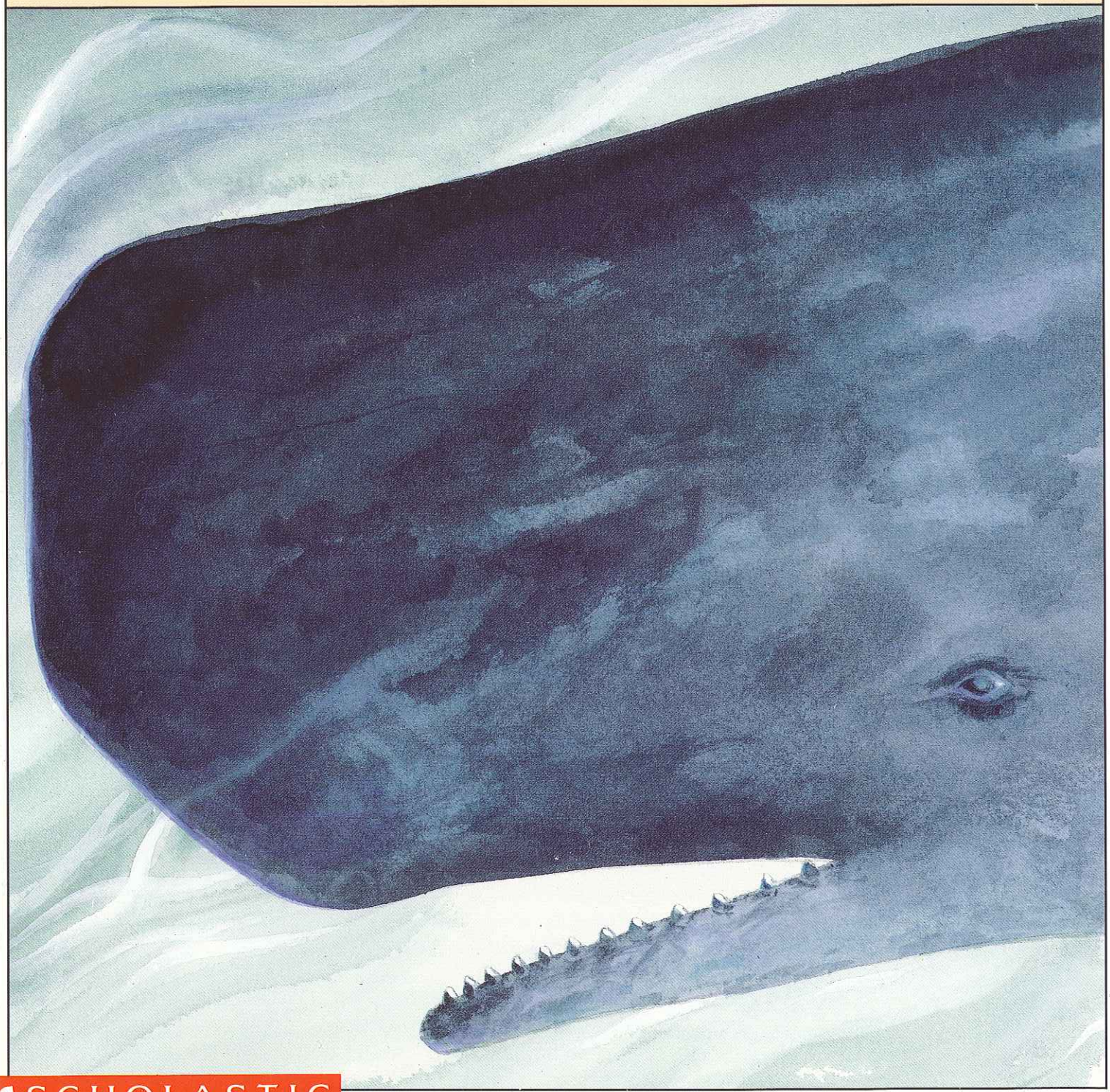
LEARNING CONNECTIONS
GRADES 1-4

WHALES

ACTIVITIES BASED ON RESEARCH FROM THE CENTER FOR COASTAL STUDIES

Written and Edited by Kath Buffington, Maria Fleming, Deborah Kovacs, Karen Steuer, and Nathalie Ward



SCHOLASTIC

WHALES

ACTIVITIES BASED ON RESEARCH FROM THE CENTER FOR COASTAL STUDIES

written and edited by

KATH BUFFINGTON, MARIA FLEMING,
DEBORAH KOVACS,
KAREN STEUER, AND NATHALIE WARD

SCHOLASTIC
PROFESSIONAL BOOKS

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This activity book is dedicated to
Dr. Barbara S. Mayo,
Founder of the Center for Coastal Studies.
Her life-long devotion to saving coastal and marine
environments was an inspiration to all ages.

The publication of this book was made possible in part through the support of the Center for Coastal Studies' members, the Jessie B. Cox Charitable Trust, the Seth Sprague Educational and Charitable Trust, and the Fund for Preservation of Wildlife and Natural Areas.

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INTRODUCTION

Here at the Center for Coastal Studies, scientists take to the water year round to observe whales in their natural habitat. Our headquarters in Provincetown, Massachusetts, on the tip of Cape Cod, is an excellent location for conducting whale research. Most of the year, the waters around our facility are home to many whales. A whale watch is a little bit like a safari: it is a special chance to see some of the largest animals on Earth in the wild, free to come and go as they please. If you go on a whale watch, you might think that whales are common. In fact, a few types, such as white-sided dolphins and minkes, are common in some places. But there are many fewer whales today than there once were. Some species are almost extinct. So for us, each sighting is a special event.

Studying whales and their environment has been an important part of our work at the Center for Coastal Studies since it was founded in the mid-1970's. We may be best known for our studies of endangered whale species, such as humpback and northern right whales, and for our work rescuing whales entangled in fishing gear. We also work hard to protect coastal ecosystems from pollution, dumping, and overdevelopment.

This book grew out of a series of lessons we developed to teach students about whales and about the work of whale researchers. We hope that the information and activities will spark students' interest in these amazing animals and instill in them a desire to help preserve whales habitat and safety.

The effort to save whales and study them is fairly new. We have just begun to learn about whales' mysterious lives. We are glad to share some of our discoveries with you and your students.

David DeKing,
Executive Director

The staff of the Center for Coastal Studies

GETTING TO KNOW WHALES

In recent years, whales have become the focus of increased attention as concern about their depleted populations has emerged. This has resulted in a growing body of information about whales, although scientists still have a host of unanswered questions about these elusive animals. This book is designed to introduce students to what scientists do know about whales and their behavior through a series of exciting activities designed to promote learning. Students are given the opportunity to do lots of fun, fact-based projects as well as "accompany" scientists on a whale watch and find out about the painstaking process of whale research. The book also includes a pull-out poster of whale tails—known as flukes—which you may want to display as your students embark on their journey of whale discovery.

Mammals of the Sea

A frequent misconception about whales is that they are fish. Whales are actually mammals, which puts them in the same animal group as dogs, apes, and human beings. Like all other mammals, they are warm-blooded, bear live young, have hair, and breathe through lungs. Mammals have highly developed brains and are believed to be extremely intelligent.

Whale Adaptations

Most mammals live on land. Why don't whales? Their ancestors probably did. Scientists believe that one of the earliest known whale ancestors was a four-legged creature that lived on land about 55 million years ago. It may have been a meat-eater. As millions of years passed, this creature found more food in the water than on land. Its body changed gradually over time so that it could live better in the water. Finally, the whale we know today found its form.

What are some of the evolutionary changes this animal underwent? Forelegs became flippers. The creature's nostrils moved from the front of the head to the top, creating the blowhole on modern-day whales. Blubber, the dense insulating fat layer that protects it from cold water, began to form. Since whale skeletons also contain the remnants of what was once a pelvic, or hip bone, many scientists think whales once had back legs, too.

Types of Whales

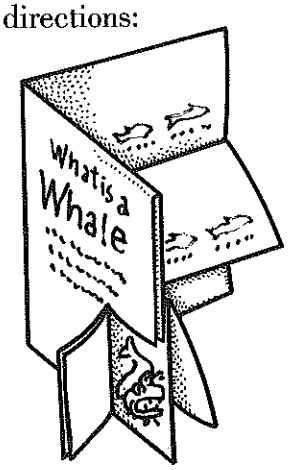
Whales belong to the scientific order called *Cetacea*. There are more than 76 kinds of Cetacea. This order of mammals includes everything from the great whales—which may grow as long as 100 feet—to smaller dolphins and porpoises. Cetaceans are generally grouped into two categories: toothed whales (Odontocetes) and baleen whales (Mysticetes). The former have teeth while the latter have hairy-edged plates, called baleen, instead of teeth.

STUDENT ACTIVITIES

Whale Characteristics

MAKE A MINI-BOOK: Students can get better acquainted with whales by making and reading the mini-book on the following two pages. Make double-sided photocopies of pages 9 and 10. (Be careful not to invert the copy on the reverse side of the page.) Distribute a copy to each child. Students can put together their mini-books by following these directions:

1. *Begin with the side showing lines A, B, C, and D facing up on the desk.*
2. *Cut along lines A and B.*
3. *Fold the bottom half of the page up along line C.*
4. *Fold the top of the page down along line D.*
5. *After making a crease, push the flap you just made back up into place.*
6. *Fold the book in half along line E so that the title page faces you.*



Finished mini-books should look like the illustration above.

LEARN WHALE ANATOMY: Pages 11–14 will help students get to know whales inside and out. Make double-sided photocopies of the page and distribute them to students.(Be careful not to invert the copy on the reverse side of the page.) After reviewing different parts of the whales' anatomies, students can hold the page up to the light to sneak a peak at the two whales' skeletons, which will show through from the other side of the page.

MAKE A BLUBBER GLOVE: Page 15 is a hands-on science activity that will help students find out about an adaptation that distinguishes whales from most other mammals: the thick layer of blubber beneath their skin that enables the warm-blooded animals to tolerate frigid ocean temperatures and that serves as a reservoir for food when they are not feeding.

What Is a Whale?

Though it lives in the ocean and spends its days swimming, a whale is not a fish. It is a *mammal*. Like all mammals, whales have hair and breathe air through lungs. They also give birth to live young instead of laying eggs.

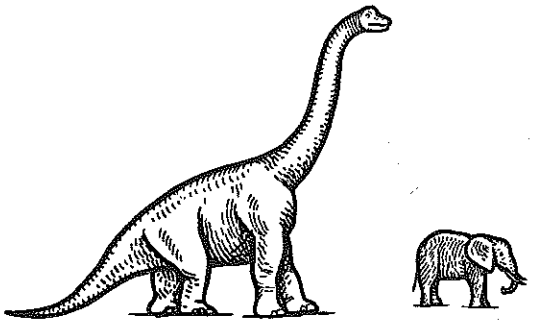
Whales belong to the order of mammals called Cetacea (see-TAY-shuh). This name comes from a Greek word that means "sea monster."

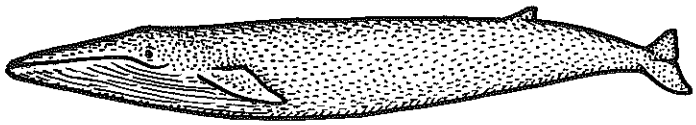
Open the flap to see what people used to think whales looked like.

Monsters of the Deep

fold

How Big Is a Whale?





What is most amazing about whales is their size. Blue whales may be the largest animals that have ever lived on Earth. They are heavier than the largest dinosaur—Brachiosaurus—and the largest living land animal—the elephant. A whale's enormous weight is supported by the water it lives in.

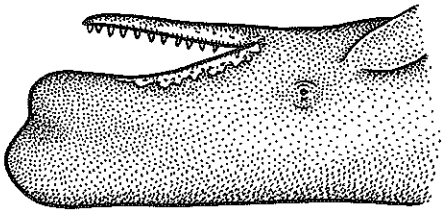
fold

fold

Types of Whales

Scientists divide whales into two main groups: *toothed whales* and *baleen whales*.

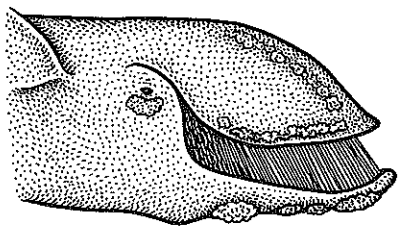
Toothed Whales



Mouth of Toothed Whale

Toothed whales have teeth for catching food. They eat mainly fish and squid. Toothed whales don't look for food—they listen for it. Have you ever heard your voice echo? Toothed whales use echoes to find food. A whale sends out a sound. When the sound hits an object, it makes an echo. The echo bounces back and tells the whale the size, shape, and distance of the object—and whether it would make a good meal! Scientists call this way of finding food *echolocation*.

Baleen Whales

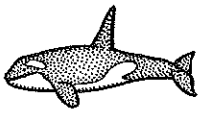


Mouth of Baleen Whale

Baleen whales don't have teeth. Instead, they have long, flat plates called *baleen* that hang down from the roof of the mouth like a comb. At the edge of each plate of baleen is a row of stiff hairs. The whale feeds by filling its mouth with a huge gulp of water. It then pushes the water out through the plates. The hairs on the baleen act like strainers. They hold onto fish and other tiny animals and plants as the water rushes out of the whale's mouth. Baleen is made from the same material as your fingernails.

Open the flap to see some kinds of toothed and baleen whales.

Some Kinds of Toothed Whales



killer whale

bottlenose dolphin

sperm whale

Some Kinds of Baleen Whales

humpback whale

blue whale

gray whale

A

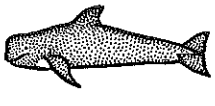
B

C

D

harbor porpoise

beluga



pilot whale

minke whale

fin whale

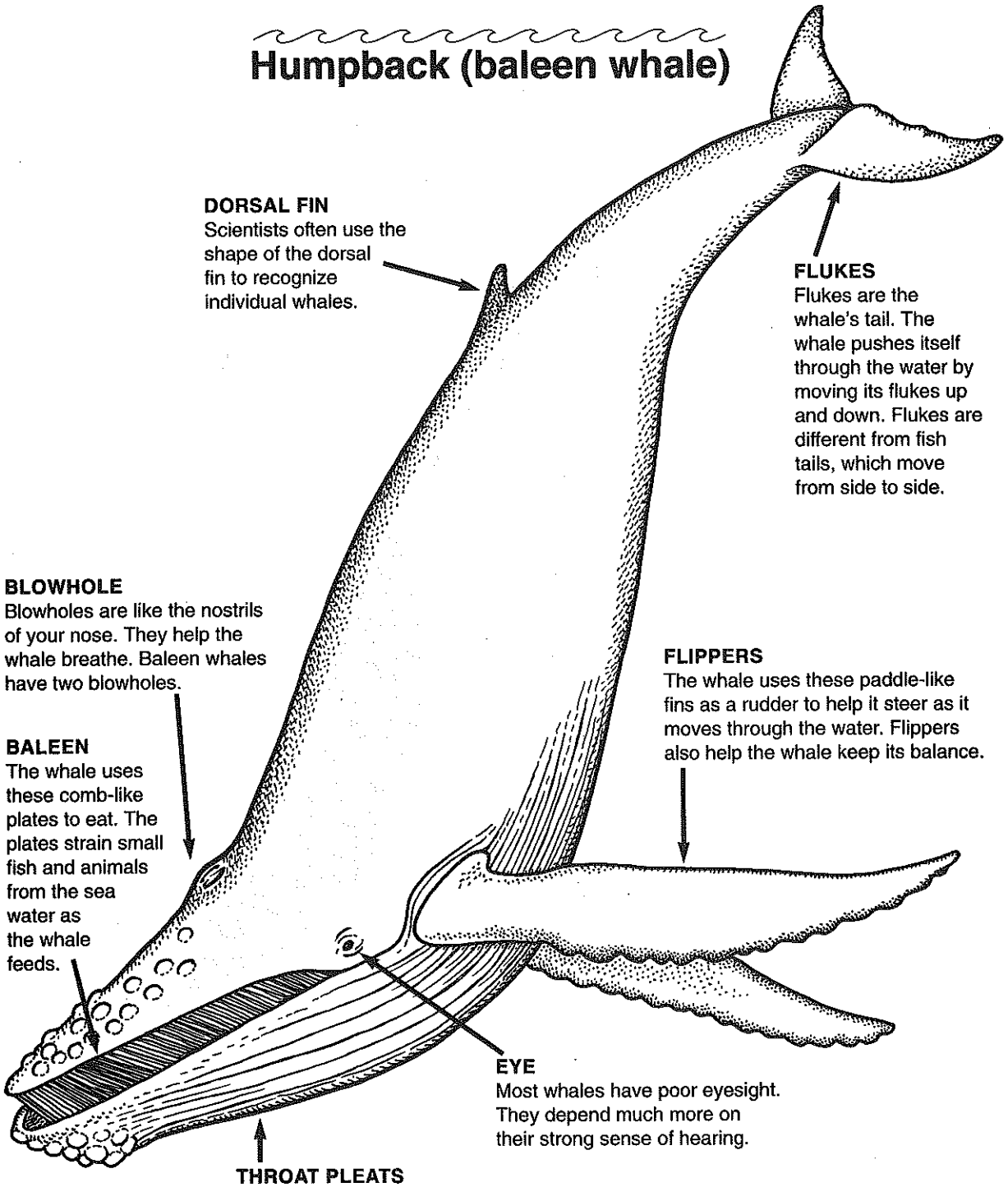
right whale

Name _____

Whales: Inside and Out

These pages show the outside of two whales. Look at the different body parts and what they are used for. After you take a look at the outside of the whales, hold the pages up to the light. What do you see?

Humpback (baleen whale)



DORSAL FIN
Scientists often use the shape of the dorsal fin to recognize individual whales.

FLUKES
Flukes are the whale's tail. The whale pushes itself through the water by moving its flukes up and down. Flukes are different from fish tails, which move from side to side.

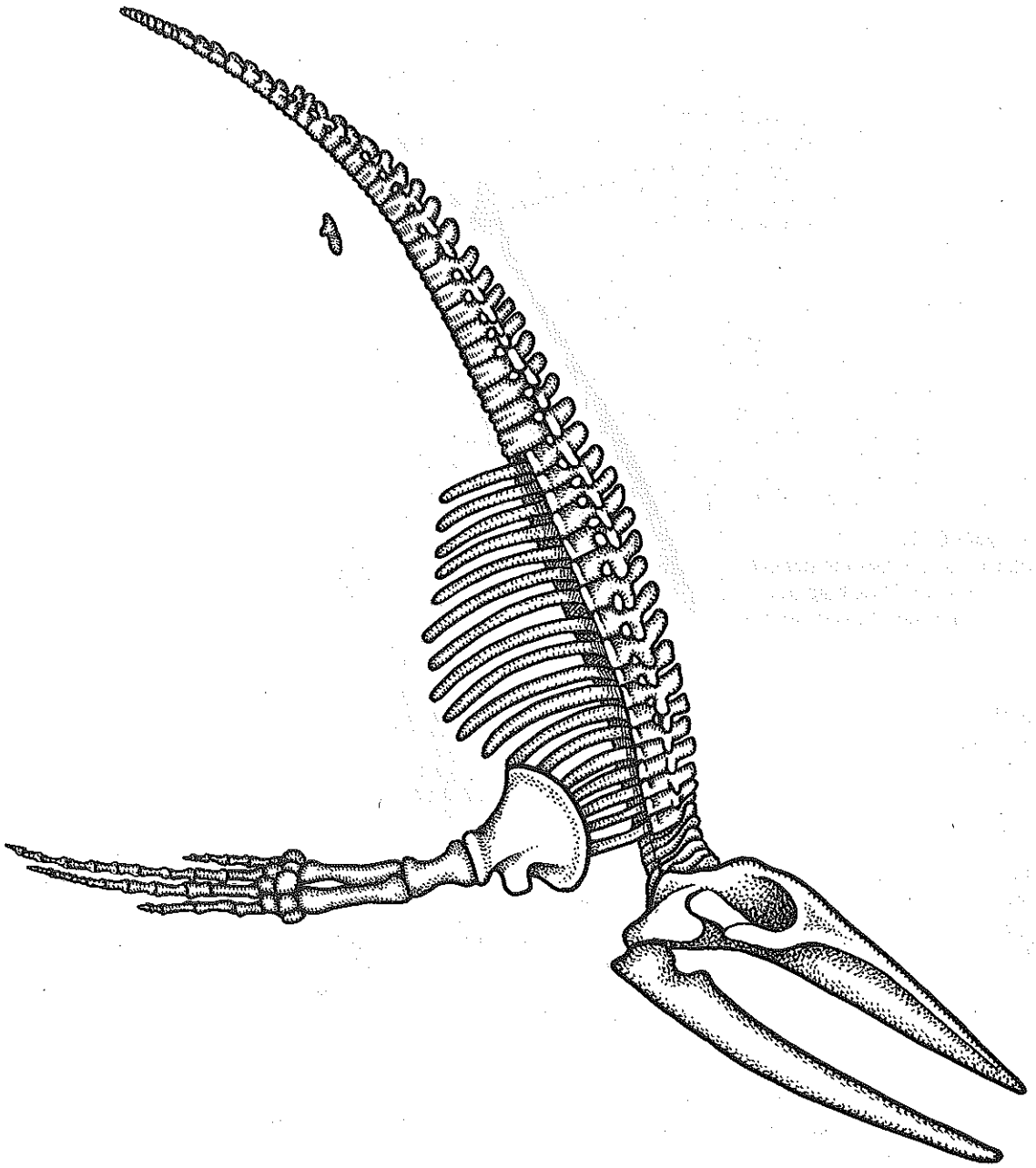
BLOWHOLE
Blowholes are like the nostrils of your nose. They help the whale breathe. Baleen whales have two blowholes.

BALEEN
The whale uses these comb-like plates to eat. The plates strain small fish and animals from the sea water as the whale feeds.

FLIPPERS
The whale uses these paddle-like fins as a rudder to help it steer as it moves through the water. Flippers also help the whale keep its balance.

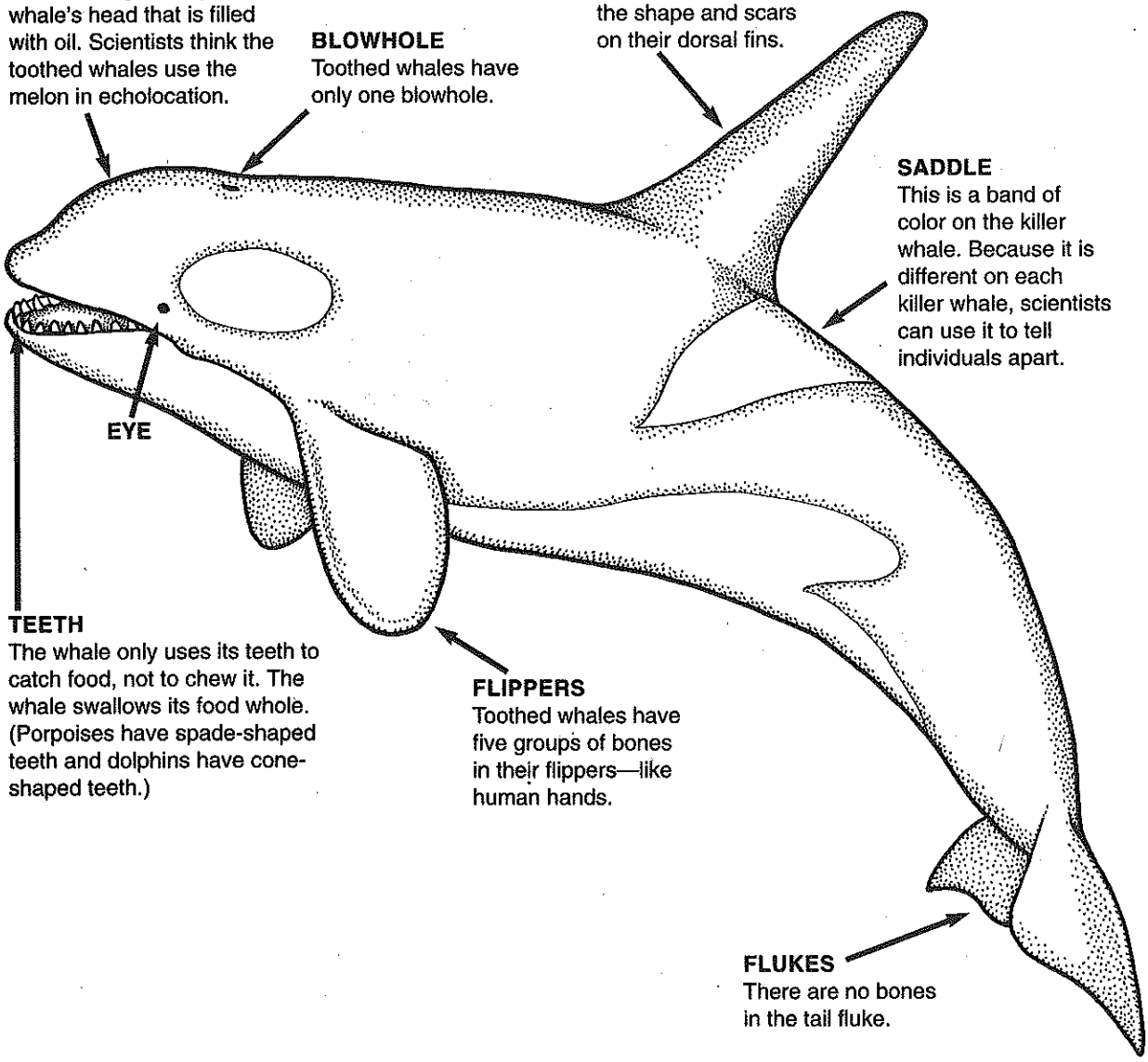
EYE
Most whales have poor eyesight. They depend much more on their strong sense of hearing.

THROAT PLEATS
These folds of skin can spread out like a fan to let the whale take in huge amounts of water and food when it feeds. Not all baleen whales have throat pleats.



Name _____

Killer Whale* (toothed whale)



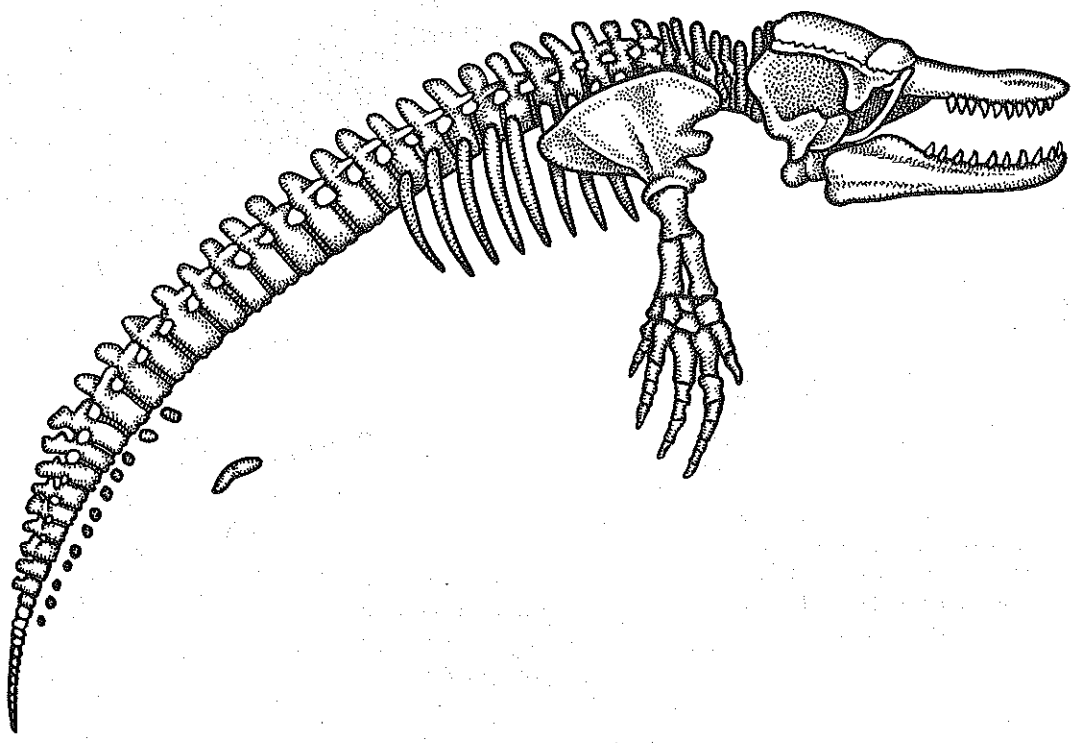
1. Write two ways the whales are alike. _____

_____

2. Write two ways the whales are different. _____

_____

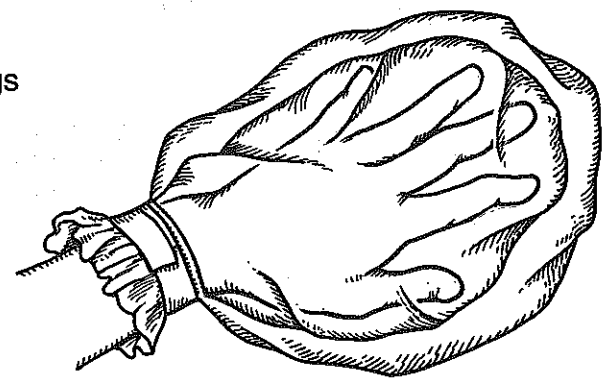
*Killer whales are also called orcas.



Make a Blubber Glove

Whales have developed several special features, or adaptations, that allow them to live in the water. One of these adaptations is a thick layer of fat, called blubber, which serves as insulation against frigid ocean temperatures. Students can demonstrate how this protective layer of fat works by making their own "blubber glove." Provide each student or group of students with the materials listed. Then have them follow the directions below.

Materials:
- two 1-gallon plastic bags
- duct tape
- bucket of cold water
- bucket of warm water
- one pound of solid vegetable shortening



Directions:

1. Have students put the vegetable shortening in one plastic bag.
2. Next, they should put the other plastic bag on their hand, using the duct tape to seal the bag around their wrist.
3. Tell them to put their hand with the bag on it inside the bag that holds the vegetable shortening, shaping the vegetable shortening into a glove of even thickness around their hand. Have them seal both bags shut by wrapping more duct tape around their wrist.
4. Tell students to put their hand with the "blubber glove" into the cold water. Then they should put the hand without the glove into the warm water. Do they notice a difference in how each hand feels?
5. Next, ask students to close their eyes and have a classmate put both buckets of water in front of them, without giving away which one is which. Tell students to dip the hand with the glove into one pail, then the other. Could they tell which was the warm water and which was the cold?
6. Keeping their eyes shut, they should repeat step five using the other hand. Did they find it harder or easier to tell the warm water from the cold water?

Questions to Discuss:

- Based on this experiment, how do students think a whale's layer of blubber protects it from icy ocean waters?
- Tell students that scientists think that whales' ancestors were once small creatures that lived on land. What are some other ways students think whales' bodies may have changed so that they could live in the water?

BALEEN AND TOOTHED WHALES: A CLOSER LOOK

There are about ten species of baleen whales and about 65 species of toothed whales. Several factors distinguish one group of whales from the other. Baleen whales are typically larger than toothed whales. The sperm whale, which can grow up to 68 feet long, is the only toothed whale that rivals the enormity of the baleen whales. Another way these two groups differ is that toothed whales vary more in size and physical characteristics from species to species than baleen whales. In addition, toothed whales tend to be more social than baleen whales. They often travel together in large, closely-knit groups (10 to 1,000 animals), called pods, warning each other of danger and helping each other find food.

In contrast, baleen whales usually travel in smaller social groups of 5 to 6 individuals. They may form temporary larger groups to feed or migrate.

Feeding

The primary difference between the two types of whales is the way in which they feed. Baleen whales use the baleen plates—historically called *whalebone*—suspended from their upper jaw to filter out food from sea water. Just how does baleen work? Each baleen plate overlaps the next plate, forming a hairy mat on the roof of the mouth. After a whale has taken in food and closed its mouth, its tongue forces the water out through the spaces between the plates. Food is trapped on the edges of the baleen and then swallowed. Plankton—drifting concentrations of microscopic plants and animals—forms the basis of the baleen whale's diet. These whales also eat krill (small shrimp) and fish such as capelin, herring, sand lance, and mackerel.

Toothed whales feed primarily on fish and squid, but may eat octopi, seals, and other sea animals. Echolocation, the method toothed whales use to find food, is similar to sonar. The whales make sounds including clicks, groans, and beeps. The waves of sound hit an object, then bounce back toward the whale, giving the whale information about what and where the object might be.

STUDENT ACTIVITIES

Identifying Whales

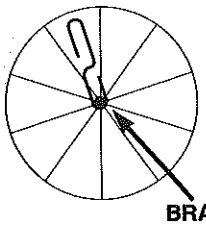
The whale identification cards on pages 19–23 will help your students distinguish among different toothed and baleen whales. Reproduce the sheets, and have students cut out and assemble the cards. Your class can then use the cards with the suggested activities below and with the graphing activity on pages 24–25. Encourage students to invent their own games and activities using the cards.

IT'S IN THE CARDS: Students can use the cards to create a variety of charts and graphs classifying whales by different characteristics, for example, by the number of teeth toothed whales have, endangered status, food sources, and so on. Divide students into cooperative groups and have each group work on a different graph or chart. Groups can take turns presenting their charts and graphs to the class.

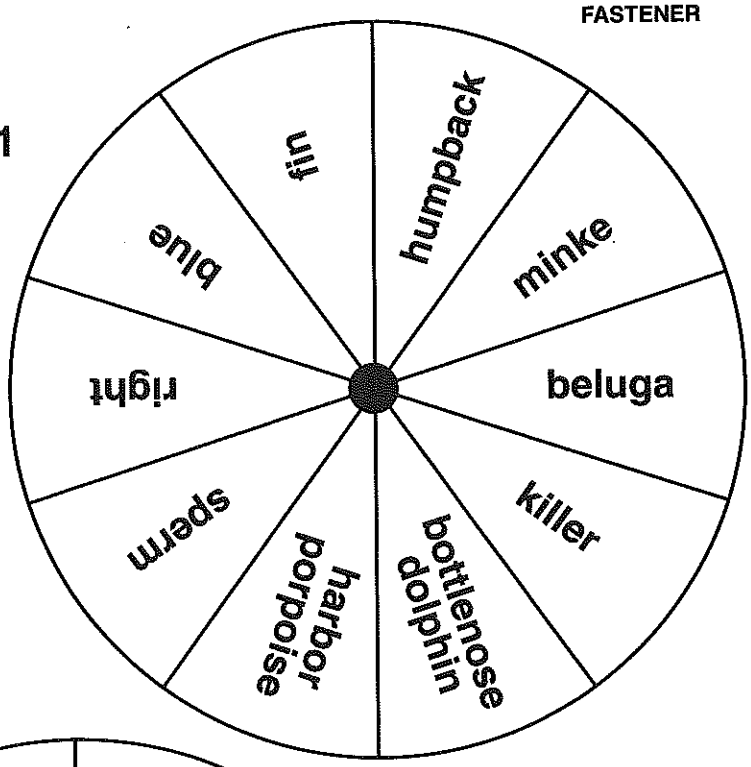
THINK BIG: Students can get a sense of how big whales really are by using their cards to make life-size whale drawings. Begin by dividing students into eight groups. Have each group select a different whale card. In the classroom, each group can measure out a piece of yarn or string the same length as its assigned whale. Then give each group chalk and take the children outside to an open, paved area, such as the school parking lot. Tell the groups to spread out. Each group can use the string as a guide for drawing its whale to size. Students can refer to the illustration of the whale on the front of the card to make their drawings accurate. (You may want to follow this activity with the graphing activity on pages 24–25.)

WHICH WHALE?: Allow time for children to examine the cards and read the whale facts. Then divide the class into pairs of students, and have each pair lay out one set of cards between them so that the illustrations of the whales are face up. Reproduce and distribute a copy of the two spinners at the bottom of the page 18 to each pair of students. By using spinner 1, children will learn to identify the whales by their appearance. Tell students to take turns spinning and trying to find the whale the spinner lands on. Students can check to see if they are right by flipping the card over. If they are correct, they keep the card; if not, the card is flipped back over. The player with the most cards at the end wins. (Note: Tell students to spin again if the spinner lands on a whale that already has been correctly identified.) Students can use spinner 2 in the same way to play a game that will help familiarize them with different whale characteristics. In this game, students try to pick a whale that possesses the characteristic the spinner lands on.

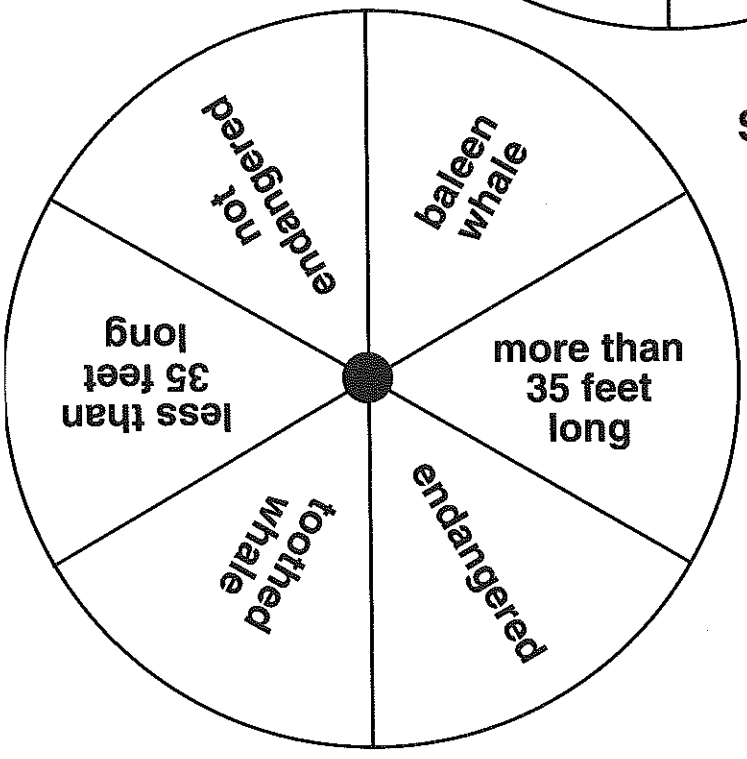
TO ASSEMBLE THE SPINNERS:
Cut out each spinner. Open a paperclip to form an "S" shape. Use a brass fastener to attach one end of the "S" shape to the center of each spinner, as shown.



SPINNER 1



SPINNER 2



Whale Identification Cards

The cards on these five pages will help you learn more about some toothed and baleen whales. To make the cards, cut along the solid lines. Then fold along the dashed lines. Tape or paste together the front and back of each card.

Right Whale

Type: baleen
Length: up to 50 feet
Color: skin is black with white patches on throat and belly
Features/Markings: unusually large head that is about 1/4 of body length; rough areas of skin on head and lips called *callosities*, used to identify individuals
Food: zooplankton (microscopic animals), specifically copepods
Endangered? yes; U.S. Endangered Species List; 300 North Atlantic right whales worldwide
Fast Facts:

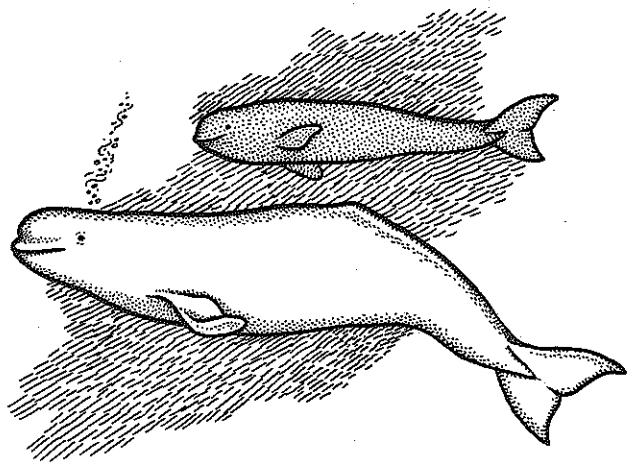
- Almost half of the right whale's weight is blubber.
- Right whales are the most endangered great whale in the world.
- The name came from Yankee whalers who said it was the "right" whale to catch, since it was slow moving, floated when dead and yielded large quantities of blubber.

Sperm Whale

Type: toothed
Length: up to 68 feet
Color: body is dark brown to dark gray; belly and area near mouth and head are often light gray or white
Features/Markings: skin often appears wrinkled; enormous, square-shaped head that is 1/3 of the body's length; single blowhole located on left of head
Teeth: 25 teeth on each side of the lower jaw; tooth sockets in the upper jaw
Food: squid, octopi, and sometimes fish
Endangered? yes; U.S. Endangered Species List; worldwide population is estimated at 1,810,000 individuals or 65% of initial stock
Fast Fact: Sperm whales can stay under water for up to two hours at a time and can dive to depths of more than 10,000 feet!

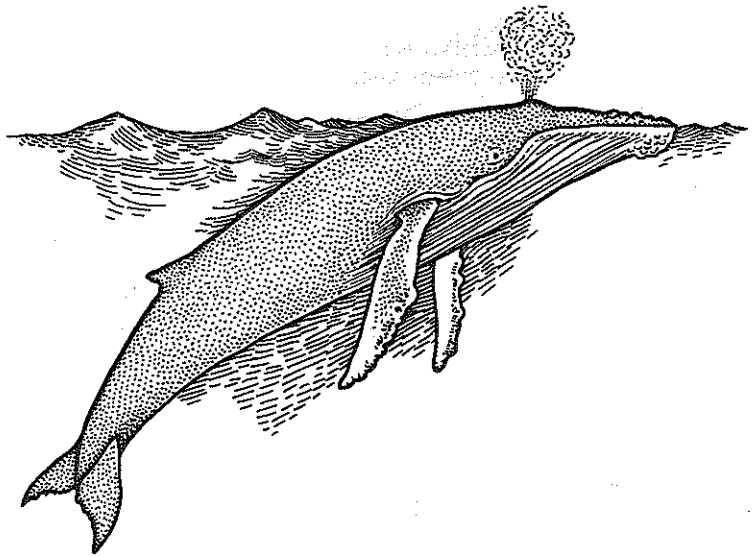
Beluga Whale

Type: toothed
Length: up to 16 feet
Color: white
Features/Markings: small head and a short neck region that lets it turn its head; no dorsal fin
Teeth: up to 11 teeth on each side of upper and lower jaw
Food: many types of fish, shellfish, and zooplankton (microscopic animals)
Endangered? no; worldwide population is estimated at 62,000–80,000
Fast Fact: Beluga whales are called "canneries of the sea" because of the high pitched, chirping sounds they make.



Humpback Whale

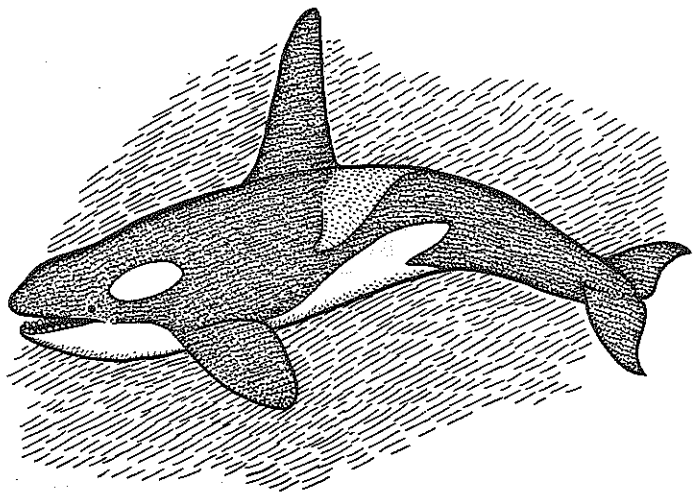
Type: baleen
Length: about 45 feet
Color: body is black with some white on its throat, belly and flippers
Features/Markings: long white flippers make up one third of their body length; a black and white pattern underneath the tailfluke that is different on each whale; fleshy bumps on the head, called *stovebolts*, with a single hair sticking out of each one
Food: small fish, krill (tiny shrimp)
Endangered? yes; U.S. Endangered Species List; worldwide population is estimated at 10,000 or 8% of initial stock
Fast Fact: The humpback whale can gulp down 150 pounds of fish at a time. It eats up to one ton of food a day. That's two thousand boxes of spaghetti!



Killer Whale (Orca)

Type: toothed
Length: up to 30 feet
Color: shiny black on back and sides with a white belly
Features/Markings: white oval patch above and behind each eye and a gray circle, called a saddle, behind the dorsal fin used for individual identification
Teeth: 10–13 teeth on each side of upper and lower jaws
Food: at least 24 kinds of whales, 5 kinds of seals, 30 kinds of fish, 7 kinds of birds, 2 kinds of squid, and turtles
Endangered? no
Fast Facts:

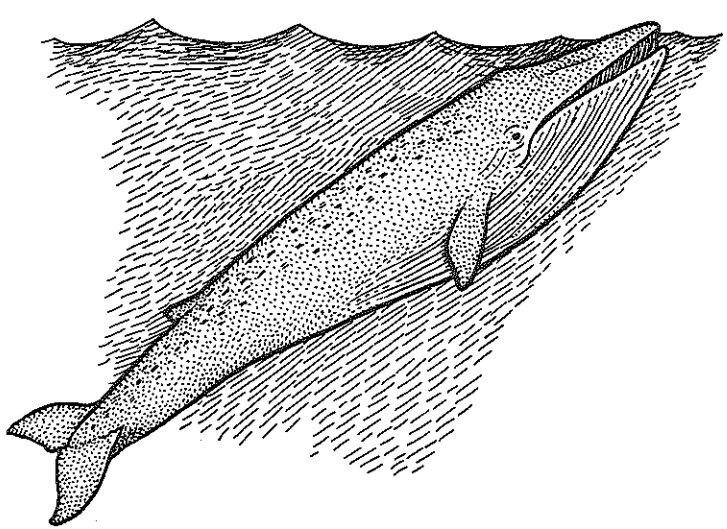
- This is the only whale that eats other whales.
- Sometimes killer whales team up to catch and eat an animal larger than themselves, such as the enormous blue whale.



Blue Whale

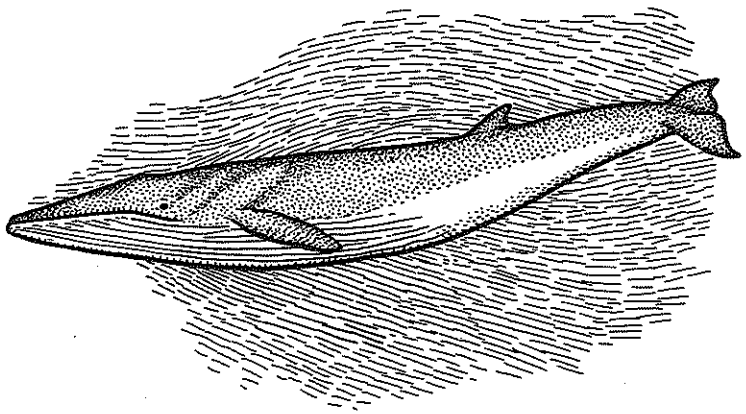
Type: baleen
Length: up to 100 feet
Color: a dark, spotty, blue-gray, with flippers that are dark blue-gray on top and paler underneath
Features/Markings: some have growths of tiny yellowish plants on their bellies called *diatoms*
Food: krill (tiny shrimp)
Endangered? yes; U.S. Endangered Species List; worldwide population is estimated at less than 9,000 or 5% of initial stock
Fast Facts:

- The blue whale is the largest living animal on Earth. Seven cars could be lined up on its back.
- Blue whale calves (babies) may grow 2 inches a day and put on 10 pounds an hour.



Fin Whale

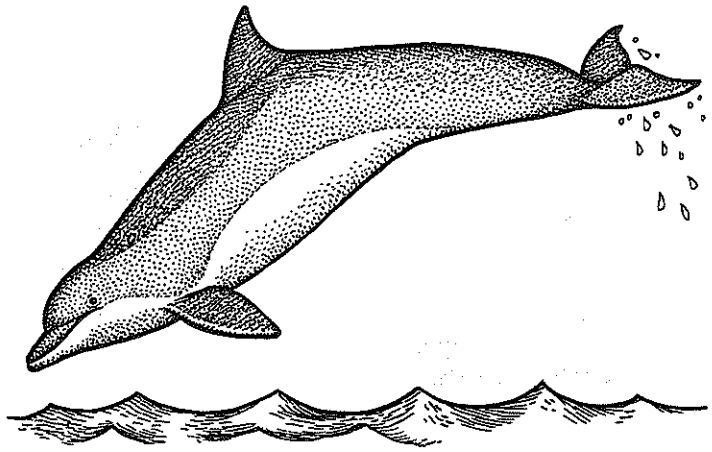
Type: baleen
Length: up to 80 feet
Color: dark gray on back and sides and white underneath; distinctive coloration as lower right jaw is white and lower left jaw is dark gray
Features/Markings: shadings and swirls behind the head called the blaze and chevron; a light gray "V" shape running from behind each eye to behind the blowholes
Food: small fish, krill (tiny shrimp), zooplankton (microscopic animals)
Endangered? yes; U.S. Endangered Species List; worldwide population is estimated at 119,000 or less than 26% of initial stock
Fast Fact: Fin whales are swift swimmers. They can travel up to 30 miles (48 km) an hour in short bursts.



Bottlenose Dolphin

Type: toothed
Length: up to12 feet
Color: dark gray on back, light gray on sides, and white or pink on belly
Features/Markings: short beak; tall curved dorsal fin
Teeth: 20–26 teeth on each side of upper jaw; 18–24 teeth on each side of lower jaw
Food: many types of fish, squid, and octopi
Endangered? no; the worldwide population is unknown
Fast Facts:

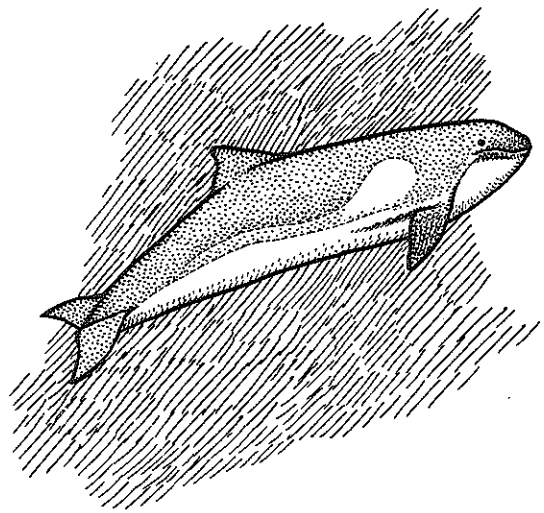
- This is the type of dolphin often seen performing at zoos and aquariums.
- Bottlenose calves are often observed being "babysat" by other adults while their mothers are searching for food.



Harbor Porpoise

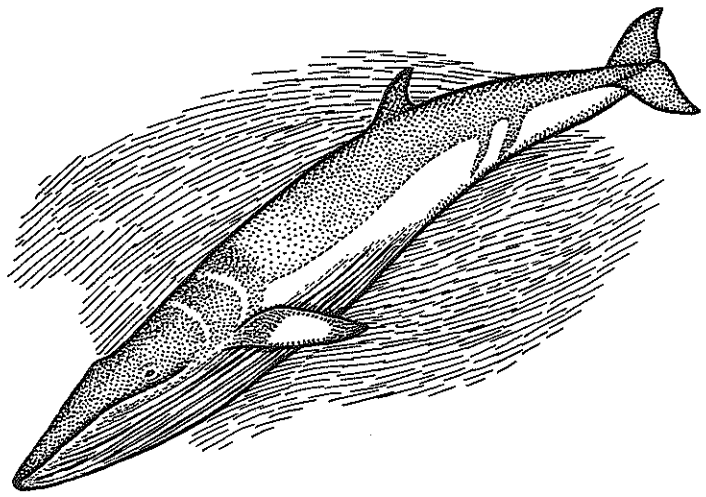
Type: toothed
Length: up to 6 feet
Color: dark brown to black on the back with a white belly
Features/Markings: no beak; dark gray line from mouth to base of flippers; triangular dorsal fin
Number of Teeth: 19–28 teeth on each side of upper and lower jaws
Food: small schooling fish such as herring, mackerel, and anchovy
Endangered? no
Fast Facts:

- The harbor porpoise is not as playful as other dolphins and tends to avoid humans.
- Sometimes these porpoises swim up rivers in search of food.
- When chased, they can swim at speeds of 14 miles (22 km) per hour.



Minke Whale

Type: baleen
Length: up to 30 feet
Color: black or dark gray on top and white underneath
Features/Markings: flippers usually have a white stripe on top in northern hemisphere; grooves on its belly run from the jaw to the navel
Food: small fish, krill (tiny shrimp)
Endangered? no
Fast Fact: Minkes are the smallest baleen whales and currently the most commercially exploited species of great whales.



Name _____

How Do Whales Measure Up?

Whales are huge animals. But some are bigger than others. Use your whale identification cards to make a graph on the next page comparing the sizes of several whales. Follow the directions below to make the graph. Then use the graph to answer the questions.

Directions:

1. On the identification cards, find the length of each whale named on the graph.
2. Draw a picture of the whale next to its name. Look at the scale at the bottom of the graph to see how long to make the whale. (One whale is already drawn for you.)
3. Inside the whale shape, write whether the whale is a toothed whale or a baleen whale.
4. At the bottom of the graph, draw a picture of yourself swimming. Be sure to make yourself the right length!

Questions:

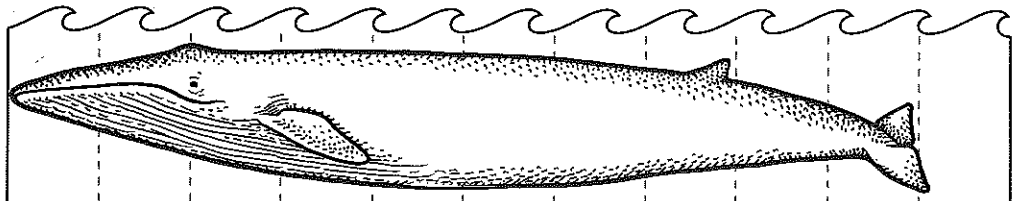
1. Which whale on the graph is the longest? _____
2. Which whales are the same size? _____
3. How much smaller than the minke is the beluga whale? _____
4. Which whale is the closest to your size? _____
5. How much longer is the fin whale than you? _____
6. About how many harbor porpoises laid end to end would fit on a sperm whale's back? _____
7. Is the smallest whale on the graph a toothed whale or a baleen whale?

   _____
8. In general, which whales are larger—toothed whales or baleen whales?

   _____

Name _____

How Do Whales Measure Up?



Blue Whale

Fin Whale

Sperm Whale

Humpback Whale

Minke Whale

Killer Whale

Beluga Whale

Bottlenose Dolphin

Harbor Porpoise

Yourself

0 10 ft. 20 ft. 30 ft. 40ft. 50 ft. 60 ft. 70 ft. 80 ft. 90 ft. 100 ft.

WHALE BEHAVIOR

Whales are wild animals whose behavior is unpredictable and mysterious to humans. A scientist on a research excursion observing a whale doesn't know where a whale will travel or what the whale does while it is under water. But every so often it is possible to catch a glimpse of a whale's behavior when it appears at the water's surface to breathe, feed, or jump. Suddenly, a massive humpback whale may hurl its 40-ton body through the air in a spectacular leap. This is called "breaching." Or it may "spyhop" by raising its head above the water's surface to peer around briefly before sinking back down out of sight. These activities are just two examples of some often-seen whale behaviors.

STUDENT ACTIVITIES

Whales in Action

WHALES IN THEIR HABITAT: Pages 28–29 show whales in an ocean scene demonstrating some commonly observed behaviors. Reproduce the pages and have students paste page 29 below page 28 (along the line) to make a mini-poster depicting how whales behave in their habitat. Ask students to read the descriptions of different whale behaviors and examine the illustrations. They can use the mini-poster with the puppet they make in the activity below.

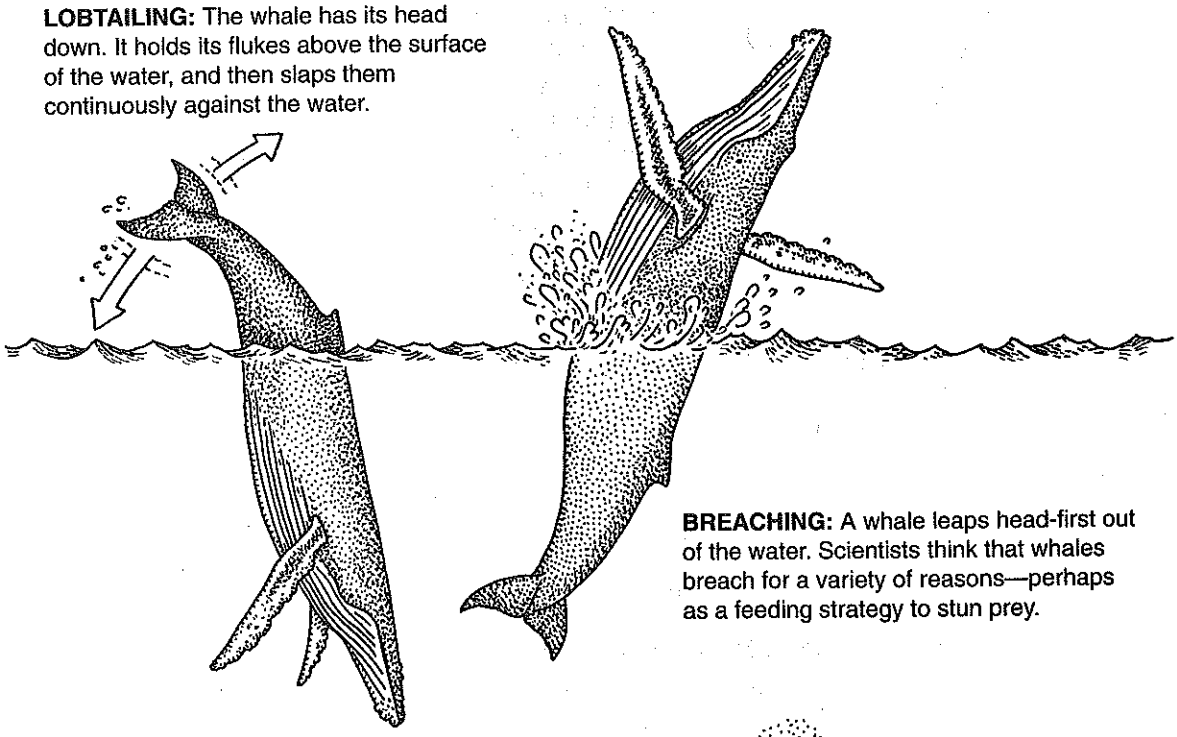
A WHALE OF A PUPPET: On reproducible pages 30–32 you will find directions and a pattern for making a right whale puppet with movable parts. Distribute a copy of each page to students and help them assemble the puppets. Children can pretend their whales are in the ocean, and refer to the mini-poster to simulate some whale behaviors. You may want to divide students into pairs for this activity. A cardboard box—painted blue and turned on its side—can be used to represent the ocean's surface. Students can take turns manipulating their puppets behind the ocean "stage."

Whales in Their Habitat:

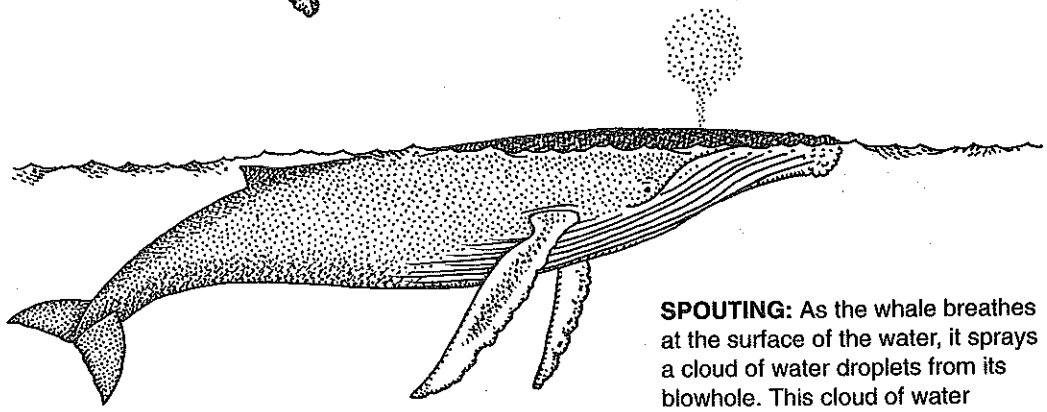
AN ACTION POSTER

Because whales live underwater, most of what they do is hidden from view. But sometimes whales come to the surface, and people can see how they behave. Here are some well-known whale behaviors.

LOBTAILING: The whale has its head down. It holds its flukes above the surface of the water, and then slaps them continuously against the water.



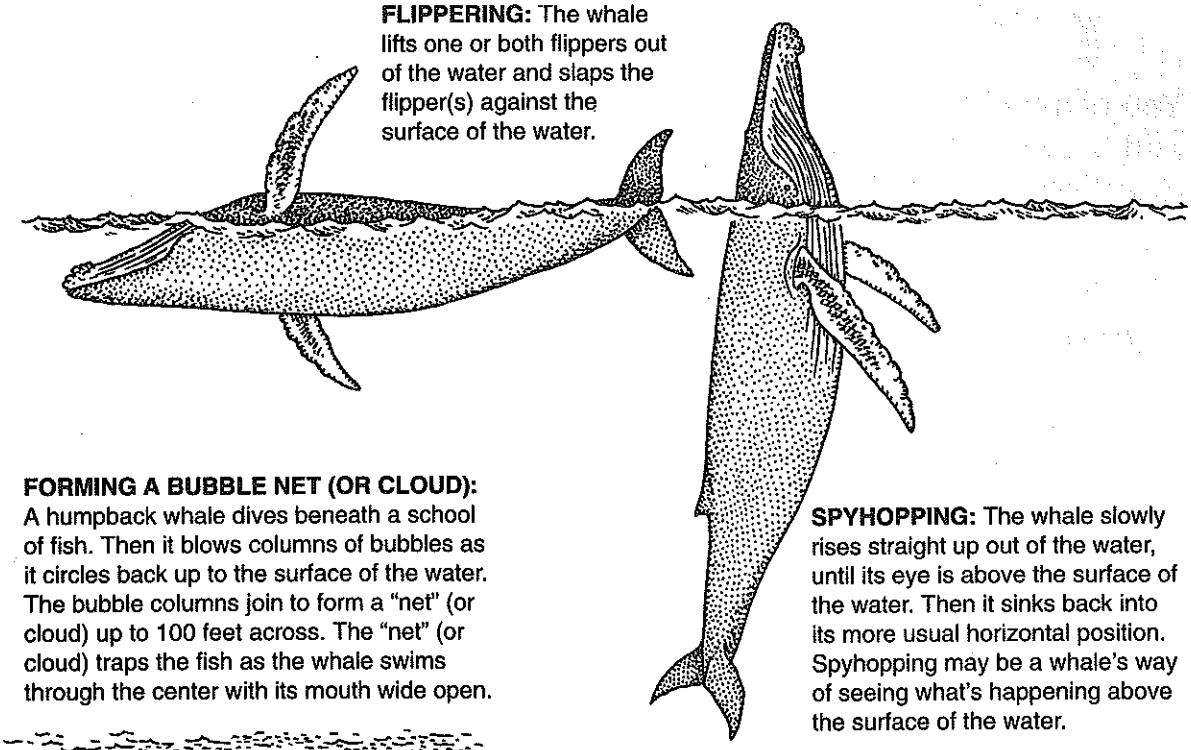
BREACHING: A whale leaps head-first out of the water. Scientists think that whales breach for a variety of reasons—perhaps as a feeding strategy to stun prey.



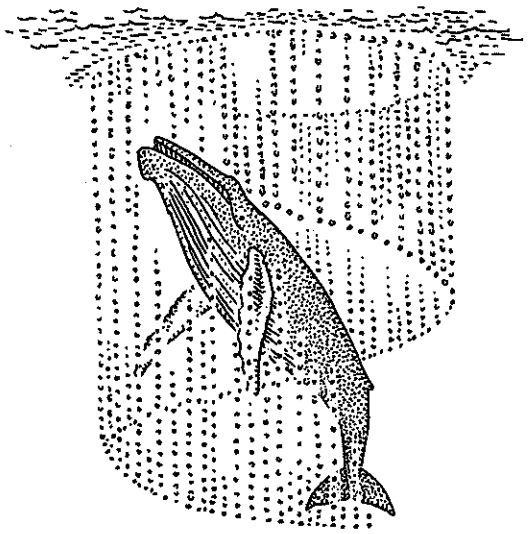
SPOUTING: As the whale breathes at the surface of the water, it sprays a cloud of water droplets from its blowhole. This cloud of water droplets is called the spout or the blow. Spouting makes a loud whooshing sound. The spouts of different kinds of whales are different shapes.

Paste along this line

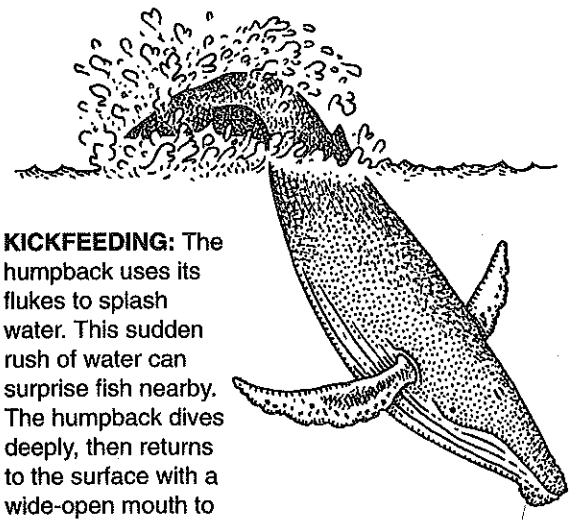
FLIPPERING: The whale lifts one or both flippers out of the water and slaps the flipper(s) against the surface of the water.



FORMING A BUBBLE NET (OR CLOUD): A humpback whale dives beneath a school of fish. Then it blows columns of bubbles as it circles back up to the surface of the water. The bubble columns join to form a "net" (or cloud) up to 100 feet across. The "net" (or cloud) traps the fish as the whale swims through the center with its mouth wide open.

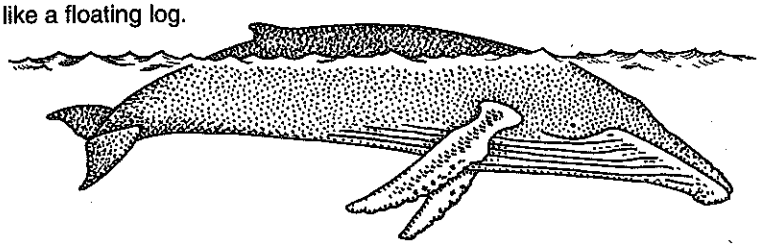


SPYHOPPING: The whale slowly rises straight up out of the water, until its eye is above the surface of the water. Then it sinks back into its more usual horizontal position. Spyhopping may be a whale's way of seeing what's happening above the surface of the water.



KICKFEEDING: The humpback uses its flukes to splash water. This sudden rush of water can surprise fish nearby. The humpback dives deeply, then returns to the surface with a wide-open mouth to scoop up the surprised fish.

LOGGING: The whale rests at the water's surface without swimming and looks like a floating log.



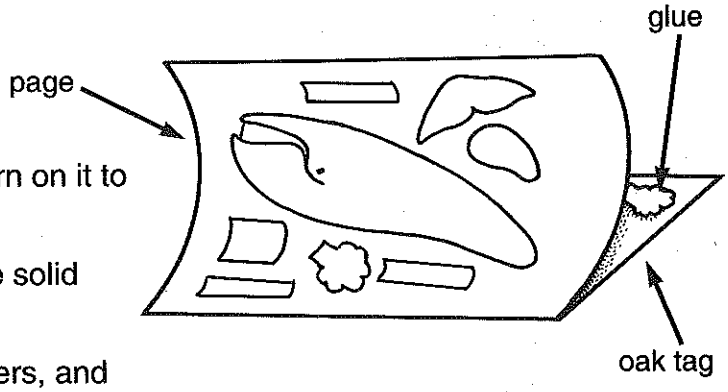
A Whale of a Puppet

You can make a right whale puppet that can spout, move its tailfluke, and flip its flippers. Just use the pattern on the next page and follow the directions below. Then put your action poster showing whales in their habitat on your desk. Pretend your whale is in the ocean. Use the poster to help show how it behaves.

Materials:

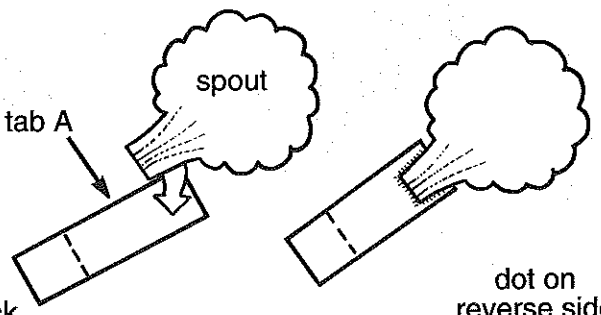
- whale pattern
- glue
- 8" by 10" piece of oak tag
- scissors
- a pencil
- markers, crayons, or colored pencils
- strong tape
- 2 brass fasteners

What you do:

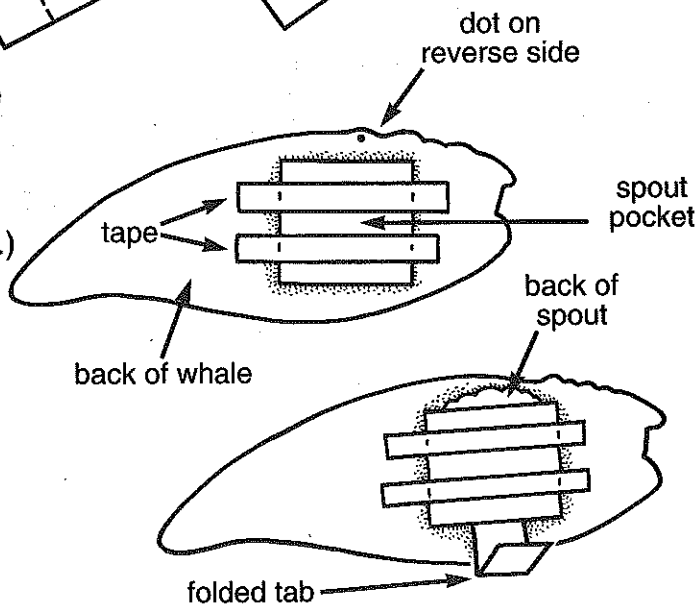


1. Glue the page with the pattern on it to the cardboard.
2. Cut out the shapes along the solid lines.
3. Color the whale's body, flippers, and flukes.

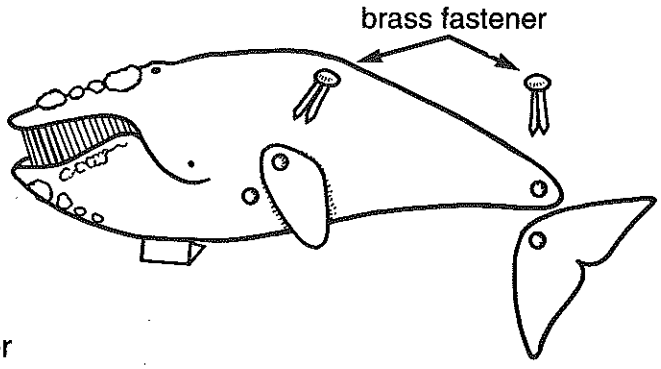
To attach the spout:



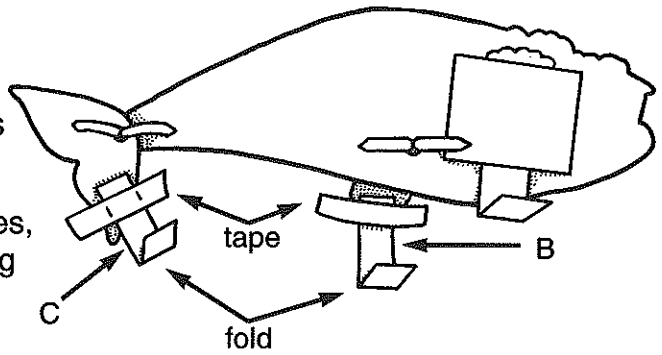
4. Tape tab A to the back of the whale's spout, as shown.
5. Tape the spout pocket to the back of the whale's body, as shown. The pocket should be just under the small, dark circle at the top of the whale's body near the dorsal fin. (This circle is the whale's blowhole.) Tape only the sides of the pocket. Do not tape the top or bottom.
6. Slip the spout into the top of the pocket you just made. Pull the tab out from the bottom of the pocket and fold tab A back on the dashed line.



To attach the flipper and flukes:

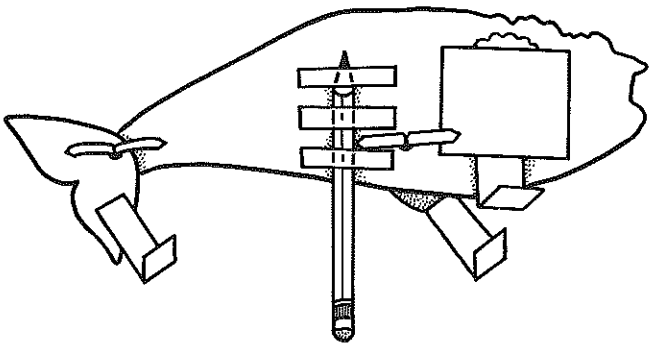


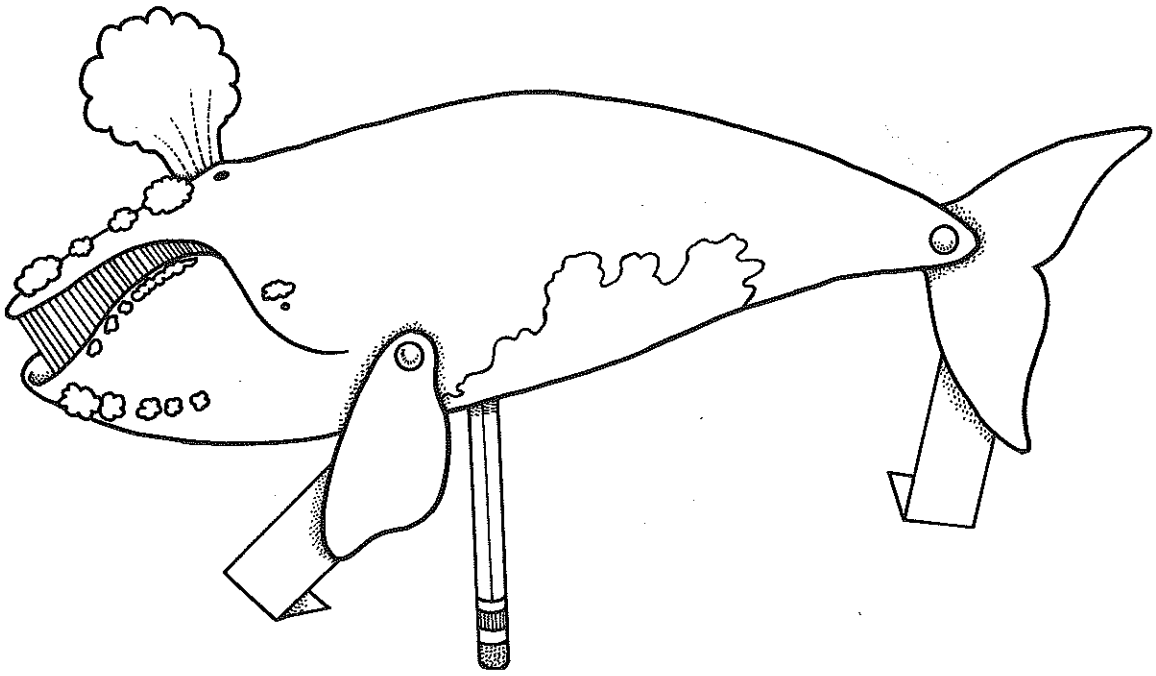
7. Use one brass fastener to attach the whale's flipper to its body.
8. Tape tab B to the back of the flipper as shown. Fold tab B back on the dashed line.
9. Use the other brass fastener to attach the whale's tail flukes to its body.
10. Tape tab C to the back of the flukes, as shown. Fold the tab back along the line.



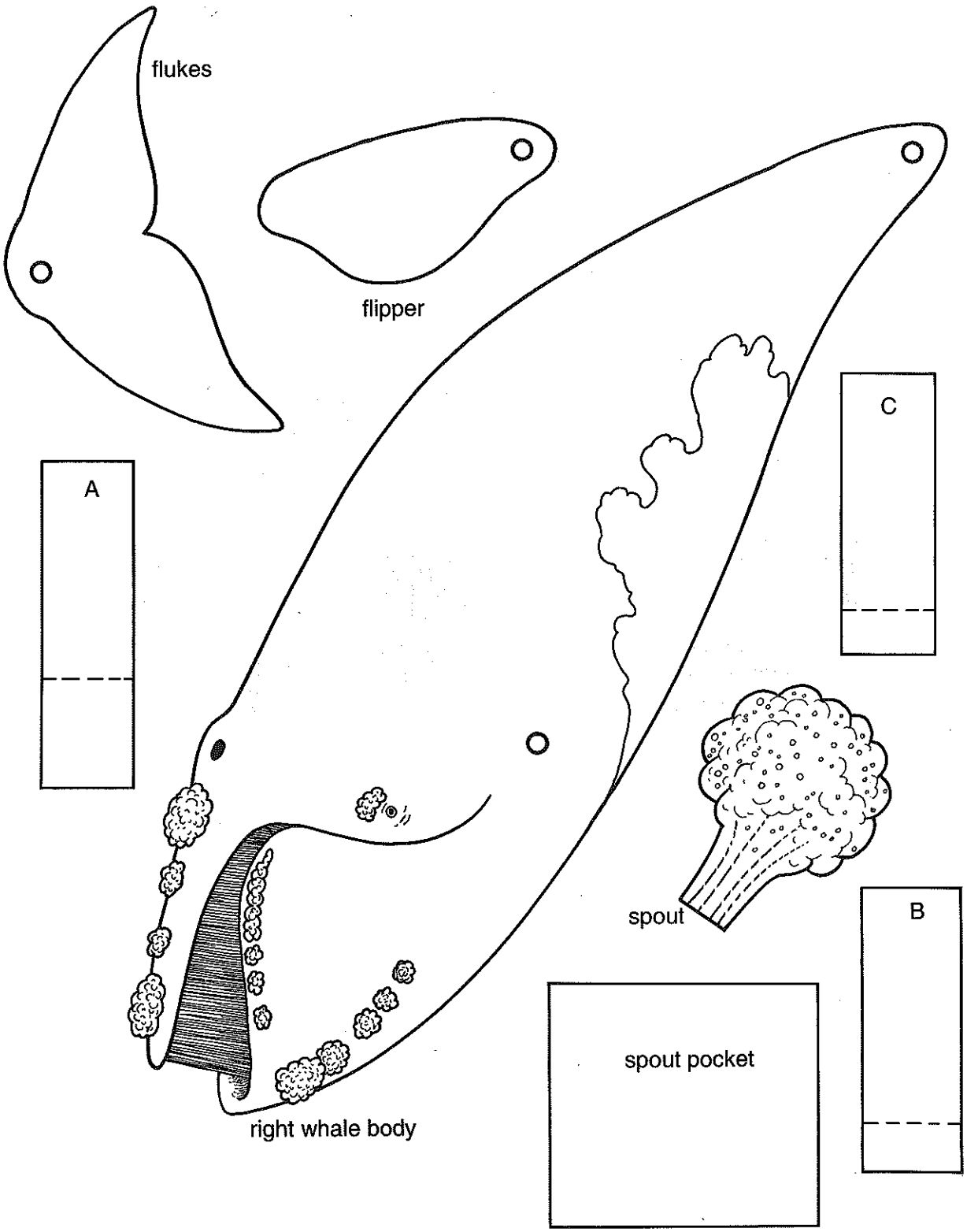
To finish your puppet:

11. Tape the pencil to the back of the whale's body. Hold the puppet by the pencil.
12. Pull or push tabs A, B, and C to move the whale's flipper or flukes and to make the whale spout.





A Whale of a Puppet



WHALE COMMUNICATION

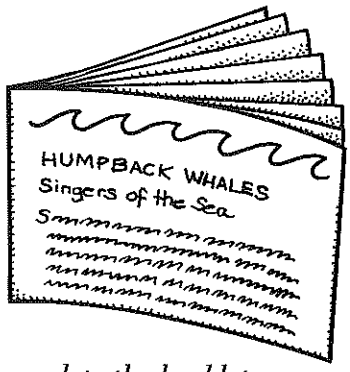
Scientists believe that whales are able to communicate with other whales within their species by making a wide variety of sounds, called *phonations.* Different species make different sounds. Belugas make high, chirping sounds. Dolphins make rapid clicks and whistles. Humpbacks make lower-pitched grunts and groans. What do the sounds mean? Scientists don't yet know very much about whale communication, but they continue to search for answers.

The sounds of one species, humpback whales, are especially interesting to scientists. Humpbacks string sounds together into patterns of phrases to make a kind of song. Scientists believe that only male humpbacks sing. Their songs can be long and complicated. Fragments of songs may be heard at the feeding grounds or during migration, but most of the singing takes place in warm tropical seas, during the breeding season. Experts think that the songs may be a way by which the male defines his territory or perhaps a courtship ritual in which the male advertises his fitness for mating.

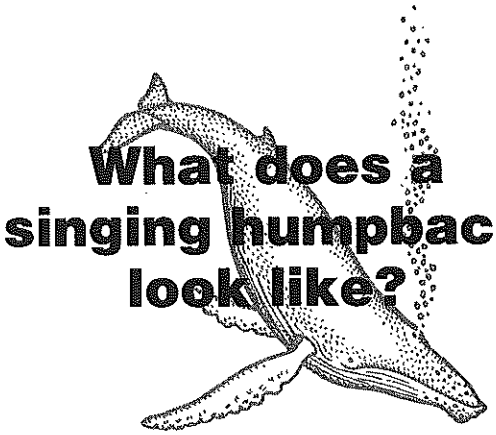
STUDENT ACTIVITY

Question-and-Answer Mini-Book

Students can find out some fascinating facts about the songs of humpback whales by making the question-and-answer booklet on pages 34–35. Make a double-sided photocopy of the pages and distribute a sheet to each student. To put the book together, students should follow these directions:

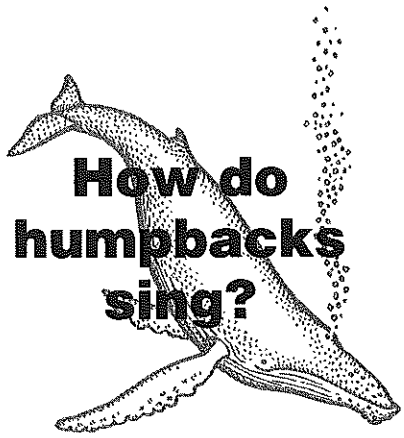


1. *Begin with the side that shows panels A, B, C, and D facing up.*
2. *Cut the panels apart along the three solid lines.*
3. *Lay the panels on top of each other in alphabetical order, with the panel marked A on top.*
4. *Staple the book along the dashed line, then fold it along this line to complete the booklet.*



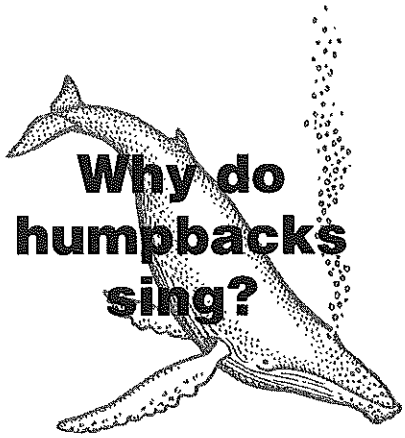
A

A singing humpback usually hovers (alone) about 50 feet below the surface, with its flippers stretched out, its head down, and its tailflukes pointing up toward the surface.



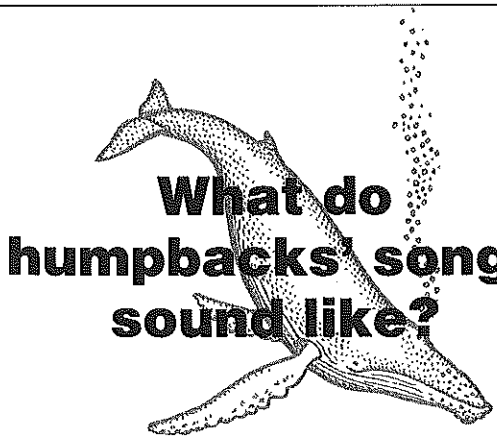
B

Humpbacks sing different songs depending on their location. But humpbacks in the same breeding area sing the same song. This song may change from year to year. But somehow, all the singers know to make the changes.



C

Sound travels underwater for a very great distance. Scientists think that a singing humpback can "talk" with other whales that are more than 50 miles away.

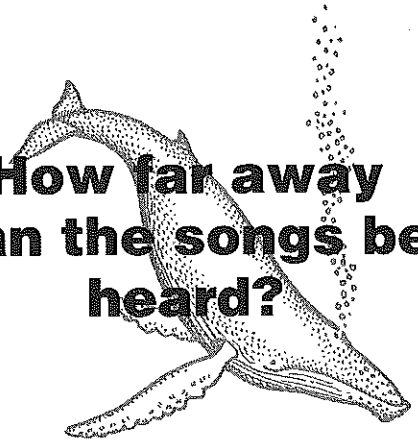


D

One humpback song may last anywhere from five minutes to half an hour. And the singer may keep singing that song for up to 24 hours!

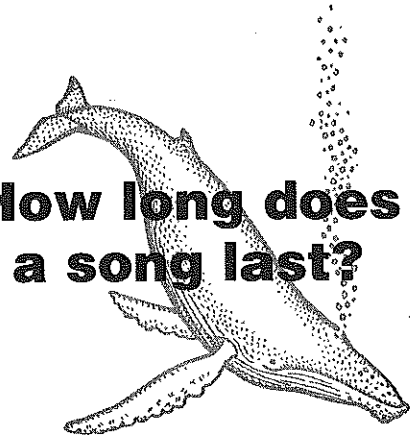
Do all humpbacks sing the same "tune"?

Scientists aren't sure how they sing since humpbacks don't have *vocal chords*. That's the part of the body humans and other animals use to make sounds. Some scientists think that there may be an air-filled pocket in the throat that opens and closes. Air may be pushed through different parts of this area to make different sounds, like a bagpipe.



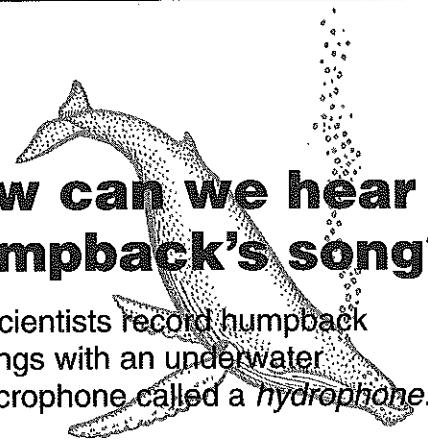
How far away can the songs be heard?

Nobody knows for sure, but some people think the songs have something to do with *breeding,* or producing young. Only males sing. It might be their way of trying to get the attention of a female whale. Or they could be telling other males to stay away.



How long does a song last?

Humpback's songs are made up of short groups of sounds, such as "Woo woo yup," "Eee oooh ahh," and "Eee yup."



How can we hear a humpback's song?

Scientists record humpback songs with an underwater microphone called a *hydrophone*.

HUMPBACK WHALES
Singers of the Sea

Scientists think that whales "talk" to each other by making sounds. The sounds humpback whales make are like songs. Turn the page to find out some fascinating facts about these underwater singers.

WHALE MIGRATION

Migration is another mysterious aspect of whale behavior. Not all whales migrate. Most baleen whales are migratory, while most toothed whales are not. Migrating whales travel thousands of miles as they move between polar and tropical regions in search of optimal breeding and feeding conditions. There are many unanswered questions about where, when, and why whales migrate, and migratory habits vary among species. But in general, whales spend the summer feeding in polar regions. Plankton—the primary food source of baleen whales—is most plentiful in Arctic and Antarctic waters. When polar waters become colder in winter, the whales head toward more temperate regions to mate and calve.

Long Journeys

Because humpback whales populate the waters near the Center for Coastal Studies during part of the year, researchers there know a little bit more about the migratory patterns of these animals than those of other whales. Humpbacks travel between 3,000 and 4,000 miles on their round-trip journey between their breeding grounds in the Caribbean and their feeding grounds in the North Atlantic. Right whales, another species that inhabits North Atlantic waters, make similarly long journeys. They travel from feeding grounds in the waters off Nova Scotia, Canada, to breeding grounds in the waters near the southern states of Georgia and Florida.

STUDENT ACTIVITY

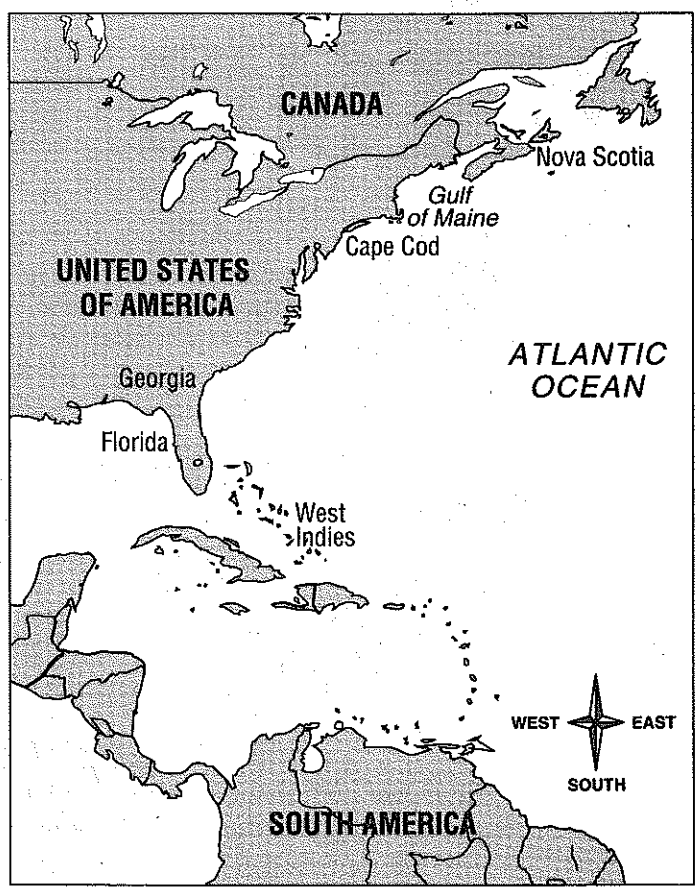
Incredible Journeys

Make photocopies of the reproducible on page 38 and distribute one to each student. It will provide them with information about the migratory habits of humpback and right whales. It also includes a fun, hands-on mapping activity for them to try.

Name _____

Incredible Journeys

Some whales make long trips called migrations. They travel from feeding grounds, places where they can find plenty of food, to breeding grounds, places where they give birth to young and mate. Read the fact boxes below about the journeys of two different whales. Then follow the directions to map the whales' migration paths.



Humpback Whales

Summer: feed in Gulf of Maine off of Cape Cod, Massachusetts

Winter: breed in waters in the West Indies

Right Whales

Summer: feed in waters off of Nova Scotia, Canada

Winter: breed in waters off of southern Georgia and Florida

Mark the following things on the map. Use a red pencil for the humpback whale and a blue pencil for the right whale.

1. Write the letter F on the map to show each whale's feeding ground.

2. Write the letter B on the map to show each whale's breeding ground.

3. Draw a line to show a path each whale might follow to get from its feeding ground to its breeding ground.

Now use the map you made to answer the questions.

4. Do the whales head north or south to breed? _____

5. Do the whales head north or south to feed? _____

6. Which whale's breeding ground is farther South? _____

7. Which whale's feeding ground is farther North? _____

CONDUCTING WHALE RESEARCH

While scientists still have many unanswered questions about whales, they are slowly learning more about these fascinating creatures. Each new discovery is the result of painstaking research, like that conducted by scientists at the Center for Coastal Studies.

Out in the Field

Whale research begins where the whales are: in the world's oceans. This map on page 42 shows Cape Cod Bay and Stellwagen Bank, one of the prime feeding grounds for humpback whales in the spring, summer, and fall, and for right whales in the winter. Center for Coastal Studies researchers do a lot of field work at Stellwagen Bank, observing living whales in their natural habitat. Researchers go out on every cruise of the Provincetown, Massachusetts-based Dolphin Fleet whale watching boats from mid-April through October. They also travel to sea on the Center's 44-foot sailing ketch *Sirius* and 34-foot converted lobster boat *Halos.* In the winter, some scientists may go to the Caribbean, the humpbacks' winter breeding and calving ground.

Collecting Data

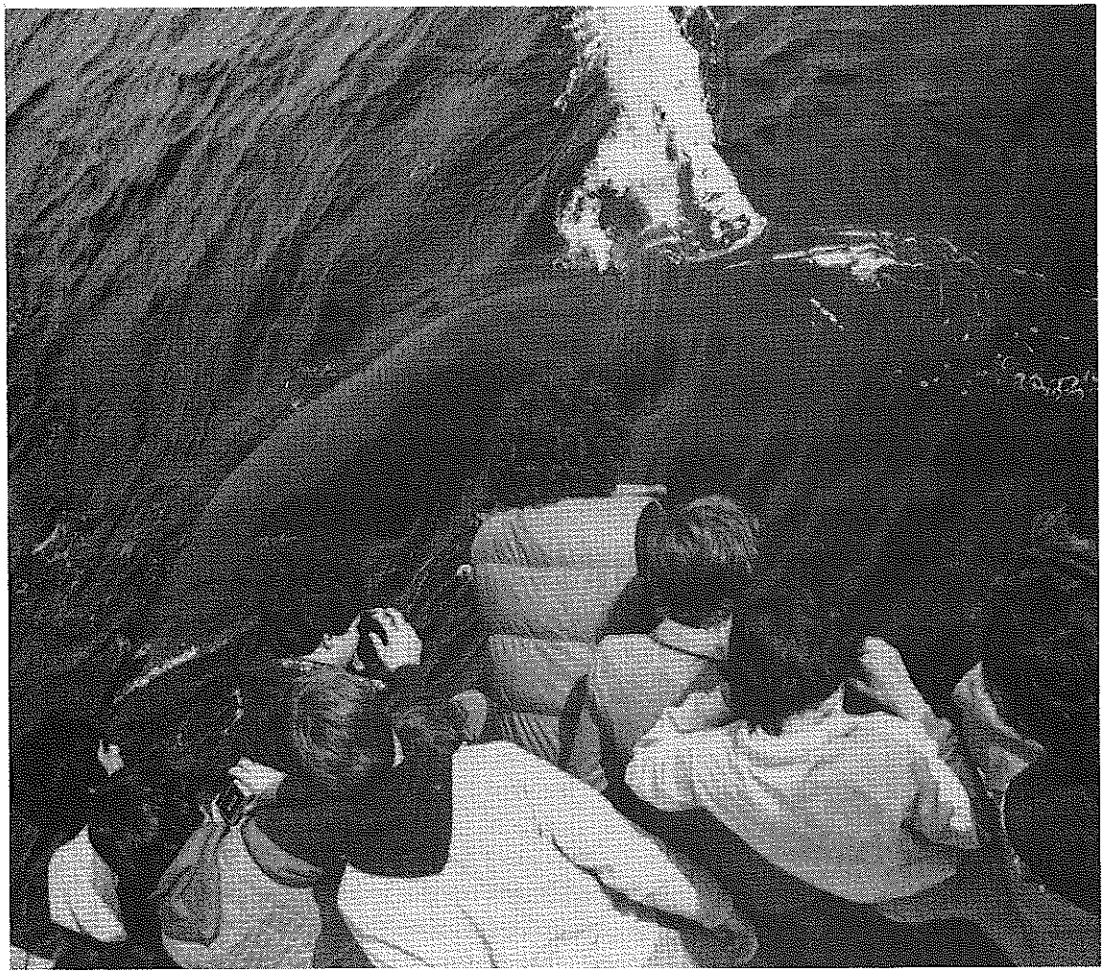
Researchers keep logs of every whale sighting during an excursion. They make careful notes of their observations, including the type of whale spotted, behaviors it demonstrates, and the time of the sighting. They also record the location of both the boat and the whale. This is done by using an imaginary grid that is laid across the water. The grid has fixed points similar to longitude and latitude. Long-range navigation equipment (LORAN) picks up radio signals sent from fixed transmitters. The equipment then displays coordinates on the grid pinpointing the boat's location. Researchers then determine the bearing, or compass direction in degrees, and distance of the whale. After the trip, they enter this information into a computer, which maps the

boat's route and indicates exactly where whales were sighted in relation to the boat's position.

STUDENT ACTIVITY

Charting the Course

The activity on the following reproducible pages gives students a chance to play the role of a researcher doing field work. Page 41 is a whale-sighting log similar to the one researchers use. Students can use the page to record observations they make on a make-believe whale watch. On page 42, students play the role of a researcher's computer as they chart the course of their make-believe whale watch using information from their logs. The page includes a map with a grid superimposed on it. The grid, which has number and letter coordinates instead of longitude and latitude coordinates, is a simplified version of the navigational grid system used by researchers.



Whale watchers see a humpback whale roll on its side and extend its flipper.

Name _____

Charting the Course

Scientists find out about whales by going out on boats and studying them up close. They take careful notes of what they observe. The whale sighting log on this page is like the ones researchers use. The first column lists a code that tells about the boat's location. The second column tells where the whale was spotted in relation to the boat. Pretend you are a researcher on a whale watch, and fill in the last two columns of the chart yourself. Write the type of whales you saw in the third column. In the last column, write what you observed each whale doing. You can choose any of the whales and whale behaviors in the boxes. Use your log to complete the charting activity on the next page.

Types of Whales Sighted

fin whale
minke whale
humpback whale
right whale

Behaviors Observed

breaching
traveling
spyhopping
spouting
lobtailing
logging
flippering
feeding

Whale-Sighting Log

Researcher (your name) _____

Boat's name _____ Date _____

Weather conditions _____

Boat's location	Whale's location	Type of whale	Whale behavior
6, H	west of boat	right whale	spyhopping
4, I	east of boat		
2, G	north of boat		
1, D	northwest of boat		
3, C	south of boat		
4, D	northeast of boat		
7, C	south of boat		
9, D	east of boat		

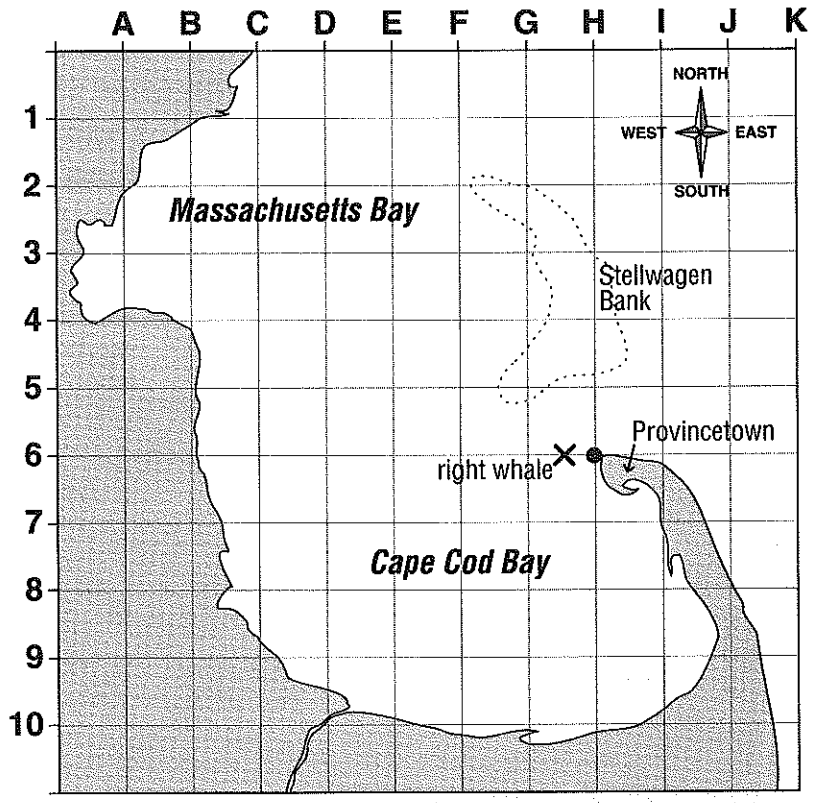
Name _____

Charting the Course

After a whale watch, researchers enter the information they have collected into a computer. The computer makes a chart showing where the boat went and where the whales were seen. You can play the part of the computer. Follow the directions in the box to chart the course of your whale watch. Then use the chart and log to answer the questions.

TO SHOW WHERE THE BOAT WENT: Look at the first column on your whale-sighting log. Find the place on the map where the two points listed meet. Mark this place with a dot. (The first one is done for you.) Plot each number and letter pair this way. Now connect the dots in order. The line shows the path the boat followed on the whale watch.

TO SHOW WHERE WHALES WERE SPOTTED: Look at the second column on your log. It tells you in which direction from the boat each whale was seen. Find a place on the map a short distance from each dot in the direction listed in the second column. Mark this place with an X. Look at the third column of the chart, and write the type of whale spotted near each X. (The first one is done for you.)



1. What type of whale was spotted the farthest north?

_____

2. What type of whale was spotted the farthest east?

_____

4. What type of behavior did you observe most often?

_____

5. How do you think logs and charts like the ones you made help scientists study whales?

_____

TRACKING WHALES

Sometimes on a whale watch, researchers at the Center for Coastal Studies may follow, or track, a whale over a distance, noting where it goes and what it does. They then make track maps like the ones pictured on page 45. Track maps show the path a whale followed and the behaviors it exhibited as it traveled, such as feeding and "social behavior"—or time spent interacting with other whales.

Center researchers make track maps by videotaping a particular whale as they follow it. As the camera rolls, a researcher constantly narrates information onto the tape about the turns made by the boat and whale, along with other information. Later, they play the tape back and use it to plot the whale's course.

Sources of Information

These maps provide scientists with information about whales' habits. For example, in studying track maps, scientists learned that the right whale's path while feeding represents a very different system of movement than that used while merely traveling. Scientists attribute this difference to the whale's method of finding food: right whales often "skim-feed," opening their mouths at the surface near dense patches of microscopic animals called *zooplankton* and filtering the food through their baleen plates. The patches are erratically situated, which explains the irregular paths the whales follow while feeding.

STUDENT ACTIVITY

Whale Tracks

The reproducibles on pages 44 and 45 include a track map that shows the paths followed by four right whales. Photocopy and distribute copies of the pages to the class. First ask students to use the tracking key to learn what types of activities the whales were engaged in at the time they were tracked. Then encourage them to study and compare the different whales' paths. How are they the same? How are they different? Finally, invite students to answers the six whale tracking questions.

Name _____

Whale Tracks

Sometimes researchers on a whale watch follow one particular whale as it travels. They keep careful records of what the whale does as it moves through the water. Scientists then use these records to make maps showing the path the whale followed and its behavior while traveling. These diagrams are called track maps. Take a look at the track map showing the paths of four whales. Use the key to help you read the map. Then answer the questions below.

KEY

..... The path the whale followed while traveling through the water but not eating.

——— The path the whale followed while eating.

- - - - - - The path the whale followed when it was involved in some way with another whale or group of whales—or when exhibiting "social behavior."

1. Which whale was observed only while it was eating?

_____

2. Did scientists observe whale B mostly eating as it traveled or mostly traveling without eating?

_____

3. What did scientists observe whale C doing?

_____

4. Which was the only whale researchers observed involved in "social behavior"?

_____

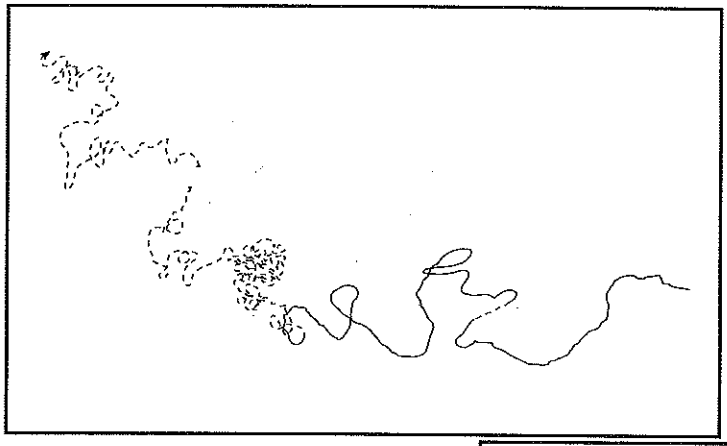
5. Does a whale's path seem straighter when it is just traveling or when it is eating as it travels?

_____

6. Why do you think this is so?

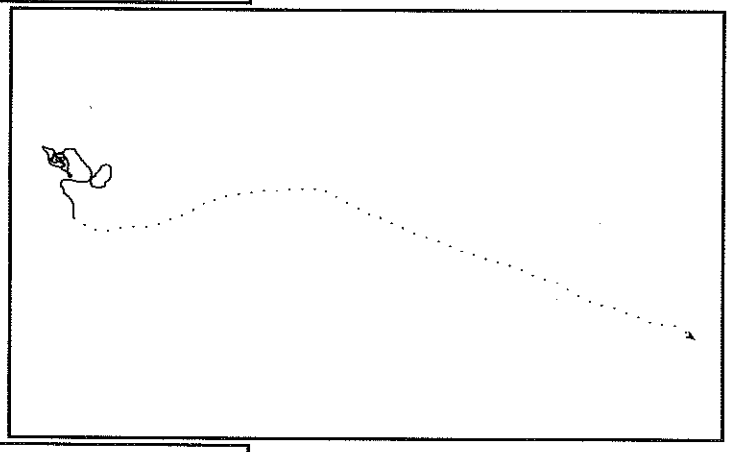
_____

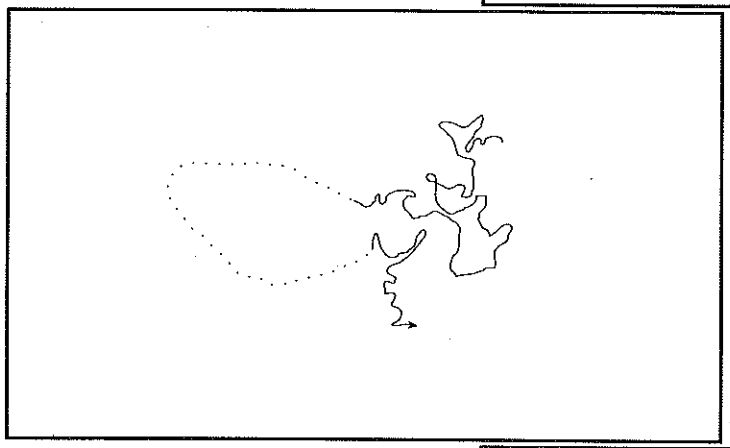
Name _____



WHALE A

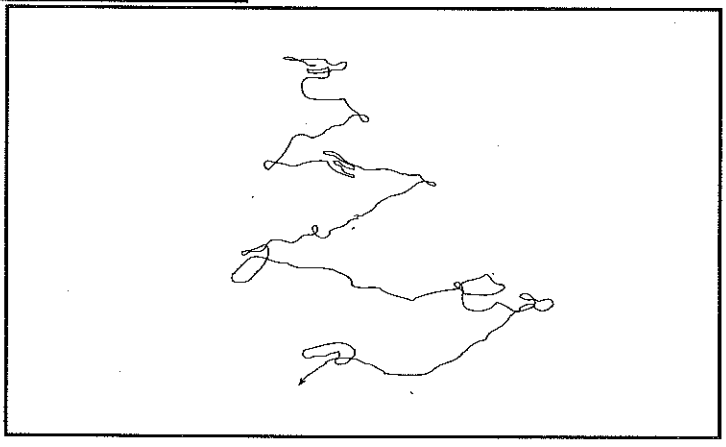
WHALE B



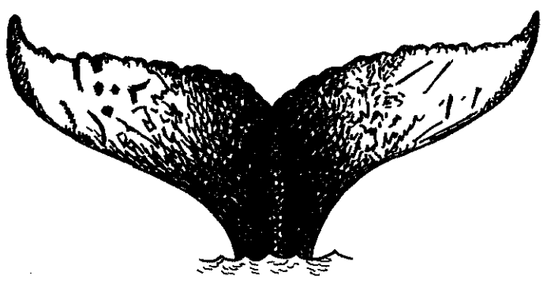


WHALE C

WHALE D

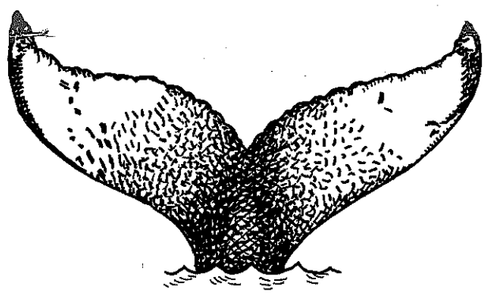


Name That Tail

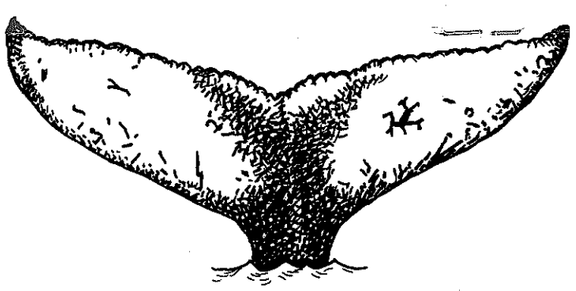


1 _____

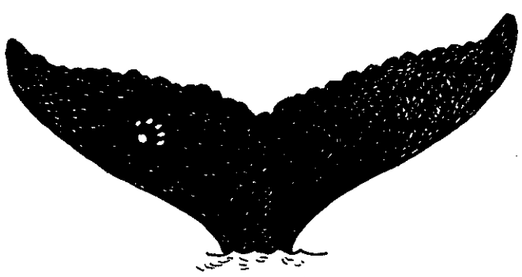
2 _____



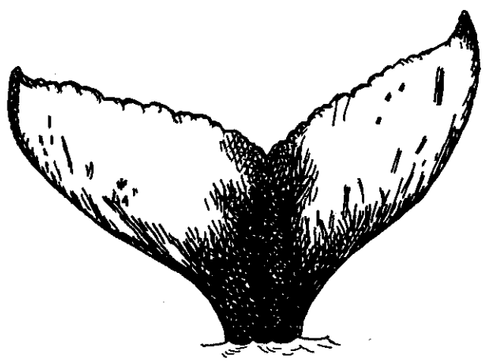
3 _____



4 _____



5 _____



6 _____

IDENTIFYING WHALES

As scientists do their research, it is important for them to be able to distinguish one whale from another. Scientists can identify whales based on various characteristics, such as unusual colorings, distinctive scars, or any other permanent marking. Right whales, for example, are identified by the pattern and shape of callosities—bumpy growths of skin—on their heads. Fin whales may be identified by shadings and swirls—known as blazes and chevrons—on their backs and by the shape of their dorsal fins. When researchers want to tell one humpback whale from another, they try to get a look at the whale's tail or flukes. The underside of the humpback's flukes has a black and white pattern that is different on each individual—a kind of natural "name tag" or "fingerprint." When the whale raises its tailfluke, researchers photograph it. They make catalogs of the fluke photos to use later in identifying whales observed on research excursions.

Once a year, Gulf of Maine whale researchers get together to name the newly sighted humpback whales and new calves for that year. At these whale-naming parties, researchers look at photos of the whales, particularly the flukes. They then try to name the whales based on the black and white tail patterns or other body markings or characteristics. For example, scientists named one frequently sighted whale "Little Spot" after the small spot behind its dorsal fin. Cat's Paw, an all-black fluked humpback, has a white "paw print" on its fluke. Of the 5,000-6,000 humpbacks that live in North Atlantic waters, about 600 have been named by Cetacean researchers.

STUDENT ACTIVITY

Name That Tail

The pull-out poster in the centerfold includes illustrations of the flukes of six humpback whales. Display the poster for the class. Have students role-play researchers at a whale-naming party by trying the cooperative activity on the next page. The reproducible on page 50 contains cards depicting each of the tails shown on the poster.

Name That Tail

COOPERATIVE ACTIVITY

1. Setting Up:

Share with students some of the background information from the previous page about how researchers identify and name humpback whales. Tell them they are going to pretend they are scientists at a whale-naming party. Divide the class into groups of six. Reproduce page 53, and distribute a copy of the sheet to each group. Have students cut the cards apart.

2. Sorting Tails:

Tell students that scientists first sort the photos based on the coloring of the whales' tails, called flukes. Read students the information box on page 49 on how to sort and assign numbers to the tails. Have students discuss what number they think each tail should be assigned. Once group members agree upon a number, they should circle it on the front of the card.

3. Observing and Describing Patterns:

Tell each student to take one card, then write one or more words on the back that describe the whale's tail. To get kids thinking creatively, ask them if the pattern reminds them of anything—does it look like a familiar object, a face, etc. The student should then pass the card to the next group member, and have him or her do the same. Students should continue passing the cards until each member has described each tail. Groups can then discuss the descriptions and use them to brainstorm a list of possible names for each whale. After group members decide on a name, they can write it on the front of the card.

4. Reporting Conclusions:

Have groups take turns presenting their numerical rankings and names to the class, matching each card to the whale tail on the poster. After all groups have had a turn, reveal the actual names scientists gave the whales. Have students compare the names they invented with scientists' choices. Ask students why they think scientists chose these names.

5. Thinking Critically:

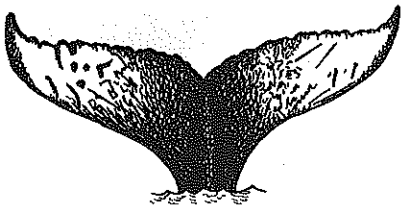
Follow-up the activity with some critical thinking questions, such as, "Why is it important for scientists to tell whales apart?"; "Why do scientists study individual

whales?" and; "What are some of the difficulties researchers face in trying to identify and name whales?"

How Scientists Sort Fluke Photos

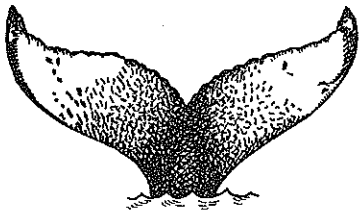
1. When whale researchers sort the tail or fluke photos of humpbacks they give each one a number from 1 to 5. A #1 fluke is almost completely white, while a #5 fluke is almost completely black. As you start to sort the flukes cards, decide what number to assign each one (more than one fluke can have the same number).
2. At first, it's hard to spot the differences between flukes. Look at the "core" of the tail (the center where the flukes come together). Compare the photos. Also, look for patterns or patches of white on black or black on white, as well as variations in the edges of the flukes.

Names scientists assigned to the whales depicted on the poster:

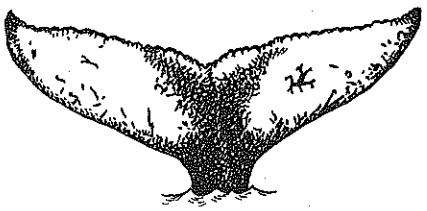


1. Crystal

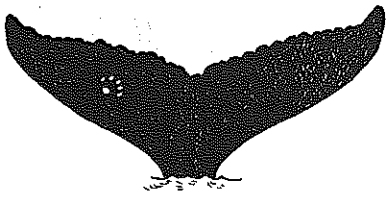
2. Trunk



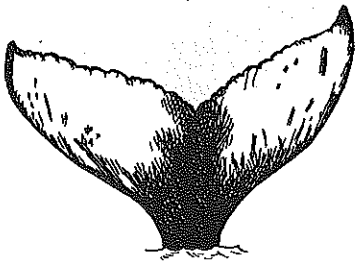
3. Colt



4. Quixote



5. Cat's Paw



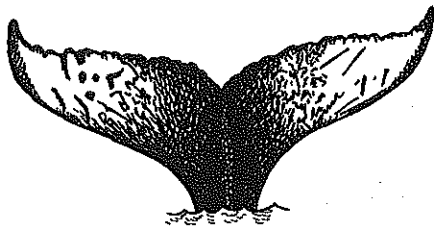
6. Patches

Name _____

Name That Tail Activity Cards

1

1
2
3
4
5



Name _____

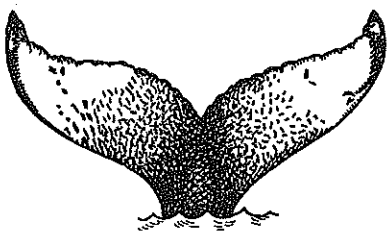
2

1
2
3
4
5

Name _____

3

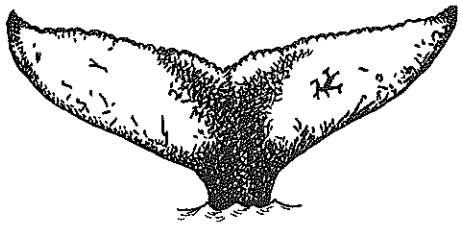
1
2
3
4
5



Name _____

4

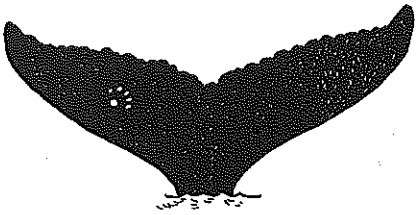
1
2
3
4
5



Name _____

5

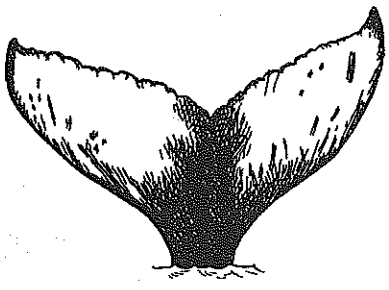
1
2
3
4
5



Name _____

6

1
2
3
4
5



Name _____

LOOKING FOR ANSWERS

Answers to many questions about whales can't be found in books; scientists just don't know enough about these creatures. For example, they think that humpbacks live between 40 and 60 years, but nobody is certain. All scientists can do is keep records of the year a given humpback is born, and then make a note each time that whale is seen. After years of documenting births and sightings of different humpbacks, scientists may be able to draw substantiated conclusions about the species' lifespan. It is slow, painstaking work, but it yields important kernels of knowledge.

Studying the Data

The study of individual whales is the first step in answering questions and forming theories about whales. Enough observations of individuals must be made before a conclusion about behavior, lifespan, feeding habits, and so on can be generalized to an entire population of whales. Scientists make discoveries about whales by sorting through masses of data collected from field research to find relationships, patterns, similarities, differences, and changes. Typical researchers at the Center for Coastal Studies spend half of their time collecting information. They spend the other half of their time in the lab organizing and analyzing the data and producing research reports and articles about it.

STUDENT ACTIVITY

From Field Work to Final Report

The reproducibles on pages 52 and 53 include a chart listing actual humpback whales that live in the Western North Atlantic. The chart tells the date each whale was first sighted by the Center for Coastal Studies researchers and, when known, the years of the whale's birth and death, mother's name, calves' names, and calves' years of birth. Photocopy and distribute a copy of the chart to each student. They will enjoy analyzing and interpreting the information on it.

Name _____

From Field Work to Final Report

Scientists use the information they gather on whale watches to help them answer questions they have about whales. This chart shows information scientists have gathered about real humpback whales over several years. Use the chart to answer the questions below.

1. How long ago was Trunk first seen? _____

2. Which whale(s) has had more than one calf? _____

3. Who is Salt's son? _____

4. Who is Cat Eye's mother? _____

5. What is the shortest interval between births of calves? _____

6. Patches has not been seen since 1990. What might that mean? _____

_____

7. How many years did Beltane live? _____

8. At what age did Beltane give birth? _____

9. Which whale has been sighted every year? _____

10. Which female has not given birth yet? _____

11. Which whales were sighted in the southern breeding grounds? _____

_____

12. Which whales were sighted in 1980? _____

_____

KEY

♀ = Female

♂ = Male

unk. = Unknown

☆ = Sighted in Samana Bay, Dominican Republic

★ = Sighted in Silver Bank, Dominican Republic

* = Died November 28, 1987

** = Died May 1990

WHALE'S NAME	SEX	YEAR BORN	YEAR DIED	MOTHER'S NAME	CALF'S NAME	YEAR CALF IS BORN	RECORD OF YEARS WHALES WERE SIGHTED												
							1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
CRYSTAL ☆	♂	1980		Salt				X		X	X	X	X	X	X	X	X	X	X
TRUNK ★	♂	unk.		unk.			X	X	X	X	X	X	X		X	X	X	X	X
COLT	♂	1981		Equus					X	X	X	X	X	X	X	X	X	X	X
QUIXOTE	♀	unk.		unk.												X	X	X	X
CAT'S PAW	♀	unk.		unk.	Velvet unnamed unnamed	1982 1984 1990				X	X	X	X	X			X	X	X
PATCHES	♂	unk.		unk.				X	X	X	X	X	X	X		X	X	X	
SALT	♀	unk.		unk.	Crystal Halos Thalassa Brine Bittern Salsa	1980 1983 1985 1987 1989 1991	X	X	X	X	X	X	X	X	X	X	X	X	X
SILVER	♀	unk.	1991	unk.	Beltane Aster Peninsula Coral Chablis	1980 1983 1985 1988 1990	X	X	X	X	X	X	X	X	X	X	X	X	X**
BELTANE	♀	1980	1987	Silver	Cat's Eye	1985		X	X	X	X	X	X	X	X*				

WHALES AND PEOPLE

Humans' relationship with whales has undergone drastic changes over the years. For many centuries, people hunted whales for their blubber, which was melted down to oil and used for lamp fuel, candles, and other purposes. Whaling ships that operated from the sixteenth through the end of the nineteenth century reduced the world-wide stocks of whales to a dangerously low number. But by far the greatest damage was done by "factory ships," introduced at the beginning of the twentieth century. These ships relied on bombs to do their work with cruel efficiency. By the late 1960's, almost every species of whale was in danger of extinction.

From Whaling to Watching

Today, almost all whaling has been banned. At the same time, many people have become interested in learning more about whales. The science of Cetacean research has been born, and is flourishing. Every year, tens of thousands of people go to sea on whale watches in hopes of catching a glimpse of these majestic animals. Even more people support groups that work to prevent whales from vanishing from the world's oceans.

Whale Rescues

The work of the Center for Coastal Studies reflects these conservationist values. In addition to conducting research and offering educational programs about whales, the Center also rescues whales entangled in fishing gear and other debris—a growing problem in increasingly polluted ocean waters.

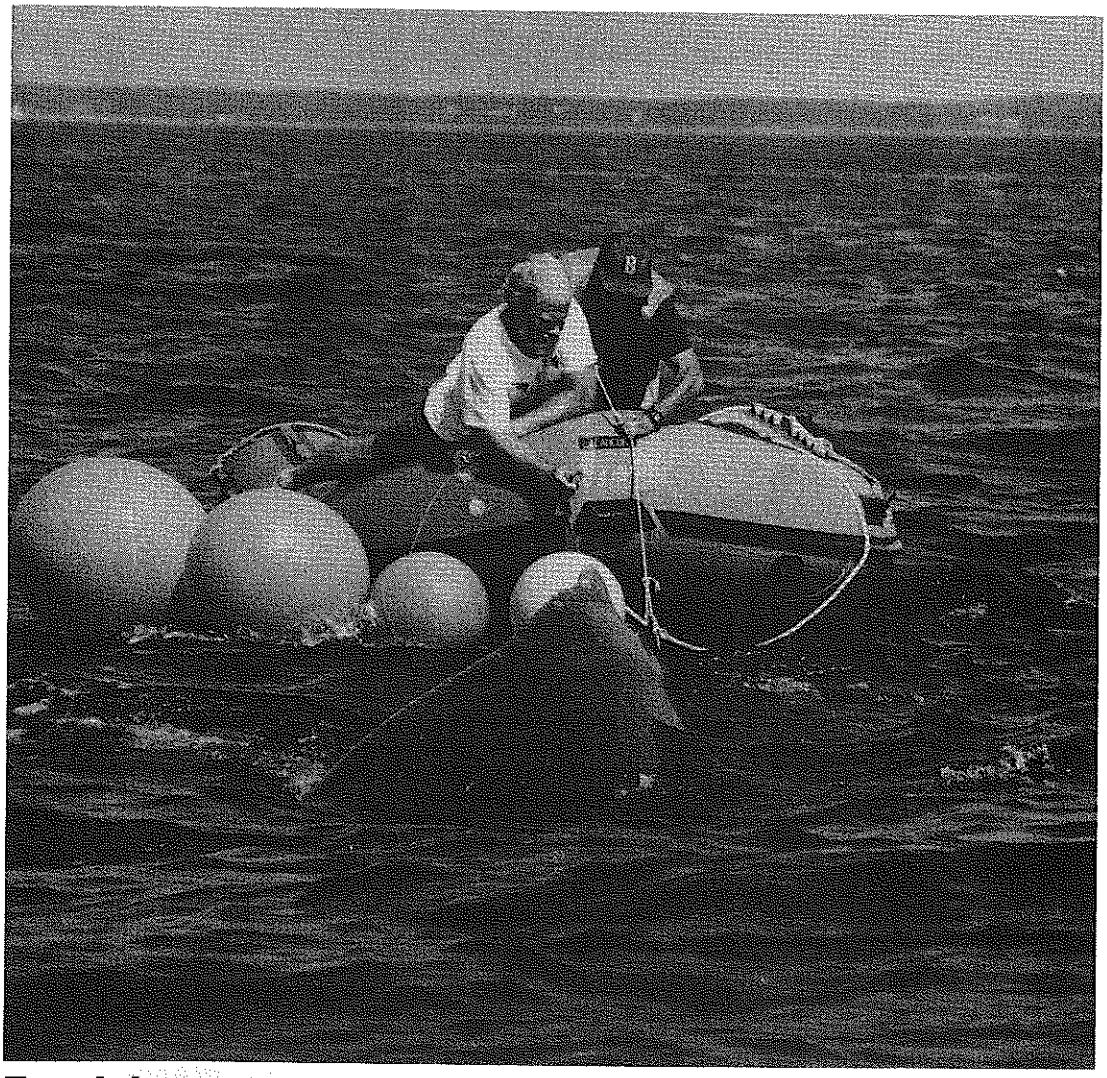
Entanglement poses a great danger to large whales and marine mammals and can injure or kill an animal. Entangled whales may drown or starve because they can't travel freely to find food. Most entanglements in the Gulf of Maine involve the two most endangered species in the area: humpback and northern right whales. There are between 6 and 12 recorded incidents of entanglement each year. Doubtless, many more whales than that die before they are discovered or disentangled. The Center is the only group on the east coast of the United States authorized to

disentangle whales. Since 1984, the Center's staff has been involved in many disentanglement attempts, most of which have resulted in the release of the whale.

STUDENT ACTIVITY

The Rescue of Comet

Your students may enjoy acting out the play on pages 56–60 about the rescue of an entangled whale. Share some of the background information with students about entangled whales before they perform the skit. As a follow-up to the play, ask students to think about why whales are endangered and why many people want to save them. Research projects on whaling may also interest students.



Two whale rescuers work quickly to cut loose the lines entangling a humpback whale.

The Rescue of Comet

Cast

Narrator

Daniel LeRoy: Director of the Center for Coastal Studies, a group in Provincetown, Massachusetts, that studies whales and rescues whales in trouble

Natalie Coho: Captain of the Minke Fleet, a whale-watching operation that runs out of Provincetown

Tex Ferreira: Whale researcher skilled at disentanglements and one of the founders of the Center for Coastal Studies

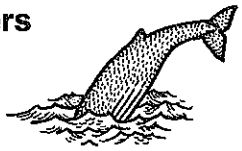
Mila Egan: Skipper of *Sirius*, the Center's research vessel

Michael Anderson: Another whale researcher skilled at disentanglements

Tom McKay: Navigator of a Zodiac inflatable boat used by the Center for rescues

Three other researchers

Reporter



SCENE I

Center for Coastal Studies Headquarters

Narrator: Early one summer morning, the short-wave radio at the Center for Coastal Studies crackles.

Natalie: *(heard as voice on radio)* Coastal Studies? Coastal Studies? Are you there? This is Natalie Coho.

Narrator: Daniel LeRoy races to the controls. He can tell by the sound of Natalie's voice that something is wrong.

Daniel: We're here, Natalie. What is it—something the matter out there?

Natalie: We've just seen an entangled humpback whale at LORANS 13799 and 44178. It's pretty twisted up in a gill net.

Narrator: A gill net is an almost invisible, but very strong, type of netting used

more and more often by commercial fishermen on Stellwagen Bank near the Center's headquarters.

Daniel: That's bad news. That whale could drown or starve really soon. I'll get Tex.

Narrator: Tex is one of the only people on the east coast of America permitted by the government to disentangle whales. Tex takes over the controls on the radio.

Natalie: What should we do now?

Tex: Hold your position. We'll get back to you in a few minutes. *(Turning to Daniel)* Where is *Sirius* today?

Daniel: It's on the bank, not too far from Natalie.

Tex: *(fiddling with the dials on the radio):* Let's try to reach *Sirius*. Research vessel *Sirius*, research vessel *Sirius*, this is the Center for Coastal Studies. Do you read me?

Mila: Yes, Tex, we read you.

Tex: Mila, we've gotten a report of an entanglement at LORANS 13799 and 44178. Are you anywhere near there?

Mila: Yes, we are. About 2 miles southeast.

Tex: Well, would you head up there and let us know what's happening? I'll get Michael Anderson and we'll head up in the Zodiac. I think it will take us about two hours to get there. Let's call each other on the radio every 15 minutes, starting in about half an hour. My watch reads 10:20.

Mila: Roger, Tex. Over and out.

SCENE II

At Macmillan Wharf

Narrator: At the dock, Tex meets the other members of the whale rescue team—Michael Anderson and Tom McKay.

Tex: Let's load the Zodiac.

Mike: It always amazes me that we can rescue a whale from a 14-foot inflatable boat.

Tom: I've got the lifejackets.

Tex: I've got the radio and the navigational equipment.

Narrator: The rescue team motors slowly out of the harbor.

Tom: Now I'm going to rev up the engine. Hold on tight everybody.

Tex: Let's make tracks. I'm sure we don't have a second to lose.

Narrator: The Zodiac slaps along on the small waves. Tex contacts Mila on the short-wave radio. *Sirius* has reached the entangled whale, and the crew is keeping a close eye on it.

Tex: *(to Tom)* We've got to head about 10 miles north-northeast of here.

Tom: Full speed ahead.

SCENE III

Back at the Center's Headquarters

Narrator: The telephone at the Center has been ringing constantly since Tex left. Reporters following the rescue operation keep calling the Center for updates.

Daniel: *(on the telephone with a reporter)* Yes, that's right. They're on their way out there right now. No, don't follow them in a helicopter. The sound would make everyone nervous—especially the whale!

SCENE IV

On Board *Sirius*

Narrator: Mila Egan and the other researchers on *Sirius* have been able to keep the entangled whale in sight. They recognize it as Comet, one of the whales the Center has been studying for many years.

Mila: I hope Tex gets here soon. Comet is starting to look really weak. I feel like I'm about to lose an old friend.

Researcher 1: I wonder if she can even breathe very well.

Researcher 2: She's trailing about 50 feet of net.

Researcher 1: She's trailing quite a lot of other junk, too. Isn't that a lobster pot and more fishing gear?

Researcher 3: *(running in)* We've just spotted the Zodiac on the horizon.

Narrator: Within minutes, the whale rescue team arrives. Tom climbs on board *Sirius* to give Tex and Michael more room on the Zodiac.

Mila: *(calling down from Sirius)* Here comes your gear.

Tex: *(reaching up)* Great! Grab the floats and line, Mike.

Narrator: The Center has borrowed a method whale hunters of old used to capture whales: a line is attached to the gear that entangles the whale. Large floats are snapped onto the line, making it difficult for the whale to dive. The whale tires quickly.

Tex: Once the whale is tired out, we should be able to move in close and cut all that gear away.

Mike: *(checking the floats and line)* What I like about this method is, it's really easy to release the whale from the floats if the rescue fails.

Tex: Let's not think that way.

Narrator: Michael and Tex work quickly to attach the floats.

Mike: *(to Tex)* That poor thing is completely hogtied from head to tail.

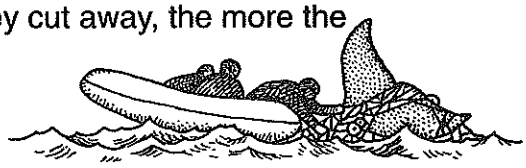
Tex: It looks like she's been tangled up for quite a while. Look at how thin she is. This won't be the easiest rescue we've ever done.

Michael: When was there ever an easy rescue?

Narrator: First, Tex and Michael have to identify the lines and gear on the animal to figure out the best way to cut her free. Then, leaning way out over the Zodiac, they begin to cut away the net.

Tex: Be sure you don't cut the line that's attached to the floats.

Narrator: They had thought it would be easy to take the net off the whale's tail, but it is very hard and slow work. The more they cut away, the more the whale starts moving.



Michael: Hold on. Here comes the tailfluke again!

Tex: I can't believe the whale still has this much energy.

Narrator: Several times, the whale almost tips the tiny Zodiac over. But finally, Tex and Michael cut the last piece of net away. With one last splash of its tailfluke, the whale swims away, free.

Everyone aboard *Sirius:* *(cheering loudly)* All right! We did it! So long, Comet!

SCENE V

Back at the Center's Headquarters

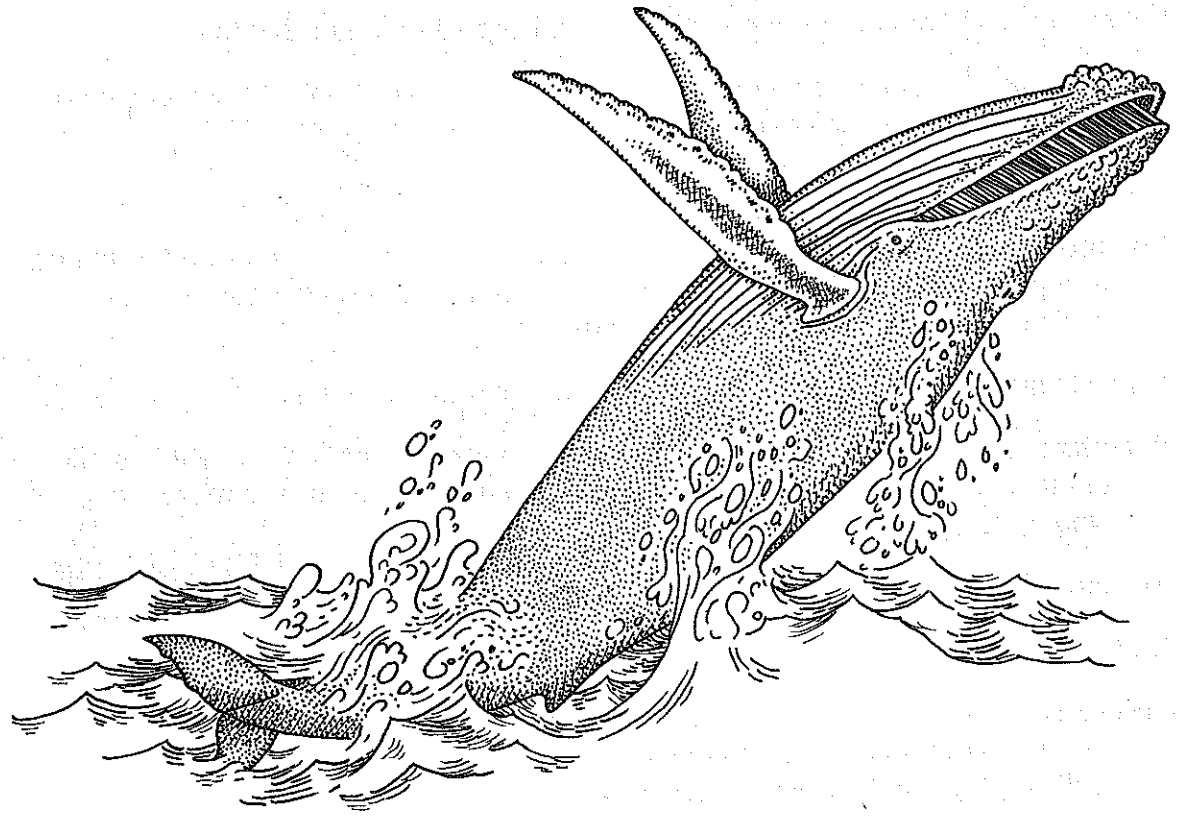
Narrator: His work done, Tex is taking time to talk to a newspaper reporter. The reporter has stopped by to interview him about the successful rescue operation.

Reporter: Isn't this work very dangerous?

Tex: I suppose so. But it's so worthwhile. To us, these whales are like our neighborhood dogs. If one of them is in trouble, we've just got to do whatever we can to help.

Narrator: Comet was seen several times later that summer, swimming freely, gaining weight, and looking healthy.

The End



WHALE RESOURCES

WHALE BOOKS FOR CHILDREN

Nonfiction Gr. 1–2

Fin Whales by Sarah Palmer (Rourke Enterprise, Inc., 1988)

Humpback Whales by Dorothy Henshaw Patent (Holiday House, 1989)

Humpback Whales by Sarah Palmer (Rourke Enterprises, Inc., 1988)

The Blue Whale by Kazue Mizrimura (Thomas Y. Crowell, Co., 1971)

Whales by Althea (Longman Group USA, Inc., 1988)

Whales: The Gentle Giants by Joyce Milton (Random House, 1989)

Nonfiction Gr. 3–4

All About Whales by Dorothy H. Patent (Holiday, 1987)

Arctic Whales and Whaling by Bobbie Kalman (Crabtree Publishing Co., 1988)

Great Whales: The Gentle Giants by Patricia Lauber (Henry Holt & Co., 1991)

Sea Mammals by Jean H. Sibbald (Dillon Press, 1988)

The Sea World Book of Whales by Eve Bunting (Harcourt Brace Jovanovich, 1987)

Whales by Helen Carey and Judith Greenberg (Raintree, 1990)

Whales by Lionel Bender (Franklin Watts, 1988)

Whales, the Nomads of Sea by Helen Roney Sattler (Lothrop, Lee and Shepard, 1987)

Whale Watch by June Benrens (Children's Press, 1978)

Whale Watch: An Audubon Reader by Ada and Frank Graham (Delacorte Press, 1978)

Fiction Gr. 1–2

Amos & Boris by William Steig (Farrar, Straus & Giroux, 1971)

Baby Beluga by Raffi (Crown, 1990)

Catch a Whale by the Tail by Edward Riccuiti (Harper and Row, 1969)

Dear Mr. Blueberry by Simon James (Macmillan, 1991)

Joshua Disobeys by Dennis Vollmer (Landmark Editions, 1988)

The Tale of Humphrey the Humpback Whale by John Heus and Tom Robinson (Brost Heus, 1985)

Whale Brother by Barbara Steiner (Walker & Co., 1988)

Whale Song by Tony Johnston (Putnam Publishing Group, 1987)

Fiction Gr. 3–4

How the Whale Got His Throat: Just So Stories by Rudyard Kipling (Putnam Publishing Group, 1988)

Kilroy and Gull by Nathaniel Benchley (HarperCollins Children's Books, 1978)

Thor, the Last of the Sperm Whales by Robert McClung (Shoe String, 1988)

Why the Whales Came by Michael Morpurgo (Scholastic, 1990)

ORGANIZATIONS, INSTITUTIONS, AND AGENCIES

Center for Coastal Studies
P.O. Box 1036, Provincetown, MA, 02657/Phone: (508) 487-3622.
Whale and marine environment research, technical publications, whale disentanglements, newsletter, field walks, whale watch information, reading lists.

American Cetacean Society
P.O. Box 2639, San Pedro, CA, 90731/Phone: (310) 548-6279.
Publications, newsletter, comprehensive *Whale Fact Pack.*

Animal Welfare Institute
P.O. Box 3650, Washington, DC, 20007/Phone: (202) 337-2333.
Whale information, newsletter, and publications including *Whales vs. Whalers.*

International Wildlife Coalition
634 North Falmouth Highway, Box 388, North Falmouth, MA 02556/
Phone: (508) 564-9980.
Whale information, newsletter, Adopt-a-Whale program.

National Wildlife Federation
1400 16th Street, NW, Washington, DC, 20036/Phone: (800) 432-6564.
Annual curriculum packet (different topic each year), magazines including *Ranger Rick's Nature Magazine* (ages 6–12) and *NatureScope* (teacher resource).

New England Aquarium
Central Wharf, Boston, MA 02110/Phone: (617) 973-5200.
Education Department, school and group visits, teacher resource center, curriculum packets, newsletter, and magazines.

Oceanic Society
Building E., Fort Mason Center, San Francisco, CA, 94123/
Phone: (202) 544-2600.
Whale information, marine education program, newsletter.

Whale Center
3933 Piedmont Avenue, Suite 2, Oakland, CA 94611/
Phone: (510) 654-6621.
Whale information, newsletter. (Information requests must be accompanied by a self addressed stamped envelope.)

Answers

Whales: Inside and Out (pages 11–14)

Answers will vary, but the similarities between the two whales include their shared anatomical features, such as flukes, blowhole, dorsal fin, and flippers. Among the differences are that the humpback has two blowholes while the killer whale has only one; the humpback has baleen while the killer whale has teeth; the humpback has throat pleats and the killer whale does not; and the killer whale has a melon and saddle, while the humpback does not.

Make a Blubber Glove (page 15)

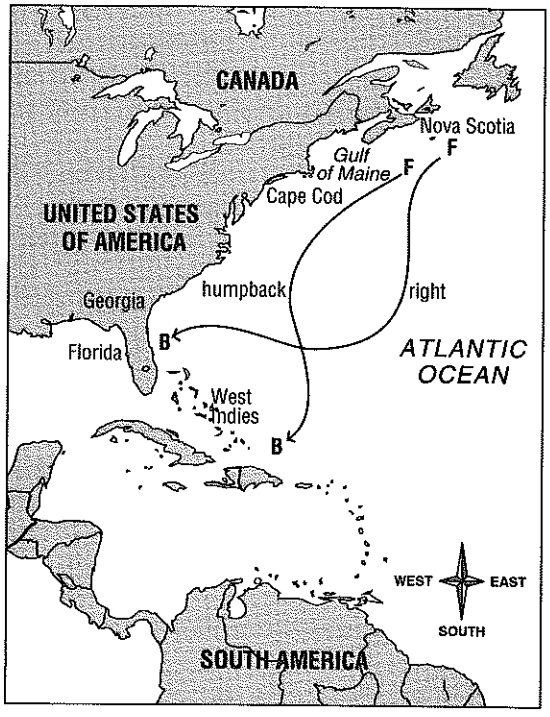
Students should find that the hand protected by the blubber glove is less sensitive to the different water temperatures than the ungloved hand. This is because the vegetable shortening in the glove provides a layer of insulation for the hand, much like the way a whale's layer of fat protects it from temperature extremes.

How Do Whales Measure up? (pages 24–25)

1) blue whale; 2) killer whale and minke whale; 3) 14 feet; 4) harbor porpoise; 5) answers will vary; 6) about 9; 7) toothed whale; 8) baleen whales.

Incredible Journeys (page 38)

1–3):



4) south; 5) north; 6) humpback whale;
7) right whale.

Charting the Course (pages 41–42)

Answers will vary.

Whale Tracks (page 44–45)

1) whale D; 2) mostly traveling without eating; 3) eating as it traveled, then traveling without eating, then eating as it traveled again; 4) whale A; 5) The path seems straighter when the whale is just traveling. This is because when a whale feeds, it must travel to wherever its food is.

Name That Tail (page 48–50)

Names and numerical rankings for whales will vary.

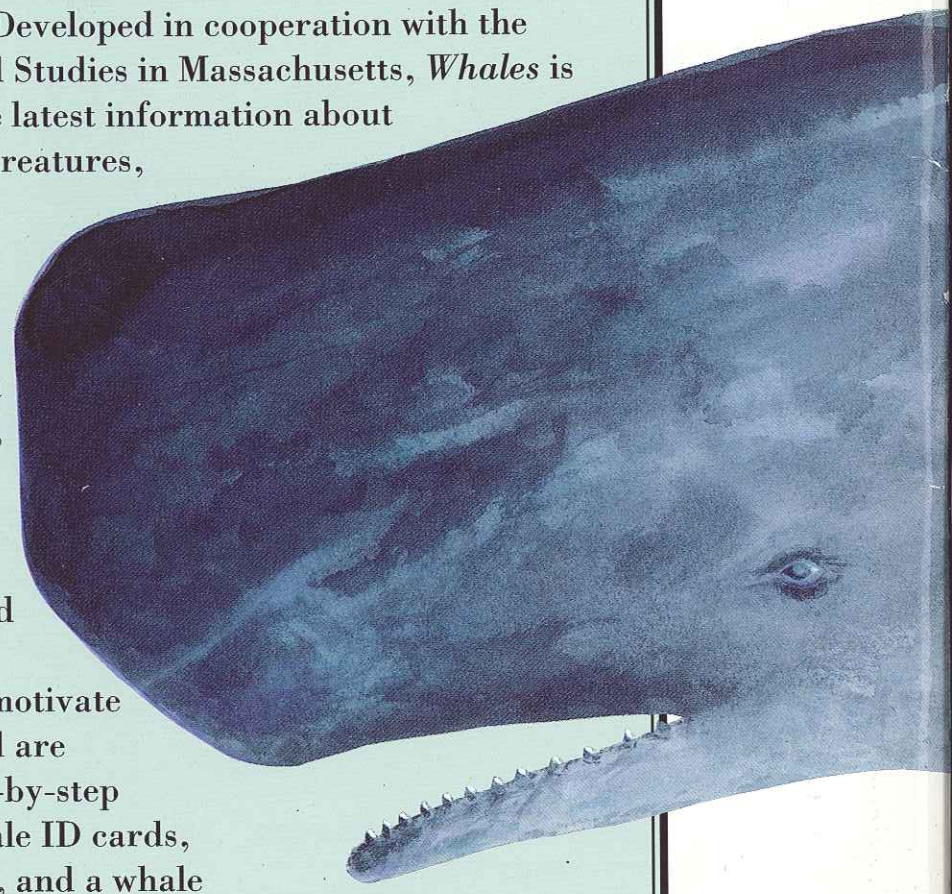
From Field Work to Final Report (pages 52–53)

1) 1979; 2) Cat's Paw, Salt, Silver; 3) Crystal; 4) Beltane; 5) 2 years; 6) Answers will vary; 7) 7 years; 8) 5 years; 9) Salt; 10) Quixote; 11) Crystal, Trunk; 12) Crystal, Trunk, Patches, Salt, Silver, Beltane.

LEARNING CONNECTIONS

WHALES

Tap your students' HUGE interest in whales with this unique resource. Developed in cooperation with the Center for Coastal Studies in Massachusetts, *Whales* is brimming with the latest information about these fascinating creatures, plus hands-on activities that enable students to conduct whale research, put on a whale rescue play, do a blubber experiment, and much more. The book is also loaded with fact-based reproducibles to motivate learning; included are patterns and step-by-step directions for whale ID cards, whale mini-books, and a whale puppet. Enrich your curriculum—and excite your class—by adding *Whales* to your professional bookshelf.



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