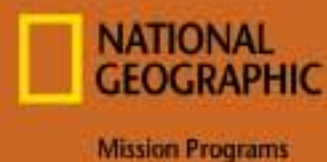
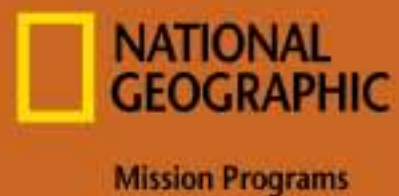




Saving the Wild

Conservation Around the World

Teacher's Guide 6-8



Standards:

The *Saving the Wild: Conservation around the World* education program supports the National Science Education Standards (NSES) and National Geography Standards.

NSES CONTENT STANDARDS for Grades 6-8 addressed in this guide

(www.nap.edu/readingroom/books/nses/html)

Science as Inquiry

- Polar Opposites, page 8
- Ocean Currents around the World, page 11
- Disappearing Wetlands, page 12
- Gray Whales on the Move, page 14

Life Science

- Polar Opposites, page 8
- Disappearing Wetlands, page 12
- Gray Whales on the Move, page 14

Earth Science

- Ocean Currents around the World, page 12

Science in Personal and Social Perspectives

- Line Up for Recycling, page 6
- Polar Opposites, page 8
- Ocean Currents around the World, page 11
- Gray Whales on the Move, page 14

History and Nature of Science

- Line Up for Recycling, page 6
- Polar Opposites, page 8
- Ocean Currents around the World, page 11
- Disappearing Wetlands, page 12
- Gray Whales on the Move, page 14

Unifying Concepts and Processes

- Line Up for Recycling, page 6
- Polar Opposites, page 8
- Ocean Currents around the World, page 11
- Disappearing Wetlands, page 12
- Gray Whales on the Move, page 14

National Research Council. *National Science Education Standards*. Washington, D.C.: National Academy Press, 1996.

Pre/Post Assessment:

Use this assessment to discover how much your students already know about animal conservation and geography before you begin this unit and later as a conclusion to your study.

1. Pretend you have been asked to help clean-up litter and fishing line around a popular lake. Describe the steps you would take to organize a campaign and how you would get others involved.
2. On a globe or world map, point to the areas where penguins live. Point to the areas where polar bears live. Could these species ever live in each other's areas? Why or why not?
3. What is a wetland? Name one type of wetland and show where it's located on a map of the United States.
4. Why do animals migrate? On a map or globe show the migration route for a particular mammal or bird.

National Geography Standards

(www.nationalgeographic.com/xpeditions/standards)

The geographically informed person knows and understands:

The World in Spatial Terms

1. How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
2. How to use mental maps to organize information about people, places, and environments in a spatial context.
3. How to analyze the spatial organization of people, places, and environments on Earth's surface.

Places and Regions

4. The physical and human characteristics of places.
5. That people create regions to interpret Earth's complexity.
6. How culture and experience influence people's perceptions of places and regions.

Physical Systems

7. The physical processes that shape the patterns of Earth's surface.
8. The characteristics and spatial distribution of ecosystems on Earth's surface.

Human Systems

9. The characteristics, distribution, and migration of human populations on Earth's surface.
10. The characteristics, distribution, and complexity of Earth's cultural mosaics.
11. The patterns and networks of economic interdependence on Earth's surface.
12. The processes, patterns, and functions of human settlement.
13. How the forces of cooperation and conflict among people influence the division and control of Earth's surface.

Environment and Society

14. How human actions modify the physical environment.
15. How physical systems affect human systems.
16. The changes that occur in the meaning, use, distribution, and importance of resources.

The Uses of Geography

17. How to apply geography to interpret the past.
18. How to apply geography to interpret the present and plan for the future.

Cover

Front (from left): black rhino (*Diceros bicornis*), killer whale (*Orcinus orca*), African lion (*Panthera leo*), Florida manatee (*Trichechus manatus latirostris*)

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Saving the Wild Conservation around the World 6 - 8 Teacher's Guide

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National Geographic Education & Children's Programs

Founded in 1888, the National Geographic Society is one of the largest nonprofit scientific and educational organizations in the world. Its mission is to increase and diffuse geographic knowledge while promoting conservation of the world's cultural and natural resources. The mission of Education & Children's Programs, a division of the Society, is to motivate and enable each new generation to become geographically literate.

SeaWorld and Busch Gardens

Based on a long-term commitment to education and conservation, SeaWorld and Busch Gardens strive to provide an enthusiastic, imaginative, and intellectually stimulating atmosphere to help students and guests develop a lifelong appreciation, understanding, and stewardship for our environment. Specifically, our goals are...

- To instill in students and guests of all ages an appreciation for science and a respect for all living creatures and habitats.
- To conserve our valuable natural resources by increasing awareness of the interrelationships of humans and the environment.
- To increase students' and guests' basic competencies in science, math, and other disciplines.
- To be an educational resource to the world.

To the Teacher

The *Saving the Wild: Conservation Around the World* Teacher's Guide for grades 6-8 was developed to help you teach your students—in an active, hands-on way—about animal conservation and geography. Our goal is to integrate geography, science, art, language, and literacy. We want students to understand their place in the world and how they are connected to the world, and to inspire them to become stewards of the environment. This teacher's guide supplements the in-park program offered by SeaWorld San Diego, San Antonio and Orlando and Busch Gardens Tampa and Williamsburg.

The National Geographic Society/SeaWorld/Busch Gardens activities support the National Science Education Standards and the National Geography Standards. The brief background information in this guide (pp. 3-5) was written for you, the teacher. It will help you complete these activities with your students. We suggest you also refer to some of the materials listed on page 20 for more in-depth information. The National Geographic Society, SeaWorld, and Busch Gardens strive to provide teachers with up-to-date information and activities that motivate students to appreciate and conserve wildlife, the oceans, and the natural world.

Goals of the *Saving the Wild* Unit 6-8

Students will explore current issues in worldwide animal conservation while learning such geographic skills as map reading and spatial organization of Earth's living and nonliving components. Students will examine their relationships to the world and its environments.

Objectives:

After completing the *Saving the Wild* unit, the student will be able to:

1. Use a map of the coastline of western North America to show the yearly migration pattern of gray whales. Compare and contrast gray whale migration to that of humpback whales and list reasons why various animals migrate.
2. Describe the hazards of discarded monofilament fishing line and create an outline for organizing a clean-up campaign in his or her neighborhood.
3. Analyze the effects of introducing geographically non-native species to new environments.
4. Describe the location of two or more wetland areas in the United States. Explain how these areas are important.
5. Illustrate and describe the circulation of major ocean currents.
6. Discuss current conservation issues with family and friends.

Vocabulary

Antarctica — an ice-covered landmass located mostly within the Antarctic Circle.

biodiversity — the genetic variability of living organisms on our planet.

carnivore — flesh-eating animal.

conservation — taking care of our environment by wisely managing its resources.

endangered species — a species of plant or animal of which numbers are decreasing at an alarming rate and is threatened with extinction by human-made or natural changes in the environment.

extant — a species represented by living creatures.

extinct — no longer existing.

fishery — organized industry of catching, processing, and selling fishes or other aquatic species.

flyway — a specific air route followed year after year as birds migrate between wintering areas and summer breeding grounds.

habitat — the place where a plant or an animal lives.

macropod — kangaroos, wallabies, and other marsupials of the family Macropodidae.

migration (animal) — the act of moving from one place to another and (usually) back, most often in a predictable cycle.

monofilament — a fishing line made of a single untwisted strand of synthetic filament.

population — a group of plants or animals of the same species that live in the same area and have the opportunity to breed with each other.

preservation — protecting resources, ecosystems, and structures for present and future generations.

restoration — returning resources, ecosystems, and structures to their original (or near-original) condition.

sustainable use — using resources in ways that do not deplete them.

telemetry — a wireless technology in which information is measured from a remote source and reported to a receiving station for analysis.

terrestrial — growing or living on land.

vessels — watercraft such as ships.

vocalizations — sounds produced for auditory communication.

wetlands — areas of low-lying land that are periodically submerged or hold a great deal of moisture in their soils.

Conservation around the World

Conservation means taking care of our environment by wisely managing its resources. Although the discipline of conservation is multifaceted, a view through “geographic eyes” can help students see, understand, and appreciate the web of relationships between people, places, and environments. A “geographically” based classroom activity may ask students to consider the significance of where resources (renewable or nonrenewable) are located or distributed, or whether there are any patterns in the locations of the resources. Students can use geographic tools (maps, globes, charts, etc.) to acquire, arrange, and use geographic information.

Practicing conservation can involve different methods. **Sustainable use** means using resources in ways that do not deplete them (e.g., reducing the use of nonrenewable resources and reusing resources). **Preservation** means protecting resources, ecosystems, and structures for present and future generations (e.g., protecting endangered animals and plants and their habitats). **Restoration** means returning resources, ecosystems, and structures to their original (or near-original) condition (e.g., cleaning a polluted river or helping endangered species make a comeback).



Rescue and rehabilitation programs for endangered species such as sea turtles are examples of preservation—protecting resources for present and future generations. Here the 500th sea turtle rescued and rehabilitated by SeaWorld is released. To learn how Crittercam, a research tool worn by wild animals, may aid sea turtle conservation go to news.nationalgeographic.com/news/2004/02/0212_040212_turtlecam.html.

Is conservation important?

When we practice conservation, we balance some of the needs of people—places to live, work, and play; food to eat, water to drink—with the need for a planet that will be healthy for years to come. One way we practice conservation is by interacting with the ecosystem in responsible ways. You are conserving when you observe fishing limits, when you recycle, and when you vote for laws to conserve resources such as timber, oil, and minerals such as iron ore.

When resources are not wisely managed, we “use up” what we have. Even though the Earth is a large place, it is not infinite. There are only so many fish in the sea, oil deposits underground, and trees growing on land. In an ecosystem everything, living and nonliving, has a role. When one element is removed—perhaps by erosion, over-hunting, habitat destruction, or disease—it affects the entire system. As more elements are removed the system becomes impoverished.

You need look no farther than your backyard to find examples of interdependence within an ecosystem. A songbird such as a Savannah sparrow (*Passerculus sandwichensis*) eats mostly insects in the summer. Insects such as crickets and grasshoppers feed on plants. Plants get their nourishment from the soil and the sun. Interactions like this within simple food chains take place every day in your own backyard!



What types of ecosystems can you find in your own backyard?



Pollution like this can be controlled through successful recycling programs.

What is an endangered species?

An endangered species is an animal or plant that is in danger of disappearing completely from our planet. Most scientists believe a species is endangered when its population is so small that it will become extinct in 15 years. Many species are threatened, which means that unless conservation measures are taken, they’re likely to become endangered.

Extinction has always been a part of nature.

As climate and food supplies change, animals that can’t adapt to an altered environment can’t survive. Some scientists believe there have been as many as five mass extinctions over the last 450 million years. They also believe the Earth may be beginning a sixth mass extinction, the first caused by—and that will affect—humans.

Why should we worry?

When people talk about the balance of nature, they’re talking about the way plants, animals, and people interact with each other and their environments. The balance can be upset when plants or animals become extinct. Each living organism plays a role in the Earth’s ecosystem: When even one disappears, others are affected. For example, if a small fish becomes extinct a larger fish that ate it may not find enough food and die. Then a hawk that ate the larger fish might starve and die. Because of this complex relationship of food webs, it’s important to maintain biodiversity—as much plant and animal variety as possible.

What’s in it for me?

As we consider using ocean and land resources, we must also recognize that we are a part of this ecosystem. People are an important element: The more people there are, the more resources they use. We have the responsibility to study our ecosystem and learn how it works so that we know how our interactions will affect it. We must learn more about the products we buy so we don’t contribute to endangering or threatening a species. The more we know about an ecosystem, the better we can predict the possibility of negative outcomes to use or harvest of its resources. This knowledge is important when we make decisions and create laws that manage (and hopefully conserve) the world around us.



African elephants (*Loxodonta africana*) are one of thousands of species that are endangered due to habitat destruction and poaching.



Earth’s animals and natural resources are not limitless. Such resources must be used wisely in order to preserve them for future generations.

Line Up for Recycling

OBJECTIVES

The student will be able to describe the sources of discarded monofilament fishing line and its hazard to wildlife. Students will plan a clean-up campaign in their area. As an option, students can carry out the campaign. During the campaign, students will document the procedure, record the amount of line collected and write a "planning book" to become a resource for others to use.

National Geography Standards: 14, 16

MATERIALS

- ❑ Internet access. Visit "How to start a monofilament recycling program" at www.fishinglinerecycling.org/implementing.htm
- ❑ Reel of fishing line and 10 to 12 lengths of line cut to 30.5 cm (12 in.) each

BACKGROUND

Monofilament Recovery and Recycling Program (MRRP) is an innovative recycling project dedicated to reducing the environmental damage caused by discarded monofilament fishing line. Monofilament line is another name for single-strand, high-density, nylon fishing line that is used on fishing reels and in the manufacturing of fishing nets. Wildlife is adversely affected by monofilament line in two ways: Entanglement and ingestion. Humans are also affected by monofilament line, which can wrap around boat propellers and SCUBA divers. Monofilament fishing line can last up to 600 years in the environment. Some facts about monofilament fishing line:

- From 1980 to 1999, one in every five manatee rescues in the U.S. was a result of entanglement in fishing line (monofilament).
- From 1996 to 2000, the Florida Marine Research Institute documented 163 turtles that were entangled in fishing line.
- From 1995 to 2000, approximately 35 dolphins in the Southeast U.S. died as a result of monofilament-related injuries.
- Researchers have documented more than 60 fish species that have swallowed or become entangled in marine debris.
- From 1999 to 2000, more than 265 seabirds of various species were rescued due to hook and line entanglements. Of those 265 seabirds, 92 died.

ACTION

1. Ask students to raise their hands if they have ever been fishing. Show students the fishing line reel and distribute the cut pieces for students to touch. Ask students to try and break the line or pull it apart. Explain that this single-strand, high-density, nylon fishing line is used around the country (and the world) by commercial and recreational fishermen. Ask students if they think this small, lightweight line could pose problems to ocean animals. Use the background information to illustrate specific instances.
2. Ask students if they have seen discarded fishing line around their neighborhood, town or favorite fishing area(s). Introduce the Web pages from the Monofilament Recovery and Recycling Program (either on overhead transparencies or by making handouts). Explain that this is a successful ongoing recycling program.
3. Have the class break into groups to investigate the many aspects and steps involved in organizing and running their own monofilament line recycling program. Issues to think about include advertising, organizing clean-ups and coordinating volunteer help. Students can find information, downloads, and support materials at fishinglinerecycling.org/startup.htm.
4. After students have finished their research, the class should discuss and analyze the pros and cons of starting their own program. Is a program needed in their area? Who should do the work? How much might it cost? If students would like to continue, ask them to create an action plan with a timeline and a list of task to be performed. As an alternative, students could invite someone who runs a monofilament line recycling program to speak to the class, and ask how they might help that program.
5. During the campaign, ask students to document their actions, record the amount of line collected and create a "planning book" as a resource for others to use.

Online Sources

U.S. Environmental Protection Agency: Student Center
www.epa.gov/students/

Monofilament Recovery and Recycling, Brevard County Florida
www.brevardcounty.us/mrrp/

Monofilament Recovery and Recycling (Texas)
<http://mrrp.tamu.edu/index.htm>



A green sea turtle (*Chelonia mydas*) swallowed a hook and fishing line. Without medical assistance this endangered animal could perish.

SeaWorld's veterinary staff operates on the troubled turtle.

After a brief recovery period this turtle was released.

Polar Opposites

OBJECTIVES

The student will be able to understand the effects of introducing geographically non-native species to a new environment.

National Geography Standards: 14, 16

MATERIALS

- Atlas; Arctic and Antarctic maps
- Computer with Internet access if available
- Writing and drawing materials including color markers or pencils

BACKGROUND

More than 100 years ago, Eugene Schifffelin, an eccentric New Yorker who loved Shakespeare, was struck by an idea—he wanted to introduce every bird mentioned in Shakespearean plays to the United States. In 1890 he released 60 European starlings (*Sturnus vulgaris*) to New York City’s Central Park (because starlings were mentioned in the play *Henry IV*). Now an estimated 200 million starlings can be found everywhere across North America. From New York to California and Canada to Mexico, these non-native birds take away food and shelter from species native to the United States such as woodpeckers (family Picidae) and cardinals (family Cardinalidae). Non-native species can be plants, animals, and other organisms. Introducing non-native species, whether intentionally or accidentally, is one of the greatest threats to biodiversity.

Sometimes a species is so common, such as starlings, that most people may not know it was ever non-native. And misinformation can be confusing. For instance, two species found in polar regions, penguins and polar bears, are often pictured together in cartoons, movies, greeting cards, souvenirs, and so on. However, penguins and polar bears live on opposite sides of the world. Penguin species are found on every continent in the Southern Hemisphere. In addition, penguins generally live on islands and remote continental regions that are free of land predators, where their inability to fly is not detrimental to their survival. To the north, polar bears are found throughout the circumpolar Arctic.



Penguins do not fly. To avoid predation, penguins generally live where there are few land predators.

ACTION

1. First, ask students to use the atlas or other maps to locate the Arctic and the Antarctic. Compare and contrast the two regions. The Arctic is primarily a mass of snow and ice. Antarctica is a continent—a landmass covered with ice and snow.
2. Divide students into two groups: Polar Bears and Penguins.
3. Begin a class discussion with these questions: What would happen if someone today wanted to introduce penguins to the Arctic environment? The Penguin group will investigate this. What if someone introduced polar bears to areas of the Antarctic? This is what the Polar Bear group will look into.
4. Using maps of the Arctic, the Penguin group should select an area in which they would like to introduce penguins. What food sources are available for penguins? What wildlife will they compete with for resources? What new predators will they face? Overall, what would be the impact on the Arctic ecosystem if penguins were able to survive there?
5. Using maps of the Antarctic, the Polar Bear group should select an area in which they would like to introduce polar bears. What food sources are available for polar bears? What animals will they compete with for resources? What new threats will they face? Overall, what might be the impact on the Antarctic ecosystem if polar bears were able to survive there?
6. Have the two groups present their findings using posters or oral reporting methods. Lead a class discussion about students’ findings. Is it ever a good idea to introduce animals to an ecosystem in which they are not native?



How would the Arctic ecosystem change if penguins were introduced to it?



Polar bears (*Ursus maritimus*) are not found in the Antarctic region, but what would happen if they were brought there?

Saving My Wild

Are non-native species present in the state in which the students live? If so, which ones? Geographically, where did the species originate? What threats do these non-native species have on the state’s ecosystems? What steps, if any, are being taken to eliminate these invading species? For extra credit students could learn what species are invasive to their region and discuss ways of removing those invasive species.

Online Sources

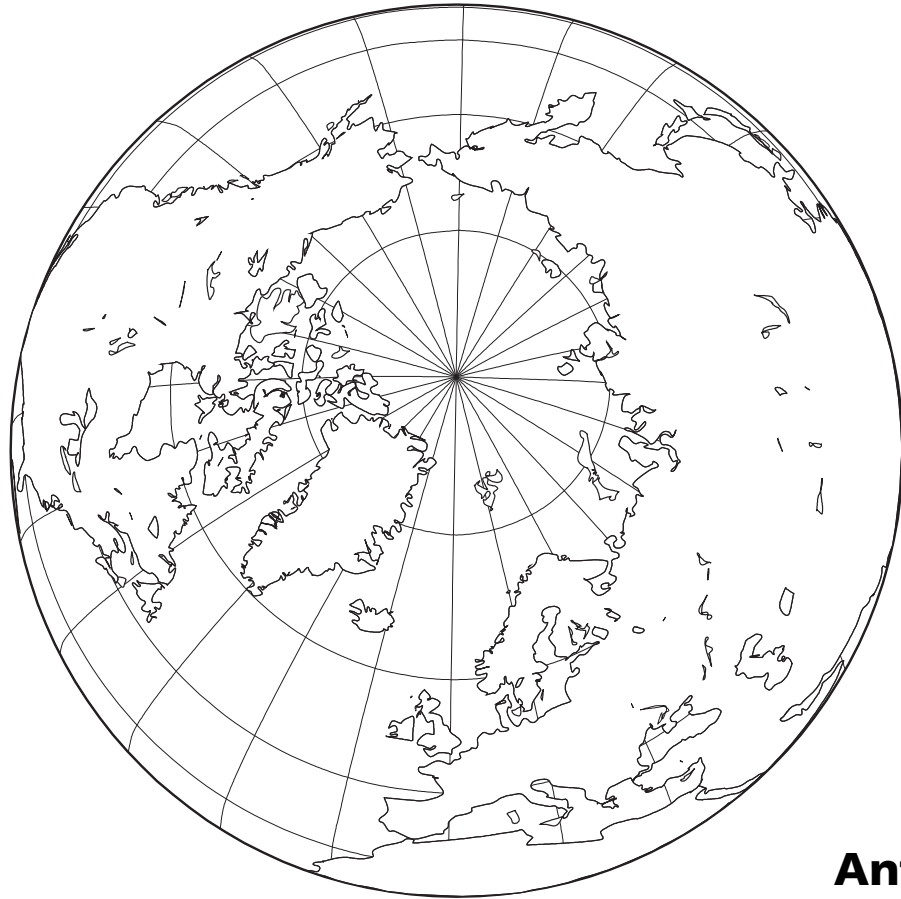
National Geographic News. “Bioinvasion: From Old World to New”
news.nationalgeographic.com/news/2001/01/bioinvasion_2001-01-23.html

National Geographic News. “Bioinvasion: Fighting the Invaders”
news.nationalgeographic.com/news/2001/02/0206_bioinvasion3.html

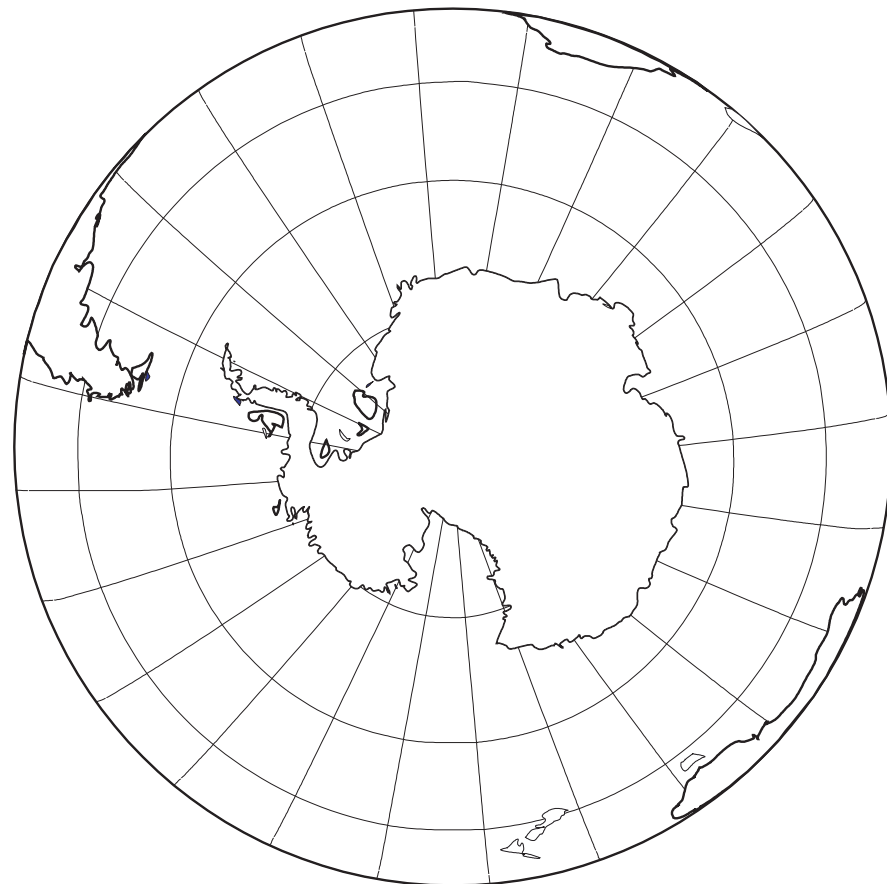
National Agricultural Library
www.invasivespecies.gov

Environmental Literacy Council
www.enviroliteracy.org/article.php/40.html

Arctic Map



Antarctic Map



Ocean Currents Around the World

OBJECTIVES

The student will be able to illustrate and describe the circulation of major ocean currents.

National Geography Standard: 1

MATERIALS

- Ocean atlas or atlas that contains ocean current charts
- Copies of world map on page 19 (one per student group)
- Writing and drawing materials including color markers or pencils

BACKGROUND

Unequal heating and cooling of the Earth's surface from solar radiation causes air masses to rise, cool, and fall. The moving air masses create wind that drives oceanic surface waters. Earth's rotation and the direction of trade winds create currents that follow a usually predictable pattern. Generally, ocean currents flow in a clockwise direction in the Northern Hemisphere and in a counterclockwise direction in the Southern Hemisphere.

ACTION

1. Divide students into five or six groups and assign each an ocean:
 - North Pacific
 - South Pacific
 - North Atlantic
 - South Atlantic
 - Indian Ocean
 - Arctic Ocean (for advanced students)
2. Using the blank world map provided (page 19), have students show the movement of water in each group's water basin. Students should use different colors to illustrate currents, indicating direction with arrows. *Note: the South Atlantic and Pacific Oceans become one uninterrupted water mass around Antarctica.*
3. Have the groups present their water basin maps to the class, explaining circulation movements.
4. Put all the maps together on a bulletin board. What are some similarities among the various ocean basin currents? What are some differences?

Activity Extensions:

1. What happens when ocean currents reverse or extend their ranges? Have students research the past effects of El Niño, a cyclic event characterized by a number of atmospheric changes, including an unusually warm water current that prevents the upwelling of nutrient-rich cold water.
2. Have students pick any coastal city. Using only the ocean currents, they should chart a course to reach the other side of the ocean. What time of year will they travel? How long will the journey take?

Saving My Wild

Did you know that in Antarctica, the bodies of some animals contain pesticides that have never been used in the Antarctic? How in the world did the pesticides get there? The answer is that ocean currents and tides, along with the atmosphere and marine animals, can carry pollution great distances. Ask students to investigate the kinds of pollutants that ocean currents carry and how the pollutants affect different ecosystems.

National Geographic News. "Cousteau Finds 'Horrifying' Trash on Desert Islands"

news.nationalgeographic.com/news/2003/07/0728_030728_trashhawaii.html

Nova Online—Tracking El Niño

www.pbs.org/wgbh/nova/elnino/#

Ocean currents map from the Office of Naval Research

www.onr.navy.mil/focus/ocean/motion/currents1.htm

Ocean Planet—Smithsonian

seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/oceanography_currents_1.html

Windows to the Universe: Currents of the Ocean

www.windows.ucar.edu/tour/link=/earth/Water/ocean_currents.html&edu=mid

Disappearing Wetlands

OBJECTIVES

The student will be able to show on a globe or map types of wetlands found regionally in the U.S. The students will be able to describe and map the yearly migration of one bird species, giving the bird's approximate locations and time of year.

National Geography Standards: 1, 14

Recommended field guides: Roger Tory Peterson, *Peterson First Guide to Birds of North America* and *A Field Guide to Western Birds*. National Geographic *Field Guide to Birds of North America*.

MATERIALS

- Atlas, world map, or globe
- Access to Internet or library
- Map of U.S. (provided)
- Writing and drawing materials including color markers or pencils

BACKGROUND

A wetland is an area that is saturated or covered by water at least part of the year. Common types of wetlands in the United States include swamps, marshes, bogs, and prairie potholes. Wetlands are found along coasts and in inland areas. Wetlands play a vital role in the health of the surrounding ecosystems. About 43% of federally endangered and threatened animals and plants depend on wetlands in some way. Important crops such as rice, mint and cranberries grow in wetlands. Wetlands provide nursery and breeding grounds for fishes, shellfishes, waterfowl and other wildlife. Migrating birds often use wetlands as "rest stops" for food and rest, and to spend the night while traveling long distances.

Unfortunately it's estimated that more than 50% of our native wetlands in the continental United States have been irreversibly altered or destroyed, from an estimated 220 million acres in the 1600s to only about 105 million acres in 1997. Extensive wetland loss results from drainage, pollution, and other human actions as well as natural threats.

ACTION

1. Begin the activity by writing "wetland" on the chalkboard or writing surface. Ask students to define this word. Are wetlands always along a coast? Are wetlands always wet? Are there any wetlands near your school or town? Display pictures from books or an Internet site (resources below) to show students what a wetland looks like.
2. Wetlands are soggy, muddy, and often smell bad. In the past, developers have filled them in and used them for housing or industry. Are wetlands important to ecosystems? Why or why not? When discussing waterfowl, show a field guide of bird migrations and established flyways.
3. Distribute maps of the United States. Write the following birds on the board: sandhill cranes, American tree sparrow, blue-winged teal, Brant goose, Rufus hummingbird, redhead duck, peregrine falcon, Townsend's warbler, bobolink, cliff swallow. Have students work individually or in groups to choose one bird and research how it uses wetlands and what flyway(s) it follows. Ask students to create a hypothesis and devise an experiment to show the outcome of their bird populations if wetlands continue to disappear along these flyways. This activity may be done in student groups or as a class.
4. Have students or student groups report findings by illustrating on the wetland map the migration of their bird from summer to winter and back again. What was their hypothesis and how could they be proved or disproved?

Saving My Wild

What kind of wildlife migrates through or near the students hometown? What habitats does wildlife use? Is it protected (refuge, park) or is the habitat at risk? Students can participate in projects such as the Great Backyard Bird Count from Wild Birds Unlimited or Journey North.

Online Sources

National Audubon Society
www.audubon.org/
National Wildlife Federation
www.nwf.org/ourprograms/

U.S. Fish & Wildlife Service
<http://wetlands.fws.gov/>
United States Environmental Protection Agency
www.epa.gov/owow/wetlands/

United States Map



Gray Whales on the Move

OBJECTIVES

The student will be able to state when, where, and why gray whales migrate, plot data of two migrating whales on a map, and describe the ecosystems to and from which they travel. As an extension, students can compare and contrast gray whale migration to Baja California, Mexico, and humpback whale migration to Hawaii.

National Geography Standard: 1

MATERIALS

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

BACKGROUND

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

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

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

ACTION

1. Look at a world map in an atlas. Discuss the values for latitude (horizontal lines) and longitude (vertical lines). What are the latitudes at the poles and the equator? Between which latitudes is the Pacific Coast of North America found? Is this region north or south of the equator?
2. Distribute the blank map to students and have them label the countries or continents, oceans, seas, coastal states, Hawaii, and Baja California, Mexico.
3. Distribute the data sheet showing the dates, latitudes, and longitudes for two gray whales migrating along the coast. Distribute the labeled map of the North American Pacific Coast to the students. Have students plot the migration data on their maps using a different color for each whale. Place arrows or other symbols along the migration path to indicate when whales travel south, travel north, or are in the area in which they give birth and/or mate. To complete the map, add a map key, a compass rose, and give the map a title.
4. As a class or as individuals, use the maps completed in class, the migration data, an atlas, and the online sources provided to answer the questions at the bottom of the data sheet. (Answers are provided on page 20.) If students cannot answer in class, let them work on the questions as a homework assignment, using the Internet or library to look up more information on gray whales and humpback whales.
5. The next day, discuss the answers. Other topics for discussion: In what ways is the ocean environment different near Alaska than near Mexico? Why do gray whales and humpback whales migrate? How do they find their way over such a long distance? What other animals migrate? Do humans migrate?



J.J. the gray whale was an orphaned calf rescued by SeaWorld San Diego. After months of rehabilitation she was released. J.J. contributed to our understanding of gray whale growth and development.

Saving My Wild

Have students ever seen a whale? Would they like to? Why? How would students feel if these giant creatures became extinct? Students can research current conservation efforts for whales and of the ocean. What do humans do that might threaten whale populations?

Online Sources

Alaska Department of Fish and Game

www.adfg.state.ak.us/pubs/notebook/marine/gray.php

Hawaiian Islands Humpback Whale National Marine Sanctuary

www.hawaiihumpbackwhale.noaa.gov/about/humpback.html

International Whaling Commission

www.iwcoffice.org/

National Marine Mammal Laboratory (includes information on gray whales and humpbacks)

nmml.afsc.noaa.gov/education/cetaceans/baleen1.htm

OBIS SEAMAP (gray whale and humpback whale information)

www.seamap.env.duke.edu/species

SeaWorld/Busch Gardens ANIMALS

www.swbg-animals.org/animal-info/animal-bytes

U.S. National Marine Sanctuaries

www.sanctuaries.nos.noaa.gov/

Whale Sanctuary of El Vizcaino

www.unep-wcmc.org/sites/wh/vizcaino.html

Gray Whales on the Move

North American Pacific Coast

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

Gray Whale Migration Data					
Whale 1: Pregnant Female			Whale 2: Mature Male		
Date	Latitude (North)	Longitude (West)	Date	Latitude (North)	Longitude (West)
20-Oct	60°N	170°W	30-Oct	67.5°N	170°W
30-Oct	55°N	165°W	19-Nov	55°N	165°W
19-Nov	57.5°N	150°W	29-Nov	57.5°N	140°W
29-Nov	50°N	130°W	9-Dec	45°N	125°W
19-Dec	35°N	122.5°W	19-Dec	35°N	122.5°W
8-Jan	25°N	112.5°W	18-Jan	25°N	112.5°W
17-Feb	25°N	112.5°W	17-Feb	25°N	112.5°W
10-Mar	25°N	112.5°W	27-Feb	40°N	125°W
26-Mar	40°N	125°W	10-Mar	50°N	130°W
15-Apr	55°N	135°W	26-Mar	57.5°N	150°W
5-May	57.5°N	140°W	15-Apr	55°N	165°W
30-May	55°N	170°W	5-May	67.5°N	170°W



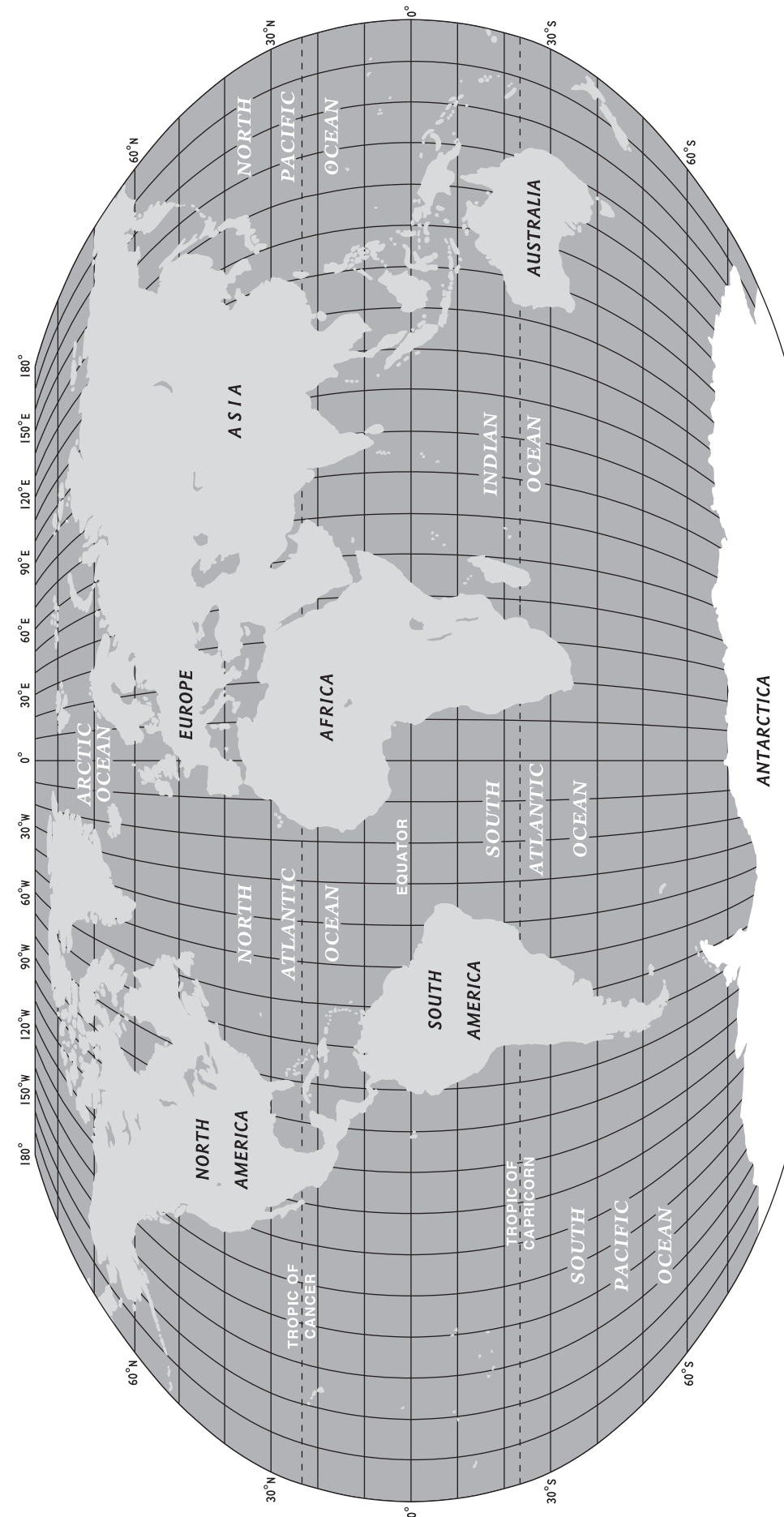
Questions

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

Plot the migration of gray whales on this map.



World Map



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www.hswri.org/

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www.nationalgeographic.com/crittercam

National Geographic Society
www.nationalgeographic.com

National Geographic Xpeditions Lessons
www.nationalgeographic.com/xpeditions

SeaWorld/Busch Gardens ANIMALS: Guide to Zoological Park Careers
www.swbg-animals.org/career-resources/info-books/zoo-careers

U.S. Dept. of Agriculture: Natural Resources Conservation Service
www.nrcs.usda.gov/

Agencia de Protección Ambiental de EE.UU (Spanish)
www.epa.gov/espanol

Zoo de Madrid (Spanish)
www.zoomadrid.com/index.html

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Videos available through SeaWorld or online at www.swbg-estore.com

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Answers to gray whale migration questions:

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

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Saving the Wild

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