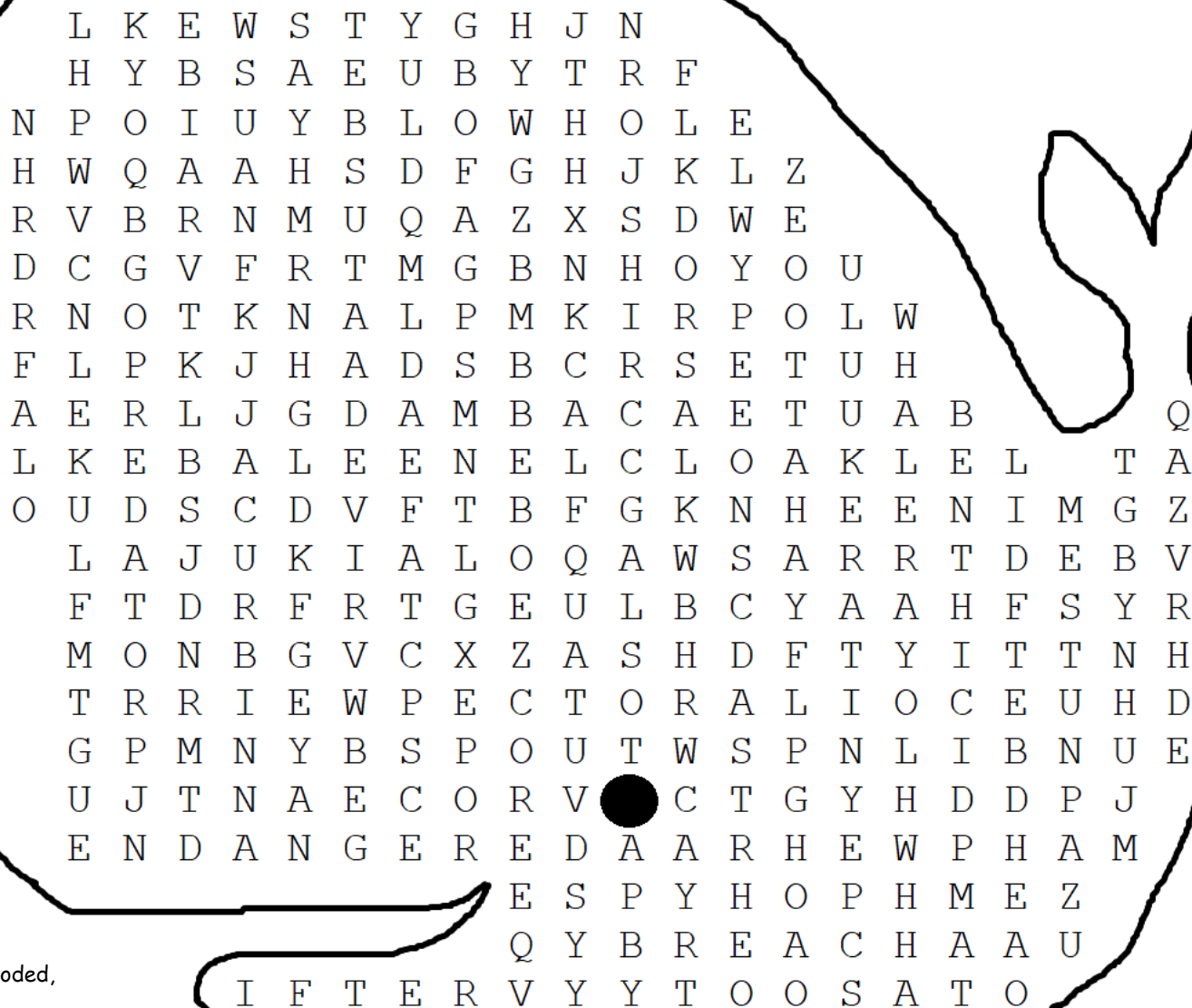


...there are over 40 marine mammal species that are classified as endangered or threatened.

# Whale Word Search

Can you find all of the words in the whale word search? The words can go up, down, forwards, backwards, and even diagonal. Think about how each word relates to whales.


- |          |            |
|----------|------------|
| Gray     | Migrate    |
| Blowhole | Ocean      |
| Plankton | Endangered |
| Humpback | Spyhop     |
| Baleen   | Breach     |
| Fluke    | Pectoral   |
| Calf     | Keratin    |
| Dorsal   | Whaler     |
| Spout    | Benthic    |
| Blue     | Predator   |



A word search grid shaped like a whale, containing the following letters:

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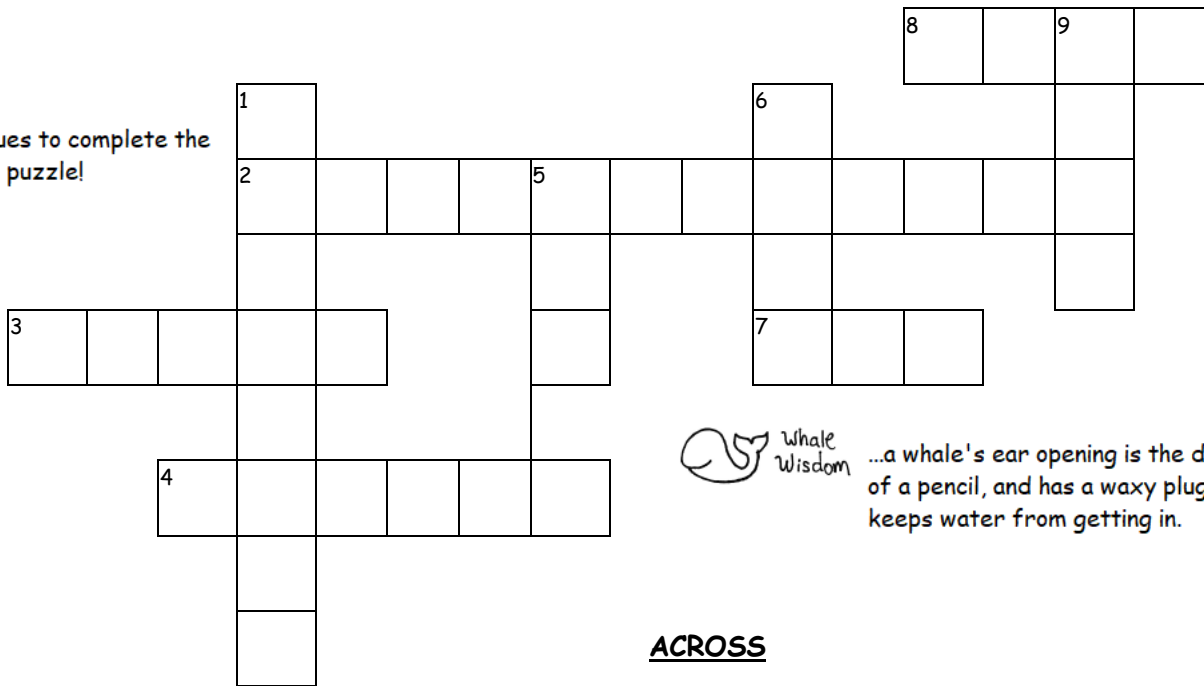
L K E W S T Y G H J N
H Y B S A E U B Y T R F
N P O I U Y B L O W H O L E
H W Q A A H S D F G H J K L Z
R V B R N M U Q A Z X S D W E
D C G V F R T M G B N H O Y O U
R N O T K N A L P M K I R P O L W
F L P K J H A D S B C R S E T U H
A E R L J G D A M B A C A E T U A B
L K E B A L E E N E L C L O A K L E L T A
O U D S C D V F T B F G K N H E E N I M G Z
L A J U K I A L O Q A W S A R R T D E B V
F T D R F R T G E U L B C Y A A H F S Y R
M O N B G V C X Z A S H D F T Y I T T N H
T R R I E W P E C T O R A L I O C E U H D
G P M N Y B S P O U T W S P N L I B N U E
U J T N A E C O R V C T G Y H D D P J
E N D A N G E R E D A A R H E W P H A M
E S P Y H O P H M E Z
Q Y B R E A C H A A U
I F T E R V Y Y T O O S A T O
  
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 **Whale Wisdom** ...like all other mammals, whales are warm-blooded, have hair, and breathe air!

# Did You Hear That?

Scientists believe that whales use sound to communicate with each other. Whales can make sounds in multiple ways. First, they can use their voices. To do this, a whale forces air out through passages in its nose, resulting in a loud sound than can travel hundreds of miles underwater. Blue whales can make sounds that are so low that humans cannot hear them! Whales can also sing a "song" which means they make a repeated pattern of noise for 30 minutes. Whales that breach, or jump out of the water, make a very loud splash, which may also be used for communication. Scientists think that whales may communicate to find mates for the breeding season. Most species of toothed whales, like the sperm whale, use sound for echolocation, which allows them to sense objects in very dark waters. There is still much research to be done to learn more about whales and their amazing sounds!

Use the clues to complete the crossword puzzle!



...a whale's ear opening is the diameter of a pencil, and has a waxy plug that keeps water from getting in.

## DOWN

1. Scientists still need to do more \_\_\_\_\_ to learn more about whale sounds.
5. Blue whales can make sounds that are too \_\_\_\_\_ for humans to hear.
6. Whales may make sounds to attract a \_\_\_\_\_ for breeding season.
9. If a whale makes a pattern of sound that repeats for 30 minutes, it is called a \_\_\_\_\_.

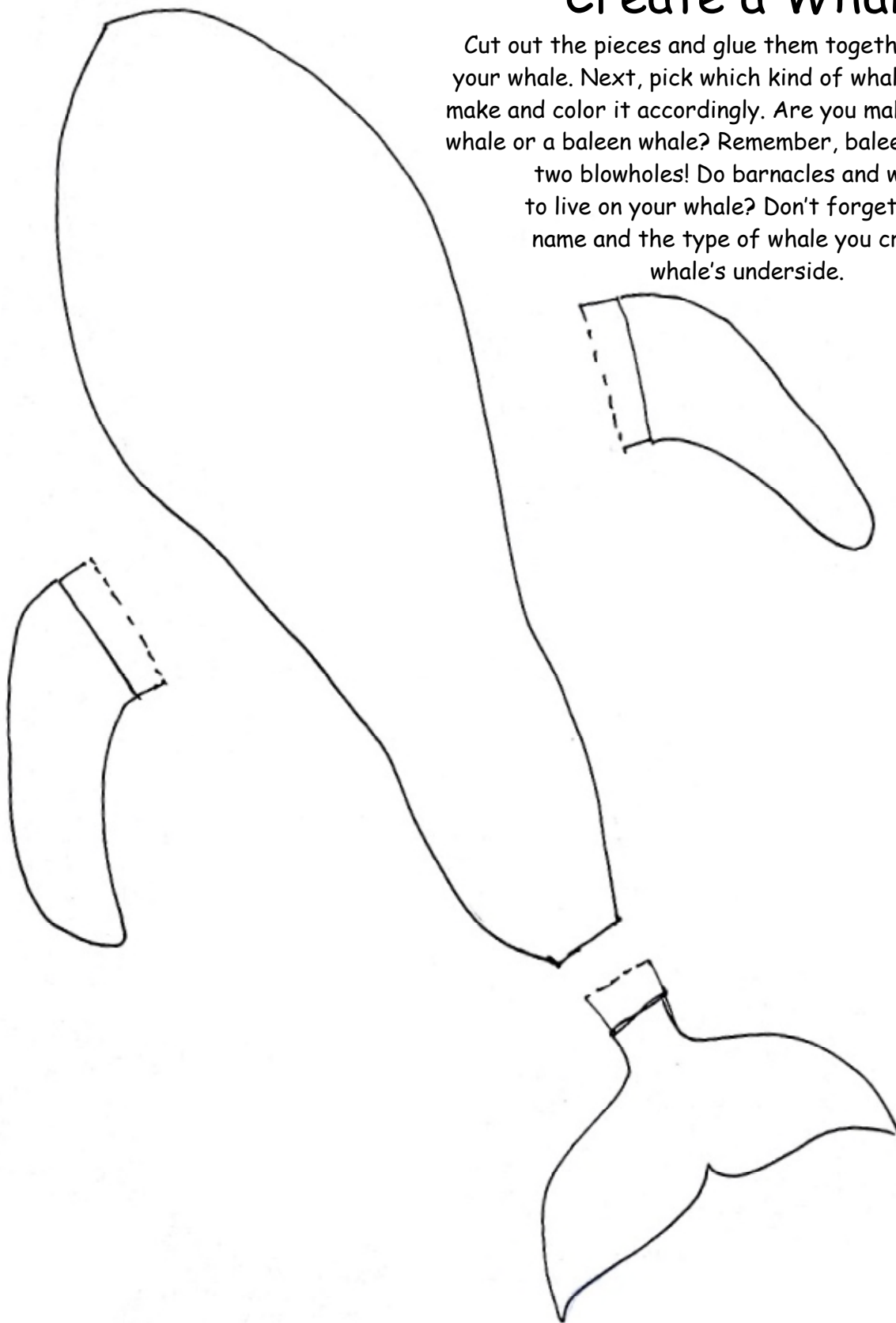
## ACROSS

2. Most toothed whales such as the sperm whale use this skill to sense objects in dark waters.
3. Some whales can make sounds that travel hundreds of \_\_\_\_\_ through the water.
4. Scientists believe whales may use this jumping out of the water behavior to communicate.
7. Whales have one very small \_\_\_\_\_ on each side of their head, which allows them to hear other whales.
8. While for most animals, the \_\_\_\_\_ is used just for smelling, whales depend on it to make sounds.



## Create a Whale

Cut out the pieces and glue them together to create your whale. Next, pick which kind of whale you want to make and color it accordingly. Are you making a toothed whale or a baleen whale? Remember, baleen whales have two blowholes! Do barnacles and whale lice like to live on your whale? Don't forget to write your name and the type of whale you created on the whale's underside.

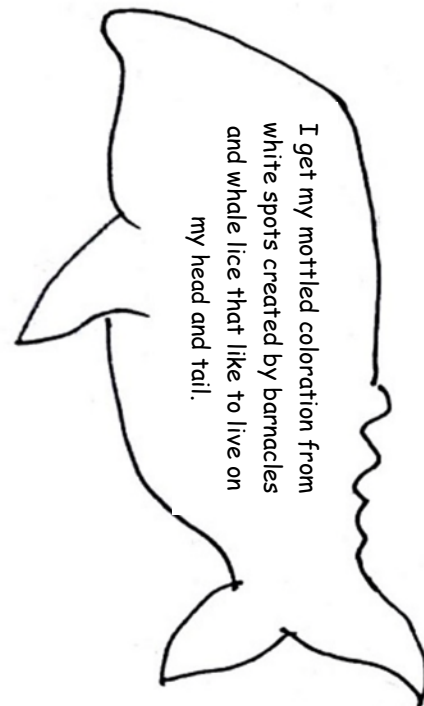
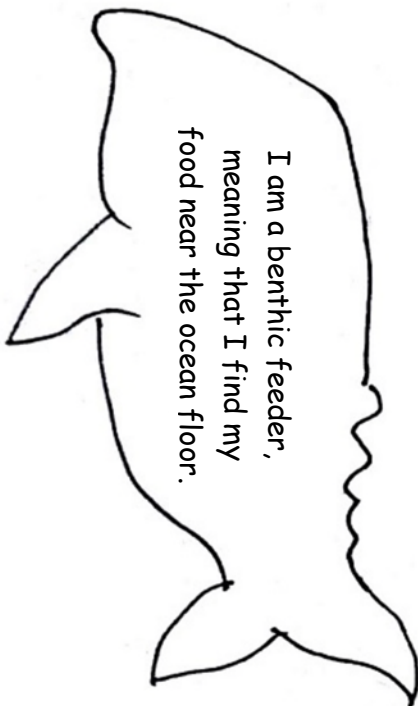
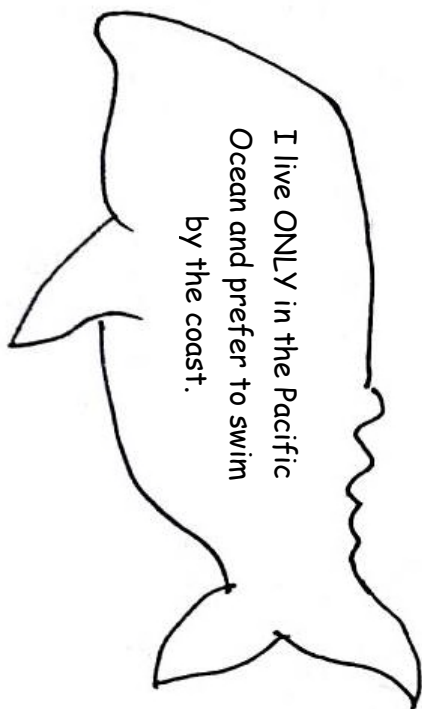


## Which Whale Are YOU?

Attention new whale experts! It's time to show how much you really know about the different species of whales. Copy, cut out, and give each friend a different whale name tag to decorate. Then use the clues to guess who is a gray whale, blue whale, sperm whale, humpback whale, beluga whale, or pilot whale!

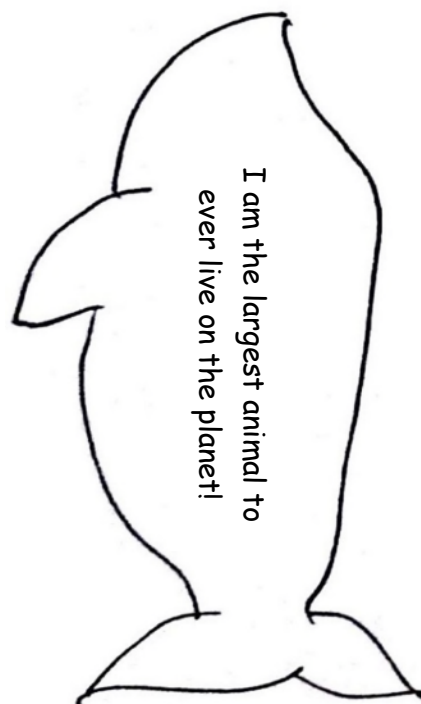
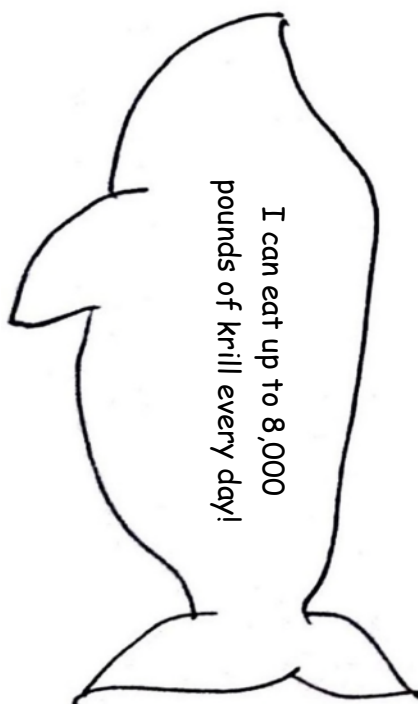
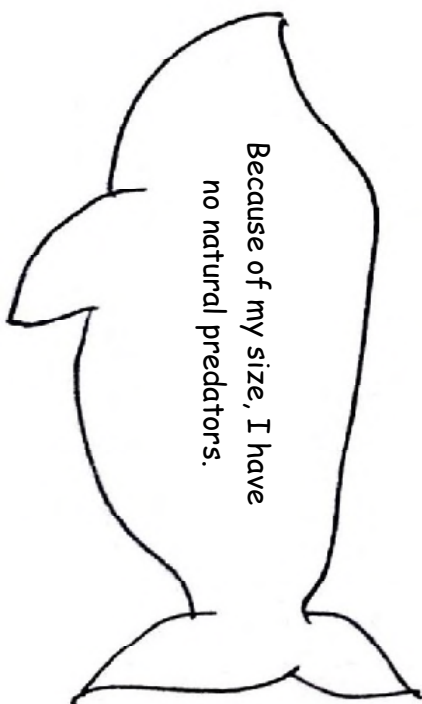
### Gray whales

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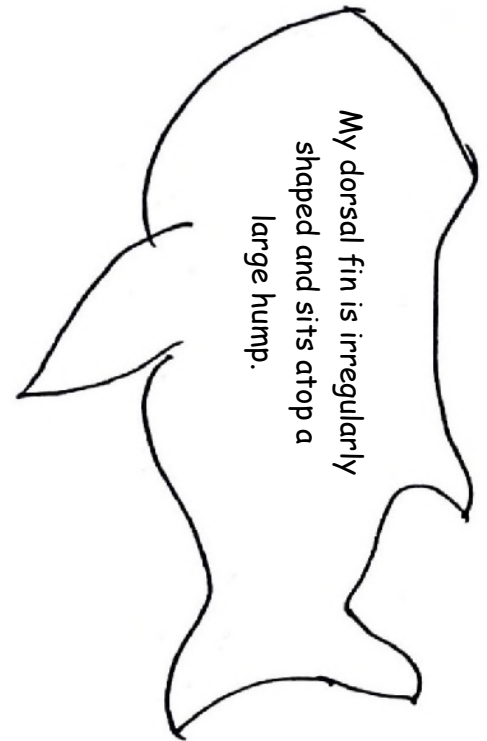
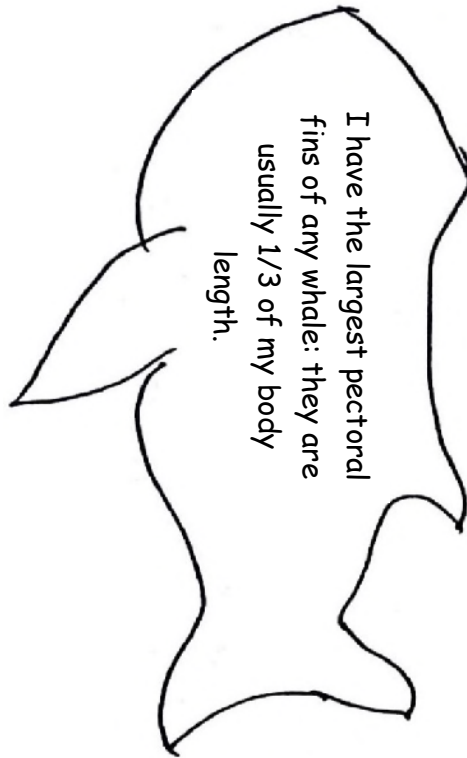
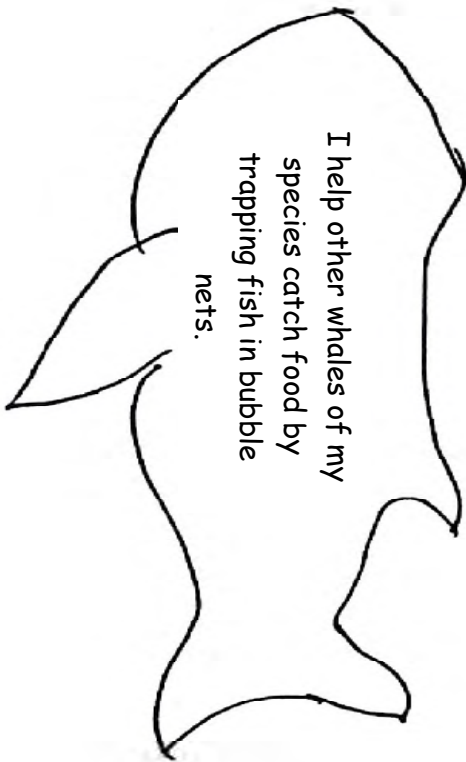
### Blue whales

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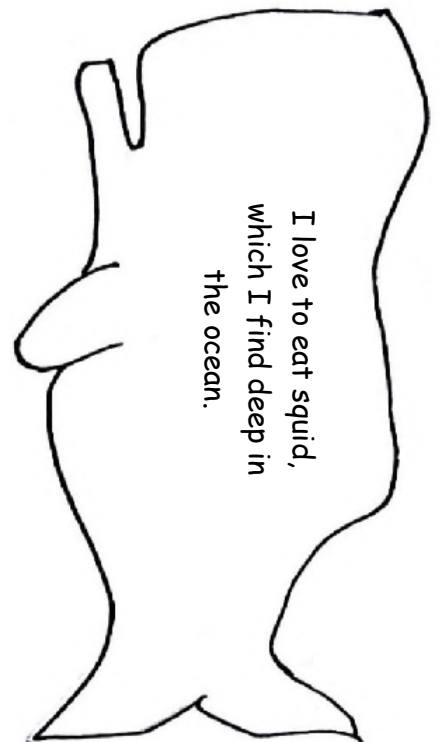
## Humpback whales

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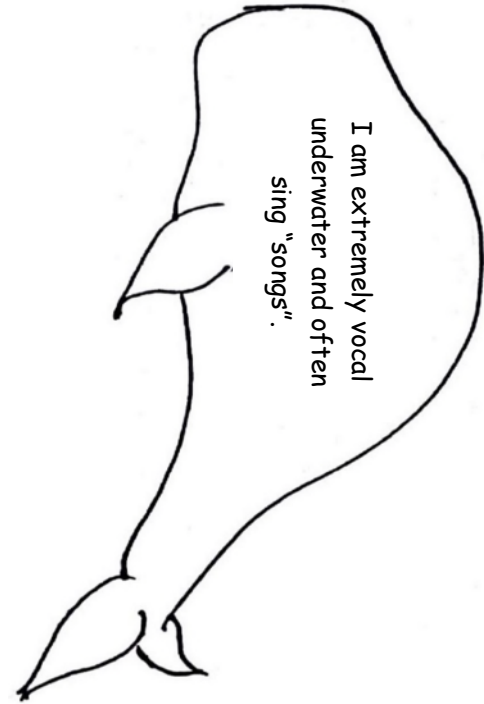
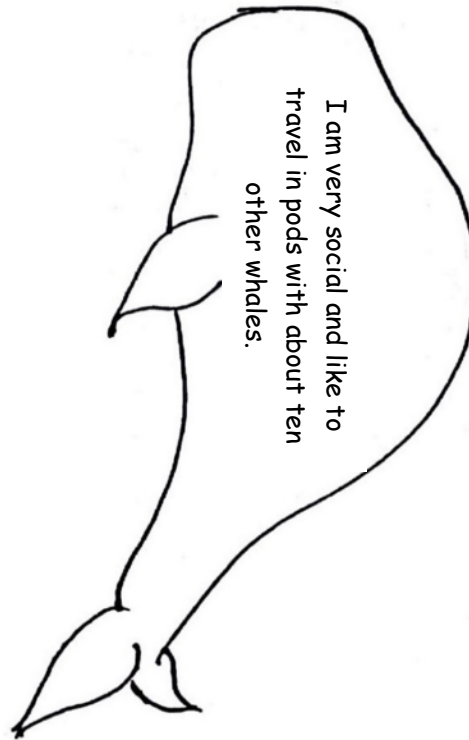
## Sperm whales


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## Beluga whale

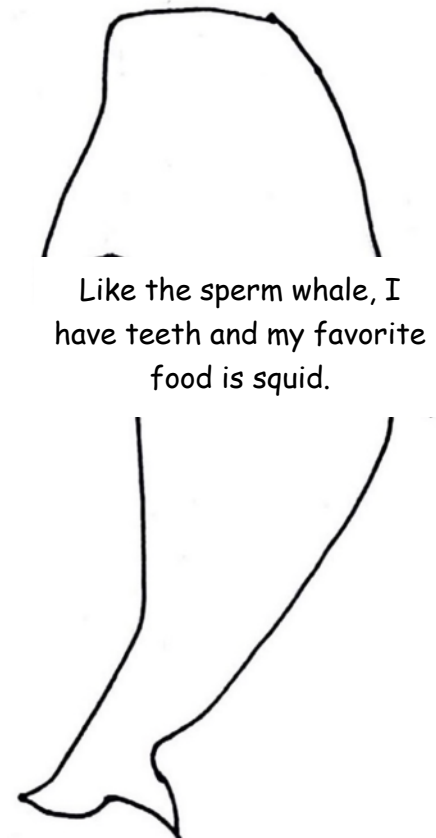
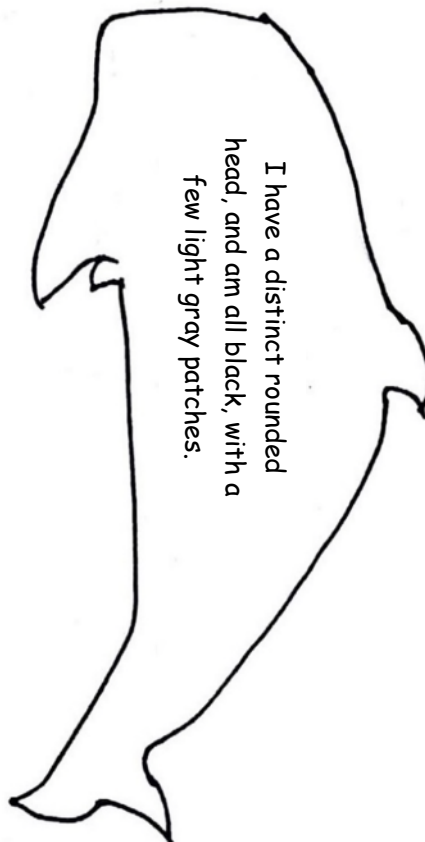
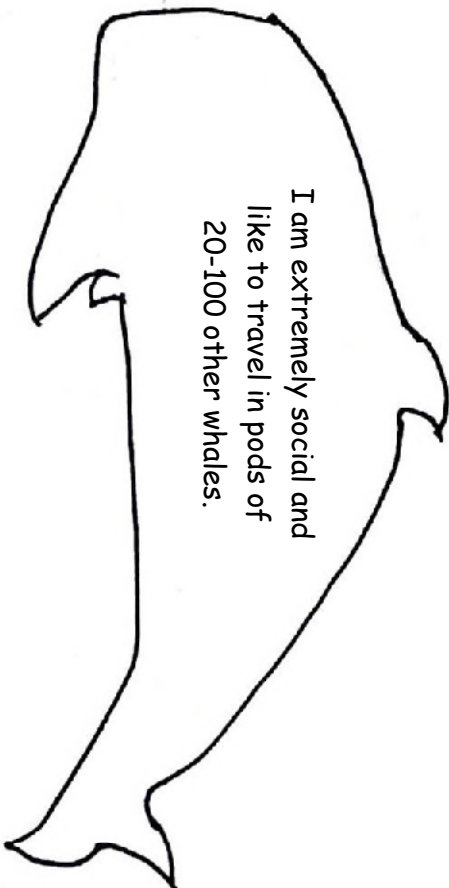
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 Whale Wisdom ...though rare, pilot whales can be found in pods of up to 1,000 whales!

## Pilot whale

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# Whale Glossary

**Baleen:** plates of keratin that hang from the upper jaws of baleen whales. Whales use baleen to strain ocean water and catch prey.

**Barnacle:** small, hard-shelled animal that attaches to surfaces underwater, sometimes to whales

**Benthic:** involving the bottom of the ocean

**Blowhole:** the hole or holes on top of a whale, which it uses to breathe

**Blubber:** a layer of fat between a whale's skin and muscle that keeps whales warm and stores energy

**Breach:** the act of jumping out of the water and falling back to the surface

**Bycatch:** animals caught unintentionally

**Calf:** young whale

**Dorsal fin:** the fin on a whale's back

**Echolocation:** sonar used by some animals that allows them to discover their surroundings through sound

**Endangered:** at risk of becoming extinct

**Extinction:** the permanent disappearance of a species from the planet

**Fluke:** the tail of a whale

**Gestation Period:** the length of time a female is pregnant

**Keratin:** the substance baleen is made of. Fingernails and hair are also made of keratin.

**Krill:** very small marine crustaceans

**Migrate:** the movement from one location to another, usually by a group of organisms, and usually repeated

**Odontecete:** a toothed whale

**Pectoral Fin:** the fins on either side of a whale

**Plankton:** very small marine organisms, eaten by some whales

**Pod:** group of whales

**Predator:** an animal that preys upon other animals for survival

**Range:** the area where an animal is found

**Spout:** a whale's exhalation

**Spyhop:** a whale's behavior in which it pokes its head out of the water to view the surroundings

**Threatened:** at risk of becoming endangered

**Whaler:** a person who hunts whales

**Ventral pleats/throat grooves:** the grooves along a whale's throat that allow the whale to open its mouth as wide as possible



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The Whale Activity Guide can be downloaded from <http://oceanconnectors.org/resources>.

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