

Pre/Post Assessment

Use this assessment to discover how much your students already know about endangered species before you begin this unit, and later as a conclusion to your study.

- ◆ What is an endangered species?
- ◆ What human activities threaten wildlife survival? Draw pictures of some.
- ◆ Identify two endangered species. Use a map to show where they live.
- ◆ Pretend you're the U.S. President. Give a speech to tell Americans how they can help save endangered species.
- ◆ List ways zoos can help endangered species. Draw a sample page that might appear in a studbook.
- ◆ Pretend you are shopping in a store. What items would be made from animal products? Which ones would you not want to buy?

NATIONAL SCIENCE EDUCATION STANDARDS

SeaWorld and Busch Gardens education programs and publications support National Science Education Standards. The *Endangered Species* Teacher's Guide for grades 4–8 includes connections to the following standards:

Life Sciences Standards

- ◆ Characteristics of organisms
- ◆ Life cycles of organisms
- ◆ Organisms and environments

Personal and Social Perspectives Standards

- ◆ Types of resources
- ◆ Changes in environments
- ◆ Science and technology in local challenges

History and Nature of Science Standards

- ◆ Science as a human endeavor

Science as Inquiry

- ◆ Abilities necessary to do scientific inquiry
- ◆ Understanding about scientific inquiry

Unifying Concepts and Processes

- ◆ Systems, order, and organization
- ◆ Evolution and equilibrium
- ◆ Evidence, models, and explanation
- ◆ Form and function
- ◆ Change, constancy, and measurement

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



Covers

Front (from left): Florida manatee (*Trichechus manatus*), black rhinoceros calf (*Diceros bicornis*), loggerhead sea turtle (*Caretta caretta*).

Back (clockwise from upper left): Florida manatee (*Trichechus manatus*), Hawaiian monk seal (*Monachus schauinslandi*), white rhinoceros mother and calf (*Ceratotherium simum*), Humboldt penguin (*Spheniscus humboldti*)

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Endangered Species

4–8 Teacher’s Guide

A SEAWORLD PUBLICATION

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To the Teacher

The *Endangered Species* Teacher’s Guide for grades 4–8 was developed at SeaWorld to help you teach your students – in an active, hands-on way – about endangered species. Our goal is to integrate science, mathematics, language and literacy, geography, and art. SeaWorld curriculum supports the National Science Education Standards.

The brief background information in this Guide was written for you, the teacher. It will help you do these activities with your students. We suggest you also refer to some of the materials listed on page 24 for more in-depth information. SeaWorld strives to provide teachers with up-to-date information and activities that motivate students to appreciate and conserve wildlife, the oceans, and the natural world.

Do you have comments or suggestions regarding the activities in this Teacher’s Guide? We’d love to hear your opinion. Write the SeaWorld San Diego Education Department, email us at SWC.Education@seaworld.com or call 1-800-23-SHAMU.

What Is an Endangered Species?

An endangered species is in danger of disappearing.

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 fifteen 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 the altered environment can't survive. Some scientists believe this kind of situation may have led to the extinction of most dinosaurs. Yet it's the rapid rate of extinction today that troubles biologists and concerned citizens. As the world population and resource use increases, the rate of extinction accelerates.

Thousands of birds, mammals, fishes, amphibians, and reptiles, along with more than 19,000 plant species are endangered and many more become *extinct* each year before scientists have even had the chance to discover them. At current extinction rates, as much as 20 percent of the world's species could be gone in the next 30 years.

Why should we worry?

When people talk about the balance of nature, they're talking about the way that plants, animals, and people interact with each other and their environment. That balance can be upset when plants or animals become extinct.



Records show the last two living great auks died in June 1844, when three fishermen came across them and their nest. Two of the men clubbed the birds; the third fisherman smashed the egg with his boot.

Consider the following example. Most people are afraid of sharks, but sharks are important ocean predators. Without sharks, the seals and fishes they eat would become *overpopulated*—there would be more than the food supply could support—and they would die.

Sharks keep seal and fish populations in check. At the same time, it's the number of seals and fishes that exist that keep the shark population from becoming too big. The interaction between predators and prey keeps the *ecosystem* balanced. When a species becomes extinct, it upsets the balance of an ecosystem, and can sometimes create a "domino effect."

If a small fish became extinct, the bigger fish species that feed on it would have less food and become fewer in number. The larger fish species such as sharks that feed on the big fish suffer when their food supply dwindles, and so on.

Endangered Species and Biodiversity

Species contribute to biodiversity.

All the species in a *habitat* are important, because they're linked to one another, often in indirect ways. For example, the extinction of an insect may not seem to have much to do with the survival of gorillas. Yet many insects eat decaying plant material. By helping to decompose this material, these insects help recycle nutrients through the rain forest habitat, and feed the plants that gorillas feed on.

This and other complex relationships show the importance of maintaining *biodiversity* (a variety of living organisms on our planet).

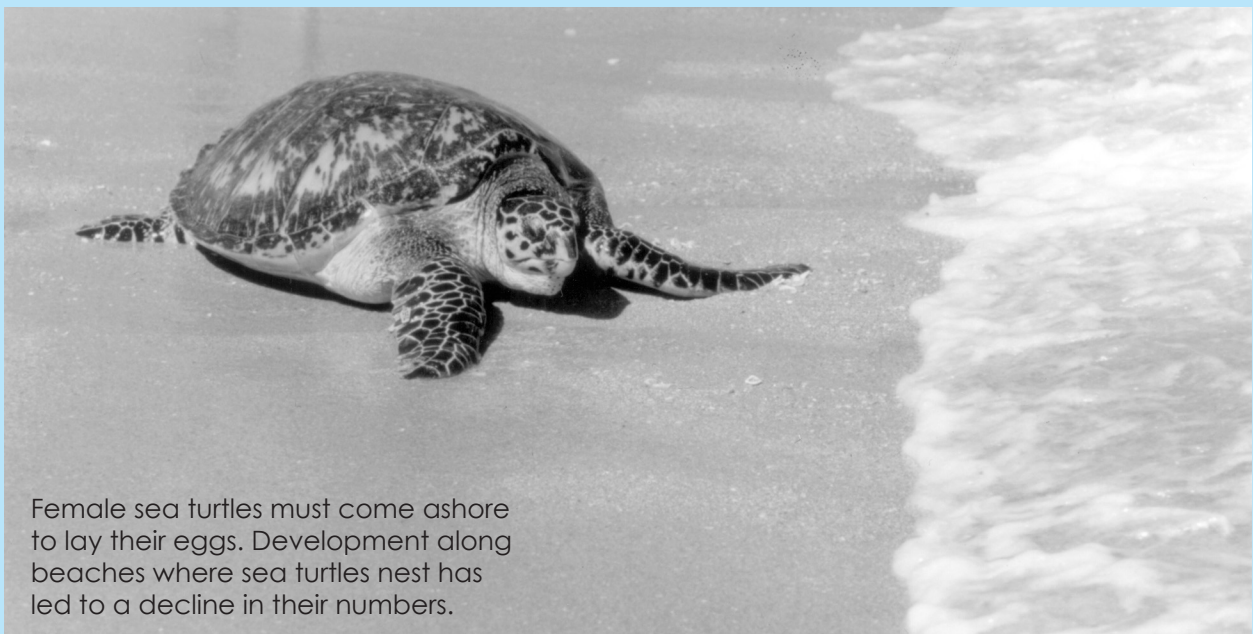
Human activities contribute to wildlife endangerment.

Although extinction is a natural process, human activities have placed many species of wildlife in danger. In 1999 the United Nations confirmed the global human population was 6 billion. And world population is currently growing by an estimated 79 million each year.

When we clear forests and develop deserts and coastlines, wild animals and plants lose their homes. As we spread out over the globe, wild habitats disappear. Their loss is a tragedy for people as well as animals. The thousands of acres of rain forest destroyed each year not only produce much of the oxygen we need to breathe, they also are home to undiscovered plants that could be the cure for devastating human diseases.

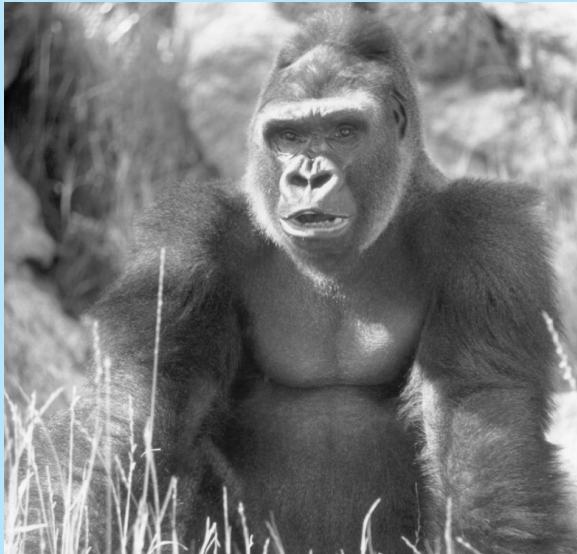
Pollution, too, places plants and animals in peril. Tons of trash, sewage, and chemicals foul land, rivers, lakes, and oceans. Toxins in water become concentrated as they're carried through the food chain, making some fish dangerous for people to eat, and killing predators who can't tell their prey is contaminated.

Some animals and plants have been *overhunted* or overcollected, leaving so few in the wild that it's difficult for them to reproduce. Unless we begin conservation measures, these species may become extinct.



Female sea turtles must come ashore to lay their eggs. Development along beaches where sea turtles nest has led to a decline in their numbers.

Conservation Action Saves Species



Gorillas are endangered due to habitat destruction and *poaching*.

People contribute to conservation.

People all over the world are helping endangered species. Some governments have passed laws to protect wildlife. In the United States, four major federal laws protect wild animals and plants: the Endangered Species Act, the Marine Mammal Protection Act, the Lacey Act, and the Animal Welfare Act. The United States is also a member of CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora. This treaty, signed by more than 85 countries, protects rare, threatened, and endangered species that are exported or imported.

SeaWorld helps endangered animals

Zoos and marinelife parks work together to help endangered species reproduce. Sometimes a species can be reintroduced into its native habitat. SeaWorld has *captive breeding* programs for the endangered Humboldt penguin and white-winged wood duck. Keeping

careful records of births, deaths, and family trees helps staff members develop successful breeding programs. In addition, what we learn about animals by observing them up close, every day, helps experts create management programs to preserve wildlife and habitats.

SeaWorld helps endangered and protected species through a rescue and rehabilitation program. Injured, ill, or orphaned marine animals are taken to SeaWorld facilities. There, veterinarians and animal care specialists treat the animals and monitor their recovery.

Sea turtles, California sea otters, and manatees are some of the other animals rescued by SeaWorld San Antonio, San Diego, and Orlando. Those that recover fully are candidates for release. SeaWorld Orlando has already rehabilitated and released more than 100 endangered Florida manatees.

When you visit SeaWorld and Busch Gardens parks, you can see some of the more than 40 threatened and endangered species currently in our care.



Help save manatees by observing boating speed zones and properly discarding fishing line and garbage into trash containers.

You Can Help Endangered Species

Every day, you can do small, simple things to help the health of our planet and save endangered species.

- ◆ Support marinelife parks, zoos, and conservation organizations that work on behalf of wildlife and habitats worldwide, encouraging sustainable solutions through support of species research, animal rescue and rehabilitation, and conservation education.
- ◆ Read about endangered species in books, magazines, and newspapers or watch wildlife programs on television.
- ◆ Dispose of pesticides, motor oil, paint, household cleansers, and other toxic wastes properly, not down the drain.
- ◆ Turn off lights when you leave a room. Turn off the television if no one is watching it.
- ◆ Create a recycling center in your home and recycle newspapers, glass, and aluminum cans.
- ◆ Turn off the water while brushing your teeth.
- ◆ Use both sides of a piece of paper.

- ◆ Plant wildflowers in your garden instead of picking them from the wild.
- ◆ Reduce the amount of trash you create: reuse your lunch bag each day.
- ◆ Use cloth napkins instead of paper.
- ◆ Don't buy animals or plants taken illegally from the wild. Ask where they're from.
- ◆ Share what you know with family and friends.

Since 1993, Anheuser-Busch Adventure Parks have recognized the outstanding efforts of K-12 students and teachers across the country who are working at the grassroots level to protect and preserve the environment. *The SeaWorld/Busch Gardens Environmental Excellence Awards* program provides school groups with a monetary award, national recognition, and some well-deserved fun at one of our parks.

For information about how you, your school, or student group could win both money and recognition, call toll-free 1-877-792-4332.



Before the Endangered Species Act, hunters killed alligators for their skins and meat. Now that several laws protect American alligators, they've made an outstanding comeback.

Math Predictions

OBJECTIVE

The student will calculate various statistics about endangered species and populations.

MATERIALS

- writing surface or chalkboard
- four markers or chalk pieces
- paper
- pencils
- four calculators
- watch or clock with second hand



ACTION

Read before beginning play.

1. Divide students into four groups. Have each group select a scorekeeper. The scorekeeper stands at the board, writes answers given from the group, and keeps score for the group.
2. With scorekeepers ready, ask groups the following questions.
 - ❶ There are 632 endangered species in the United States. Of these, 203 are found in Hawaii. What percentage of U.S. endangered species are found in Hawaii? (*32%*)
 - ❷ Scientists have identified more than 1.5 million kinds of plants and animals (with more counted daily). If current extinction rates continue, as much as 20 percent of the world's species could be gone in the next 30 years. How many plants and animals is that? (*300,000 plants and animals*)
 - ❸ Of the 20,000 known plant species, some scientists estimate one out of five are endangered. How many is that? (*4,000 species*)
 - ❹ Of the 9,600 known species of bird, about 11.5% are threatened with extinction. How many is that? (*1,104 birds*)
 - ❺ Of the 4,300 known species of mammals, 60 have become extinct during the last 200 years. What percentage is that? (*1.4%*)
 - ❻ The Florida manatee population is about 3,000 (in 2001). About 10% of the population dies each year. If about 150 calves are born each year, will the population increase or decrease? (*decrease*)
 - ❼ The 2003 world population growth rate estimate is about 1.31% per year. Given the current human population estimate of 6.3 billion, that means about 226,109 babies are born each day, and 9,421 each hour. About how many babies are born each minute? (*157 babies*)
3. Groups have one minute to give their answers to scorekeepers. Correct each question before continuing. If no group answers correctly, the closest answer wins. Groups use paper and pencils to compute math problems, ready to show their methods.
4. After all questions are answered, scorekeepers tally points. Winners can create more questions to stump the other teams.

Rhino-It-All

OBJECTIVE

The student will identify various facts about rhinoceroses.

MATERIALS

- Rhino-It-All Background Information* on pages 9–10
- Rhino-It-All Questions* on page 11
- sand timer (from a board game)

BACKGROUND

Five species of living rhinoceros exist in the wild today: black, white, Javan, Sumatran, and Indian. All five species are critically endangered due to poaching and habitat loss.

The rhino is named for the horn on its nose. However, a rhino's horn is not a true horn that is attached to the skull. It grows from the skin and is made up of keratin fibers, the same material found in hair and nails. People in some cultures believe the horn contains medicinal and aphrodisiac properties. Even though the horn has no such medicinal abilities, it is still the primary reason rhinos are killed today.

Rhinos are heavy browsers that hinder woody plants from dominating their habitat. Their feeding strategy is important because it allows grasses to grow, providing food for many other animals on the grassy plains.



ACTION

1. Discuss the different rhino species as listed in the *Rhino-It-All Background Information* (on pages 9–10). As on many game shows, some answers you know, others you have to think about and guess. Feel free to simplify this game's language or make it easier with multiple choice for younger participants.
2. Divide the class into three or more teams.
3. Ask students a question from the quiz sheet provided. If the group does not get the answer correct, it passes to the next group until someone gets the right answer. The entire group confers and must come to a consensus answer.
4. The first group to successfully complete ten questions are the rhino experts.



Rhinos are endangered due to poaching and habitat loss.

(*Note:* to minimize the time allotted to each answer, use a timer. Students

Rhino-It-All Background Information

BLACK RHINOCEROS

Diceros (two horns) *bicornis* (two horns)

The black rhino has two horns and a triangular, prehensile lip. It lives among the bushy plains, rugged hills, and scrublands in isolated areas of central and southern Africa. Scientists estimate a population of about 2,700 individuals. Black rhinos are seen as aggressive animals, but in reality they are actually quite shy. Scientists believe when a rhino becomes aggressive it is a result of poor eyesight. In fact, at a distance of only 15 feet, they seem unable to distinguish the difference between a man and a tree. Some researchers believe black rhinos have such bad eyesight because their ancestors were forest dwellers, living in thick, dense foliage where sharp eyesight wasn't necessary.



WHITE RHINOCEROS

Ceratotherium (horned mammal) *simum* (snub-nosed)

The white rhino has two horns and broad, flat lips. They live on the open savannas and grasslands of eastern and southern Africa. The population is about 10,377 individuals.

During the European exploration of Africa, white rhinos were actually less numerous than black rhinos. In recent history, black rhino populations have been heavily poached to alarmingly low levels. Today, because of careful management in the Republic of South Africa, white rhino populations have increased dramatically. South Africa has approximately 80% of the world's population of white rhinos.

JAVAN RHINO

Rhinoceros (horned nose) *sondaicus* (belonging to the Sunda/Malay Islands)

The Javan rhino has one horn and several dermal plates around the head and covering the neck. It lives in lowland tropical rainforest found in Malaya, Burma, Thailand, Indochina, Java, Sumatra, and Northern India. Severely endangered, fewer than 70 Javan rhinos survive.

The Javan rhino is the rarest of the five rhino species mainly due to habitat loss, but poaching has played a part as well. There are only two known locations: Indonesia and Vietnam. Vietnam has a population of less than 10 animals. Many scientists believe the Javan to be the most rare large mammal in the world.



Rhino-It-All Background Information

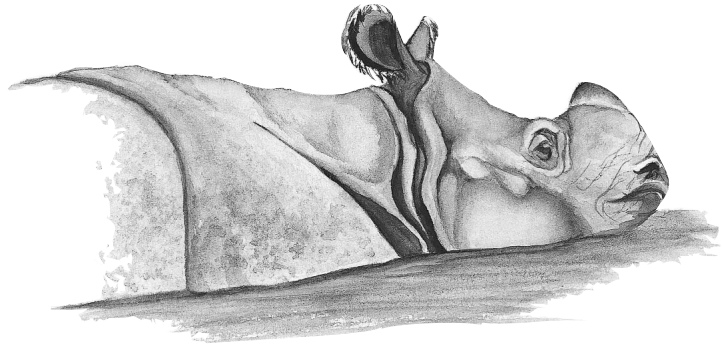
INDIAN OR GREATER ONE-HORNED RHINOCEROS

Rhinoceros (horned nose) *unicornis* (one horn)

This species has only one horn and a triangular, prehensile lip like the black rhino, but is often found in lakes and streams. It lives on the floodplains and riverine grasslands of southern Nepal and northern India. The population is about 2,500 individuals.

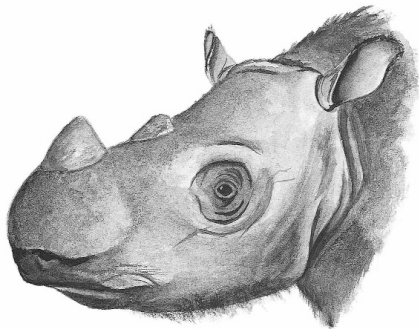
By 1980, Indian rhinos had vanished from most areas except southern Nepal, Bhutan Duars, and parts of West Bengal. Aside from hunting for sport, Asian rhinos suffered at the hands of another trade: tea. By 1900, Britain was importing 62 million kilos of black tea from India. This boom in production left India scrambling for more land to grow tea and Assam had an ideal climate. The transformation of rhino habitat to tea plantation, the tremendous influx of workers and land owners, and a railway linking Assam with other parts of India left little chance for the rhino's survival.

It wasn't until 1910 that India abolished hunting rhinos. Soon after, the state governments began to protect the few remaining rhino habitats. Since then, Indian rhinos are perhaps one of the success stories in rhino conservation. Though poaching and habitat destruction still plague them, they have recovered from less than 200 individuals in the early part of this century to more than 2,500.



SUMATRAN RHINO

Dicerorhinus (two horns on nose) *sumatrensis* (belonging to Sumatra)



The Sumatran – the smallest rhino species – has two small horns; a long, flat head; and is the only rhino with hair covering most of its body. It lives in the tropical rainforest and mountain moss forest covering all of Southeast Asia from Assam through Malaysia, Sumatra, and Borneo. Scientists estimate about 250 to 300 Sumatran rhinos live in the wild.

Sumatrans are also known as “hairy rhinos” due to their coat of shaggy, reddish-brown hair. Their coat is more pronounced in younger rhinos, growing thin by the time they reach their adult years. For this reason, scientists believe Sumatrans may be the most primitive of all living rhinos.

The first rhinos lived about 60 million years ago. These primitive creatures looked more like horses without horns. The first rhinos lived in North America, later migrating to Asia. The last rhinos in North America became extinct 5 million years ago.

Rhino-It-All Questions

Q: Rhino horn is used by different cultures for what purposes?

A: Medicine, aphrodisiacs, ceremonial dagger handles.

Q: How many species of rhino are endangered?

A: All 5 rhino species are endangered due to habitat loss or poaching, or both.

Q: T/F Rhino horn is worth twice as much as gold in certain parts of the world.

A: True.

Q: Rhino horn is composed of what substance?

A: Keratin. Human fingernails and hair also are composed of keratin.

Q: What are the closest relatives of rhinos?

A: Zebras and horses.

Q: Black rhino babies weigh about _____ pounds.

A: 75 to 80 pounds.

Q: T/F Rhino mothers are not protective of their calf.

A: False! In fact, after a baby rhino urinates or defecates, its mother will urinate over the top of it in order to throw off predators.

Q: Gestation for a black rhino is about _____ months.

A: 15 months.

Q: Are baby rhinos born with horns?

A: No.

Q: A black rhino baby walks behind its mother. Where does a white rhino baby walk?

A: In front.

Q: What is a group of rhinos called?

A: A crash.

Q: Which rhino species has the most hair?

A: Sumatran.

Q: T/F White rhinos are gregarious and live in small groups.

A: True.

Q: Which two species of rhino only have one horn?

A: Indian and Javan rhinos.

Q: Where can 80% of the white rhino population be found?

A: South Africa.

Q: Which rhino is most endangered?

A: Javan.

Q: Indian and Javan rhinos look armor-plated, but those pieces of “armor” are really just _____.

A: Skin folds.

Q: White rhinos are the largest species of rhino. How much can they weigh?

A: Up to 8,000 pounds.

Q: T/F Asian rhinos enjoy swimming.

A: True.

Q: A white rhino horn can grow to _____.

A: 5 ½ feet.

Q: T/F There are more African species of rhino than there are Asian.

A: False.

Q: Why do rhinos roll in the mud?

A: The mud cools them and repels insects.

Q: Black rhinos have a prehensile lip. What does prehensile mean?

A: Gripping or grasping.

Q: Why are they called black rhinos?

A: They appeared black when they were first discovered because they had been rolling in mud.

Q: Black rhinos cannot see very well. What other two senses do they rely on more?

A: Smell and hearing.

Q: Are male or female rhinos larger in size?

A: Male.

Q: How many offspring do rhinos generally have at one time?

A: Normally only one.

Bioaccumulation Relay

OBJECTIVE

The student will describe the process of bioaccumulation.

MATERIALS

- ❑ 80 or more round plastic game chips
- ❑ playing field (30' x 60')

BACKGROUND

Although it might seem that any toxins that enter the ocean would be diluted in the water, they actually become very concentrated as they pass from prey to predator in a food chain. For example, phytoplankton (small plants that float or drift in an ocean's currents) get their "food" or energy from the sun. Phytoplankton may also absorb toxic chemicals or heavy metals dissolved in the water.

When fish eat plankton, they also ingest these toxins. These toxins become part of a fish's body. The more the fish eat, the more toxins they absorb. Fish are prey for seals, and a seal may eat many fish. In turn, a shark may eat many seals. With each step along the food chain, consumers obtain bigger chunks of concentrated toxins. Scientists call this effect *bioaccumulation* – the buildup over time of harmful substances in animal and plant tissues. These substances are then passed on to animals higher in the food chain.



ACTION

1. Before beginning the relay race game, review with students the concepts of predator, prey, food chain, food web, and how energy is passed from one level to the next in a sample food chain of phytoplankton, krill, squid, fish, and shark.
2. To prepare for the relay game, have students count off in fives. Mark a starting line on the playing field and have each number form a single-file line behind the starting line. Name the first student in each line phytoplankton; the second krill; the third squid; the fourth fish; the fifth shark.
3. Place plastic chips on the opposite side of the playing field.
4. Instruct students to run down the playing field and pick up twice as many plastic chips as they already have. Phytoplankton students begin by grabbing one chip and passing it to the next student in line, krill. Krill students grab another one to double the chips to two. Squid students grab two to double the number to four. Fish grab four, and sharks grab eight for a final total of 16 plastic chips.
5. When the game is over explain that each plastic chip represents a toxin. Ask students what happens to top predators (like sharks) that consume prey with toxins in their tissues. Explain bioaccumulation and how concentrated toxins can pose a serious threat to the survival of predators.



Endangered Species Cards

Use the cards on this insert to get started exploring some of the world's endangered species. Here are some ideas for ways to use these cards in your classroom:

- ◆ Use the facts on the cards to help you prepare lessons and lead discussions in class.
- ◆ Copy and cut apart the cards. Distribute a different card to each cooperative learning group. Visit the school library to learn more about the animals. Groups may even adopt that species as their "mascot" while working on the Endangered Species unit.
- ◆ Copy and cut apart the cards. Distribute a complete set to each student or group of students. Students compare similarities and differences among various animals.

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white rhinoceros *Ceratotherium simum*

size: 1.7 to 1.9 m (5.6–6 ft.) tall at shoulder,
3.25 to 4.25 m long (10.75–
14 ft.); 1,600 to 2,260 kg
(3,500–5,000 lb.)

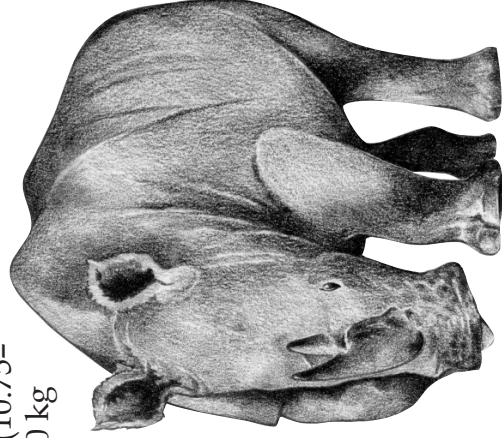
distribution: eastern and
southern Africa

habitat: open savannas and
grasslands

food: short grasses

population: 11,000

status: endangered



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African cheetah

Acinonyx jubatus

size: 1.1 to 1.4 m (3.6–4.6 ft.) long;
39 to 65 kg (86–143 lb.)

distribution: Africa

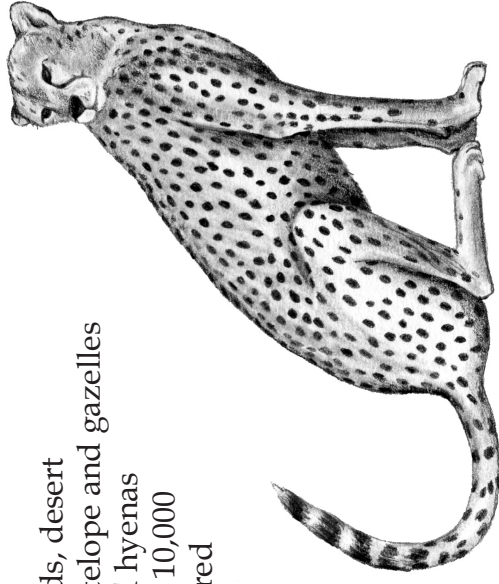
habitat: grasslands, desert

prey: small antelope and gazelles

predators: lions and hyenas

population: less than 10,000

status: endangered



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mountain gorilla

Gorilla gorilla beringei

size: to 1.7 m (5.6 ft.); 140 to 180 kg (309–397 lb.)

distribution: Democratic Republic of the Congo, Rwanda, Uganda

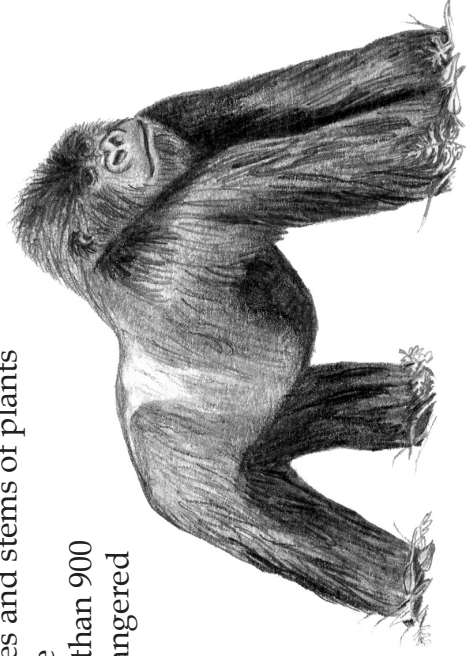
habitat: high elevation forests

food: leaves and stems of plants

predators: none

population: less than 900

status: endangered

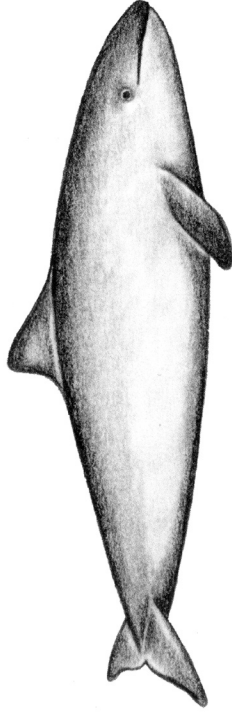


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vaquita

Phocoena sinus

size: to 1.5 m (5 ft.); 43 to 47 kg (95–104 lb.)
distribution: upper Gulf of California
habitat: offshore water
prey: fishes and squids
population: unknown
status: endangered

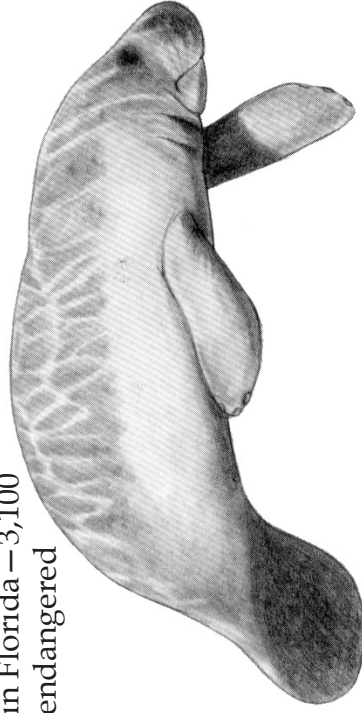


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West Indian manatee

Trichechus manatus

size: to 3 m (10 ft.); 500 kg (1,102 lb.)
distribution: southeastern North America, the Caribbean to the coast of northern South America
habitat: shallow coastal water, estuaries, rivers
food: aquatic plants
predators: alligators, when young; none as adults
population: in Florida — 3,100
status: endangered

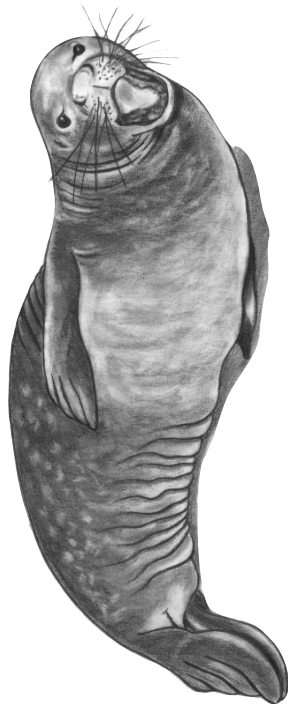


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Hawaiian monk seal

Monachus schauinslandi

size: to 2.4 m (8 ft.); 270 kg (595 lb.)
distribution: northwestern Hawaiian Islands (Leeward chain)
habitat: beaches, sand spits, islets to a depth of 37 m (121 ft.)
prey: eels and other fishes, octopuses, lobsters
predators: sharks
population: 500 to 1,500
status: endangered



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Hawksbill sea turtle

Eretmochelys imbricata

size: 53 to 114 cm (21–45 in.); 27 to 86 kg (60–190 lb.)
distribution: tropical waters worldwide
habitat: near coral reefs and rocky outcroppings in shallow coastal areas
food: sponges, shrimps, squids, tunicates
predators: sharks; large birds and fishes eat eggs or hatchlings
population: unknown
status: endangered

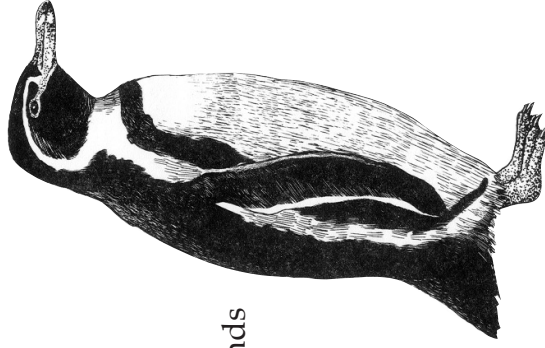


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Humboldt penguin

Spheniscus humboldti

- size: 56 to 66 cm (22–26 in.); 4 kg (9 lb.)
- distribution: islands off the west coasts of South America and along the coast of Peru and Chile
- habitat: rocky coastlines, small islands
- prey: anchovetta (a small fish)
- predators: fur seals, sea lions, sharks, foxes; gulls prey on chicks
- population: 33,000
- status: endangered

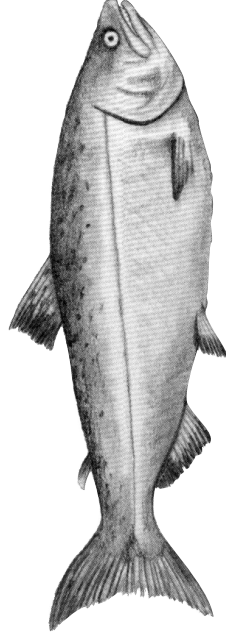


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Chinook salmon

Oncorhynchus tshawytscha

- size: 1.4 m (4.6 ft.); 57 kg (126 lb.)
- distribution: Pacific coast of the United States and Canada
- habitat: ocean and rivers
- prey: sardines, herrings, smelts, and pelagic shrimp
- predators: sea lions, killer whales, sharks, and bears
- population: unknown
- status: dual status—listed as endangered in one part of its distribution and threatened in another

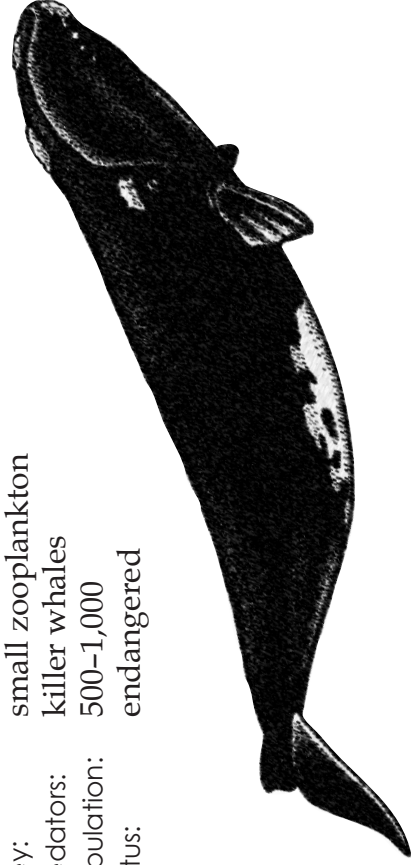


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Northern right whale

Eubalaena glacialis

- size: to 18 m (60 ft.); 27,216 to 72,576 kg (30–80 tons)
- distribution: North Atlantic and Pacific
- habitat: ocean
- prey: small zooplankton
- predators: killer whales
- population: 500–1,000
- status: endangered



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American alligator

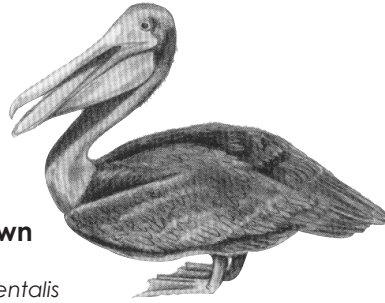
Alligator mississippiensis

- size: 2.4 to 3.7 m (8–12 ft.); 181 to 227 kg (400–500 lb.)
- distribution: southeastern United States
- habitat: large shallow lakes, marshes, swamps, rivers, canals, ponds; sometimes brackish waters along coastlines
- prey: fish, turtles, mammals, snakes, birds
- predators: raccoons, skunks, otters, turtles, fishes, birds, and larger alligators eat eggs and hatchlings
- population: 1,000,000
- status: downlisted from endangered to threatened in 1977



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Going or Gone? Picture Cards

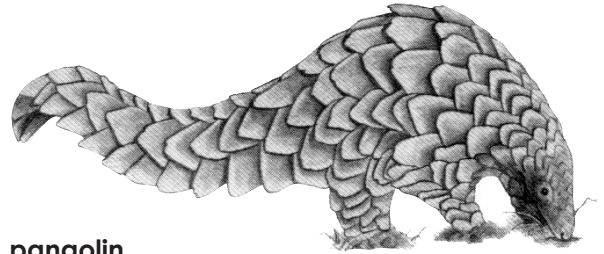


California brown pelican

Pelecanus occidentalis

HABITAT: coastal waters of California
DIET: fishes
BREEDING STRATEGY: nests along the edge of cliffs
HUMAN INTERACTION: DDT, a pesticide used on land, entered the ocean food web and caused reproductive failure.

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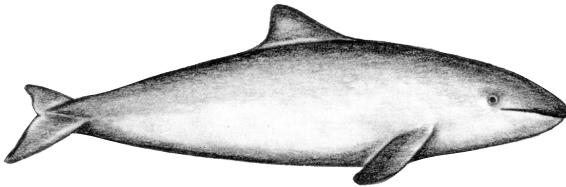


pangolin

Manis sp.

HABITAT: grasslands, forests of Africa and southern Asia
DIET: ants and termites
BREEDING STRATEGY: single young each year, live alone until breeding season
HUMAN INTERACTION: hunted for meat and scales

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vaquita

Phocoena sinus

HABITAT: offshore waters of the upper Gulf of California
DIET: fishes
BREEDING STRATEGY: unknown
HUMAN INTERACTION: trapped in fishing nets that drown these air-breathing mammals

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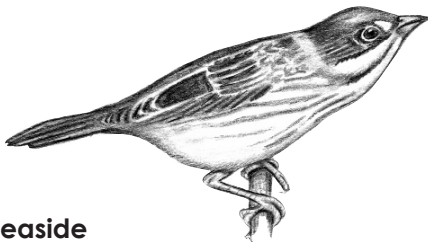


Steller's sea cow

Hydrodamalis gigas

HABITAT: shallow coastal water around Bering and Copper Islands in the Aleutian Island archipelago
DIET: kelp
BREEDING STRATEGY: single calf, adults may mate for life
HUMAN INTERACTION: hunted for food

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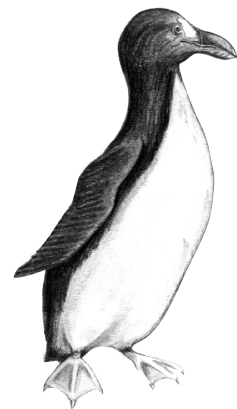


dusky seaside sparrow

Ammodramus maritimus nigrescens

HABITAT: salt marshes along the Indian River in Florida
DIET: insects and spiders
BREEDING STRATEGY: woven nest in salt marsh
HUMAN INTERACTION: drained, developed marshes

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great auk

Pinguinus impennis

HABITAT: rocky islands in the North Atlantic
DIET: small fishes
BREEDING STRATEGY: huge colonies on small, rocky islands
HUMAN INTERACTION: hunted for food and feathers

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Going or Gone?

OBJECTIVE

The student will distinguish, from a set of animal pictures, which animals are extinct and which still exist.

MATERIALS

- ❑ seven copies of *Going or Gone? Picture Cards* on insert

BACKGROUND

Use the following information to supplement student research:

California brown pelican (extant): California brown pelicans faced extinction during the 1950s and '60s when the pesticide DDT caused the eggs to have thin shells. When DDT was banned, the bird made a slow comeback and now has a stable population.

pangolin (extant): These mammals are not extinct, but some species are endangered. In Asia, natives grind the scales of the Cape pangolin into a powder that they believe has medicinal properties. Africans kill pangolins for both scales and meat.

vaquita (extant): As one of the world's most endangered whales, vaquitas number only a few hundred. Shrimp trawlers "accidentally" catch vaquitas in nets set to catch sharks and fish. In total, only 65 live vaquitas have been sighted, while 30 drown in nets each year.

Steller's sea cow (extinct): With a long reproduction time and small populations, this relative of the manatee became extinct in a short 27 years after it was discovered. Fur traders sailing to the Aleutian Islands easily caught and killed sea cows for food.

dusky seaside sparrow (extinct): Once living in the marshlands of Florida's Indian River, this sparrow died in the wild when lands were drained. In 1980, the last five birds were collected for captive breeding, but died as governmental red tape slowed the plan down.

great auk (extinct): During the seventeenth century, seafarers raided auk nests for eggs and killed birds for feathers and meat. By the middle of the 1800s, they were extinct.



ACTION

1. As a class help students define the terms extant and extinct.
 - ◆ **extant** – a species currently represented by living creatures.
 - ◆ **extinct** – no longer existing.
 Ask them to name examples of each.
2. Divide students into groups of five and give each group a picture card set. Direct groups to read cards and decide if they think these animals are extinct or extant. Have one person in each group write the group's decision at the bottom of each picture card.
3. Give students library time to research the actual status of these animals.
4. Lead a group discussion on whether the animals are extinct or extant. Can you tell just by looking? Ask students to share some of their research findings and use the above information to supplement their findings.
5. Ask students how they think an ecosystem changes when an animal becomes extinct. What happens to the balance between the animal's predators and prey?

Purchase Power

OBJECTIVE

The student will distinguish, from a list of consumer products, which products are environmentally friendly to purchase.

MATERIALS

- enlarged copies of pages 16 and 17
- paper
- pencils

BACKGROUND

There are no right or wrong answers to this activity. Oftentimes, consumers purchase items and don't realize that they may be contributing to endangered or threatened species. This activity will help students become aware of their purchasing power and inspire them to learn more about the products they buy. Throughout the activity, please encourage students to discuss their personal feelings about purchasing various items.



ACTION

1. To prepare for activity, enlarge the cards on pages 16 and 17, cut apart, and mount on construction paper. For easy reference, you can also copy page 15, cut apart subjects, and attach to the back of the corresponding card.
2. Distribute paper and pencils. To begin activity, ask students to number their papers from 1 to 16. Hold up a card in front of class and ask students to write yes or no on their papers to indicate whether they think purchasing this item would contribute to endangering or threatening a species. If they don't know, ask them to guess.
3. When finished, ask for a vote by raising hands "yes" or "no" on each item. Read information on page 15 to your students, then ask them to vote again. Point out that some people believe that no animal product is okay, whether it was raised on a ranch or not. Ask students to think about how they feel about animals raised to create wildlife products.



Tortoise shell comes from sea turtles. Hunters also kill sea turtles for meat and skin. U.S. regulations prohibit sea turtle products.

Purchase Power Product Information

boar's bristle hairbrush: The bristles are taken from the hides of hogs processed for food.

brain coral: Coral reefs create habitats for many specialized tropical fish and invertebrates. Corals may need hundreds of thousands of years to grow into a mature reef habitat. Coral has become a popular item to use for jewelry and other decorative items. Harvesting coral can severely threaten the future of complete reef systems.

cactus: It's alright to purchase most small cacti, but very large ones may have been illegally collected. Some cactus, like the saguaro, are protected by law. Make sure you buy from a reputable dealer.

cloves, cinnamon, vanilla spices: These three spices grow in rain forests. When harvested, the whole tree does not need to be cut down. These are good examples of how harvesting goods from the rain forest can help preserve the habitat.

conch shell: Most of the shells you see used on jewelry boxes, lamps, and other objects came from live animals, not from shells lying on the beach. Empty shells on the beach often serve as shelter for other animals. Taking live animals and empty shells disrupts the cycle of the ecosystem.

cow-leather belt: Leather comes from the hides of cattle killed for food.

eelskin wallet: Some eels (and hagfish) are farmed for making wallets, shoes, and belts. Others are mass fished from the ocean. Mass fishing takes large numbers from small areas, and, if not monitored, can cause species extinction.

elephant hair bracelet: All elephant products are illegal in this country, but natives on the streets of some African cities sell them to unsuspecting tourists who try to bring them home.

ivory jewelry: Ivory comes from animal tusks, mostly African elephants.

Although protected by law in many nations, the demand for ivory has made poaching worth the risk for some people. The U.S. government has banned the sale of ivory, but some people may have bought items before the ban.

natural sea sponge: Divers in small villages make their livings collecting and cleaning sponges to sell.

ostrich feather duster: The feathers are taken from farm-raised birds.

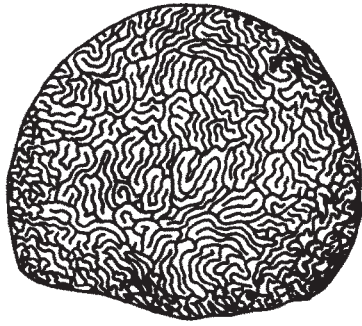
rattan basket: Rattan comes from the spiny stems of certain palms found in the rain forests of Southeast Asia and Australia. Only about one sixth of the rattan are grown on plantations. More could be farmed as a secondary crop in fruit orchards and as growth in heavily logged forests.

snake skin watchband: Some types of reptile skin are approved for use in this country, but there are endangered species that are carefully protected. Know what you are buying! When in doubt, contact the U.S. Fish and Wildlife Service or U.S. Customs Service.

teak bowl: Teak trees grow in rain forests. Although small bowls don't require much wood, the furniture industry takes large numbers of teak trees for tables, chairs, cabinets, and more. Mass cuttings of trees can permanently destroy rain forest habitats.

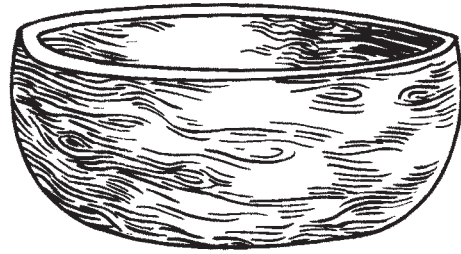
tortoise shell hair ornament: Tortoise shell comes from sea turtles. Hunters also kill sea turtles for meat and skin. U.S. regulations prohibit sea turtle products, but Americans visiting other countries may not know this.

tropical fish: Some fish are raised by breeders, others are collected from their natural habitat. Check by asking when you buy fish! If fish are taken from tropical reefs, native collectors often pour a chemical in the water to paralyze them. Collected fish are revived in buckets, but the chemical remains in the ocean water to poison other animals.



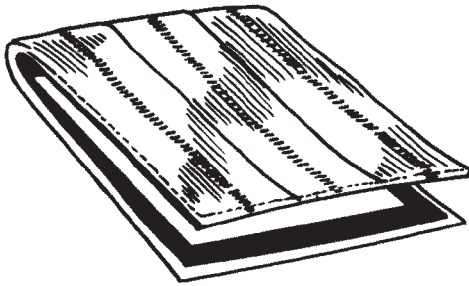
brain coral

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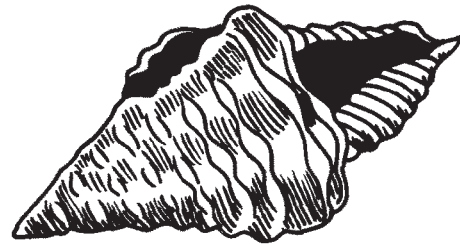
teak bowl

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eelskin wallet

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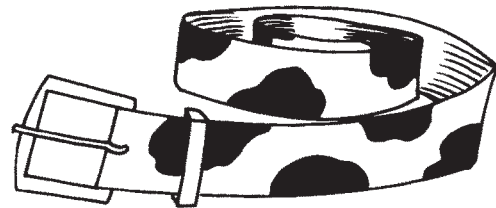
conch shell

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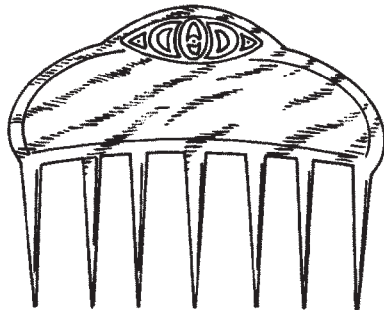
ivory jewelry

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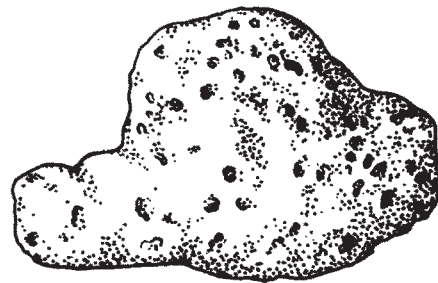
cow-leather belt

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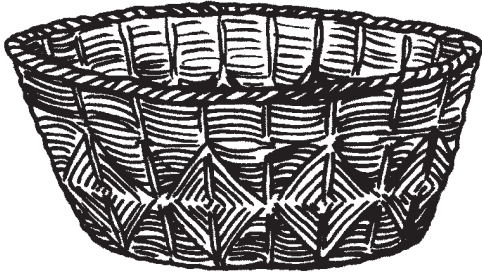
tortoise shell hair ornament

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natural sea sponge

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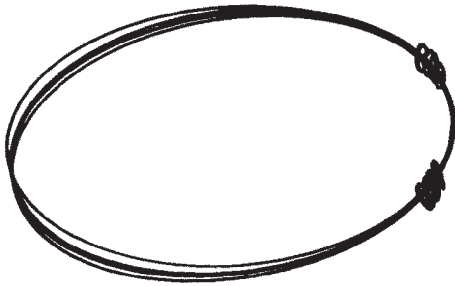
rattan basket

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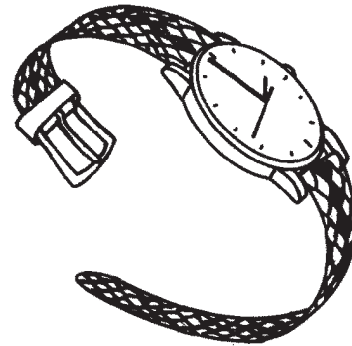
cloves, cinnamon, vanilla spices

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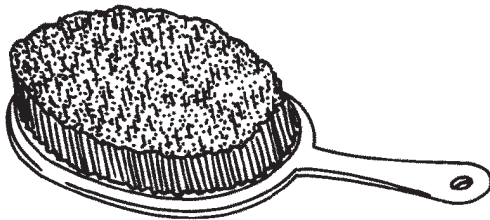
elephant hair bracelet

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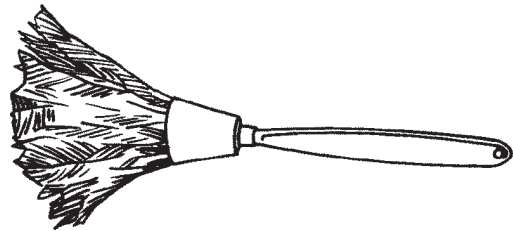
snake skin watchband

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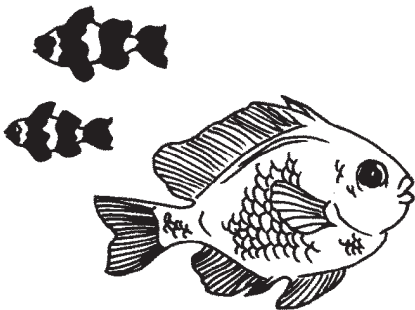
boar's bristle hairbrush

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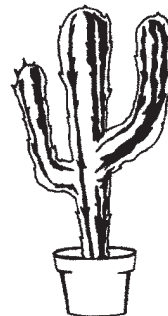
ostrich feather duster

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tropical fish

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cactus

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A Calculating Turtle Tale

OBJECTIVE

The student will calculate several equations to complete a story about sea turtles.

MATERIALS

per student

- A Calculating Turtle Tale* funsheet
- calculator
- pencil

BACKGROUND

Like other turtles, sea turtles lay eggs. Many female turtles return to and nest on the very beach where they were born. Since their nesting grounds are usually far from their feeding grounds, sea turtles migrate long distances. Green sea turtles migrate almost 2,414 km (1,500 miles) from nesting to feeding grounds. Leatherbacks have the longest migration of all sea turtles. They have been found more than 4,828 km (3,000 miles) from their nesting beaches! Although both male and female turtles make the journey to nesting beaches, the males remain in the water, waiting to mate with the females after they have laid their eggs. After he hatches, a male sea turtle never goes ashore again.

A female turtle comes ashore at night, and uses her flippers to scoop out a nest in the sand above the high tide line. Into this nest, she deposits a clutch of 80 to 100 eggs the size and shape of pingpong balls, then covers the eggs with sand before returning to sea. She may repeat this process up to nine times in one breeding season, and may nest every two to three years.

Temperatures inside nests may determine whether male or female turtles hatch from eggs. Lower nest temperatures produce males; higher temperatures produce females. After 45 to 70 days buried beneath the sand, the young turtles break out of their eggs using a temporary egg tooth, or caruncle. The hatchlings may take three to seven days to dig their way to the surface. They usually wait until night to emerge from the nest. Hatchlings head toward the sea in groups. Some are snatched by predators like dogs, birds, and raccoons before they ever reach the water. Bright city and street lights confuse young turtles trying to find the surf. Many actually head away from the ocean and toward parking lots. These animals may be eaten by predators or crushed by cars. When a hatchling reaches the ocean surf, it dives into a wave and rides the undertow out to sea.



ACTION

1. Distribute *A Calculating Turtle Tale* funsheet to students.
2. Students use calculators to solve each equation. Turn calculators upside down to read the words formed by answers. (*Remind students to complete operations within parentheses first.*)
3. Write the words above equations to read the story.

ANSWERS

hole, holes, lose, is, shells, holes, oil, less

A Calculating Turtle Tale

Use a calculator to find the answer to each equation. Turn your calculator upside down to read the word formed by your answer. Write the correct word above each equation to read the story. Remember, always complete operations within parentheses first.

On a moonless night, a female sea turtle crawls out of the surf and heads up the beach. She stops at a spot just past where the waves wash up with the highest tide, and begins to dig a deep $(1,852 \times 2)$ in the sand. All around her, other female turtles are busy with $(6,713 \times 2) \times 4$ of their own. Each female lays 80 to 100 round eggs in her nest, then covers the hole with sand. In a few months, the young turtles hatch. They climb up through the sand at night and head for the sea. They find their way to the water by following the light of the moon and stars. Sometimes, bright lights from buildings and street lights confuse hatchlings, and they $(1,500 \times 2) + (50 \times 10) + 7$ their way. Without the safety of the sea, the young turtles can't survive.

Sea turtle survival is threatened in other ways, too. Even though it $50 + 17 - 8 - 8$ against the law in the United States and many other countries, sea turtles are still hunted by some people for the meat and $62,705 \times 9.20732$. The shells are used to make combs, eyeglass frames, and trinkets. Turtle eggs are sometimes taken from nest $23 \times 37 \times 63 + 91$ and eaten. Not long ago, turtle $(228.5 \times 2) + 253$ was prized as a skin moisturizer.

Habitat, an animal's home, is the most important part in its survival success. A clean ocean and safe breeding beaches are important to sea turtles. Unfortunately, as more people put up buildings on beaches, sea turtles wind up with fewer places to nest, which could mean $(1,100 \times 5) + (4 \times 9) + 1$ sea turtles in the future.

Breeding for Survival

OBJECTIVE

The student will correlate manatees into prospective breeding groups given studbook information.

MATERIALS

- ❑ six copies of page 21, cut into individual sets of cards

BACKGROUND

When developing captive breeding programs, zoological specialists and keepers make the best matches between animals by studying studbook information. A studbook is a comprehensive record of all births, deaths, and interinstitutional transfers of a particular species. This record helps keepers avoid inbreeding individuals by tracking related animals. Studbooks can also tell about each animal's personality and what individuals they do and don't get along with. The U.S. Fish and Wildlife Service currently has a moratorium on breeding manatees in captivity. However, this exercise provides a hands-on manatee management scenario.



ACTION

1. Begin the activity with a class discussion on breeding animals in captivity. What measures would ensure success? What problems would keepers want to avoid?
2. Divide the class into groups of five to six students. Tell them they're to be manatee keepers responsible for developing a new breeding program.
3. Give each student group a set of *Manatee Logic* cards and *Manatee Name* cards.
4. Tell students to use cards to place manatees into three breeding groups, each containing at least one male and four to five females. Use name cards to form groups; use logic cards to ensure individuals are compatible.
5. When students have finished, review their groupings and allow discussion between groups as to why their breeding groups would or would not be good choices. (There may be more correct choices than those in the Answer Key.)

ANSWER KEY

A1	A2	A3
Rube(M)	Dock(M)	Bink(M)
Sheba	Lotus	Oma
Bea	Blossom	Cleo
Ruby	Isis	Dawn
Skipper	Dolly	Star
Rock	Reva	Oscar
Ethel	Delta	Rosie
B1	B2	B3
Rube(M)	Dock(M)	Bink(M)
Lotus	Dolly	Skipper
Blossom	Rosie	Rock
Oscar	Oma	Bea
Ruby	Star	Isis
Sheba	Cleo	Reva
Dawn	Ethel	Delta

DEEPER DEPTHS

Continue this activity by developing a *Species Survival Plan* (SSP). SSP is a program for managing captive populations of certain threatened or endangered animals. Plans include an education component, breeding plan, animal care plan, and reintroduction plan. Learn more at the American Zoo and Aquarium Web site: www.aza.org/ConScience

Manatee Name Cards

Ethel <i>Manatee Name Cards</i>	Delta <i>Manatee Name Cards</i>	Rosie <i>Manatee Name Cards</i>
Oma <i>Manatee Name Cards</i>	Star <i>Manatee Name Cards</i>	Dolly <i>Manatee Name Cards</i>
Cleo <i>Manatee Name Cards</i>	Bea <i>Manatee Name Cards</i>	Dawn <i>Manatee Name Cards</i>
Sheba <i>Manatee Name Cards</i>	Isis <i>Manatee Name Cards</i>	Reva <i>Manatee Name Cards</i>
Blossom <i>Manatee Name Cards</i>	Ruby <i>Manatee Name Cards</i>	Lotus <i>Manatee Name Cards</i>
Dock (M) <i>Manatee Name Cards</i>	Rube (M) <i>Manatee Name Cards</i>	Oscar (M) <i>Manatee Name Cards</i>
Bink (M) <i>Manatee Name Cards</i>	Rock (M) <i>Manatee Name Cards</i>	Skipper (M) <i>Manatee Name Cards</i>

Manatee Logic Cards

Skipper and Rock don't get along with Oscar <i>Manatee Logic Cards</i>	Skipper is Lotus' son <i>Manatee Logic Cards</i>	Blossom is so young, she needs to stay with Lotus <i>Manatee Logic Cards</i>
Dock is aggressive toward all other males <i>Manatee Logic Cards</i>	Rock is an immature male <i>Manatee Logic Cards</i>	Oscar is an immature male <i>Manatee Logic Cards</i>
Skipper is an immature male <i>Manatee Logic Cards</i>	Dawn is Dock's daughter <i>Manatee Logic Cards</i>	Ruby and Bea are aggressive toward Dock <i>Manatee Logic Cards</i>
Ruby and Dolly don't get along <i>Manatee Logic Cards</i>	Sheba is Dock's daughter <i>Manatee Logic Cards</i>	Sheba and Bink were unsuccessful at breeding with one another <i>Manatee Logic Cards</i>

Wildlife Reserve

OBJECTIVE

The student will design a protected environment for an endangered animal that encourages the animal's natural behaviors and meets its physical requirements.

MATERIALS

per student group:

- construction paper
- rulers
- markers, colored pencils
- stencils of geometric shapes
- craft supplies (craft sticks, modeling clay, cardboard, etc.)
- natural materials (leaves, twigs, etc.)

BACKGROUND

A reserve is place set aside for wildlife and protected from human disturbance. Some reserves are completely natural and some have wildlife viewing areas and education centers. Reserves provide a refuge for animal living and reproduction.



ACTION

1. Divide the class into groups of four or five students. Assign members in each team to be wildlife specialists and architects responsible for designing a modern wildlife reserve.
2. Choose the endangered animal your reserve will be built for.
3. Visit a library or use the Internet to search for species information. Make sure to note information that will help you plan and build the reserve. (Key words: *wildlife reserve, conservation, animal breeding and propagation, zoos.*)
4. Design and draw the reserve and conservation center. Include the following elements in your design: food, water, space, nesting, and viewing. Examples: area for the animals to eat – from plantings and additional feed, water source, areas for animals to perform courtship or breeding displays, areas for animals to build nests or give birth, sheltered viewing area for visitors, natural landscaping, animal care area for veterinarians and wildlife specialists, shade or cover to protect the animals from extreme weather, living space for human researchers (optional), a visitor education center (optional).
5. Create a three-dimensional model. Use craft supplies and natural materials to make their dwelling as similar to their habitat as possible.
6. Brainstorm ways to create partnerships with businesses to help fund construction. Research how zoos and museums use “development departments” to create tax-free donation and sponsorship programs.
7. Present your reserve to the class. Point out what makes it unique and how it will encourage breeding.

Local Species Science Fair

OBJECTIVE

The student will research protected plants and animals that live in their state and create a presentation about that species to share with others.

MATERIALS

- library and classroom resources; Internet access
- art supplies or other presentation media

BACKGROUND

Most people can identify endangered species like rhinos, sea turtles, or manatees. However, they may not know very much about the endangered plants and animals in their own backyards.

In 1966, U.S. Congress passed the Endangered Species Preservation Act. This law allowed listing native animal species as endangered, but gave listed species a limited amount of protection. The Departments of Interior, Agriculture, and Defense were assigned to protect listed species and preserve habitats. Three years later, the 1969 Endangered Species Conservation Act provided additional protection to species in danger of “worldwide extinction.” This Act prohibited importation and sale of such species within the U.S. The 1973 Endangered Species Act combined and strengthened the previous acts.



ACTION

Use this activity as a science project for individual students or as a classroom project for cooperative learning groups.

1. Students use library and classroom resources or the Internet to find out what animals and plants are listed as endangered or threatened species in their state.
2. Students select a species to research. Important research points include:
 - ◆ species name (both common and scientific)
 - ◆ distribution and habitat
 - ◆ food
 - ◆ predators
 - ◆ adaptations
 - ◆ population
 - ◆ endangered or threatened species status.

Also, students should answer these questions:

- ◆ What may have caused this species’ population decline?
 - ◆ What, if anything, is being done to save the species?
 - ◆ What suggestions do you have to help the species survive?
3. Students decide on the best ways to present their information. Ideas include posters, videos, models, written reports, PowerPoint®, or display boards.
 4. Provide class time for students to showcase their species with short presentations to classmates. Set aside another time for other classes and parents to attend an endangered and threatened species science fair.

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Shamu TV on Video*

- Saving a Species: The Manatee Story, 2002 ◆ Saving a Species: The Rhino Story, 2002
- Saving a Species: The Sea Turtle Story, 2003 ◆ Amazing Animal Rescues, 2001

Web Sites

- American Zoo and Aquarium Association (SSP information): www.aza.org/ConScience
- Conservation Breeding Specialist Group, Species Survival Commission: www.cbsg.org
- Conservation International: www.conservation.org
- Hubbs-SeaWorld Research Institute: www.hswri.org
- National Audubon Society: www.audubon.org
- National Geographic Society: www.nationalgeographic.org
- National Wildlife Federation: www.nwf.org
- National Fish & Wildlife Foundation: www.nfwf.org
- The Nature Conservancy: www.nature.org
- World Wildlife Fund: www.worldwildlife.org

* These books and videos available through SeaWorld. Call 1-800-23SHAMU for order information.

Goals of the Endangered Species Unit

Students will investigate why some species are rapidly declining and will recognize that humans are an interconnected part of all ecosystems.

Objectives

After completing the SeaWorld *Endangered Species* unit, students will be able to...

1. Define the term "endangered species."
2. Identify two human actions that threaten the survival of endangered species.
3. Describe two actions that they can take to help save endangered species.
4. Identify three endangered animals and their geographical distributions.
5. Choose to change a behavior or an action, such as littering, which could harm an endangered species.
6. Describe the process "bioaccumulation."
7. Define the term "studbook" and explain how a studbook is used in captive breeding to help endangered species.
8. Express concern for how human activities may impact animals' survival.

Vocabulary

bioaccumulation – the buildup over time of harmful substances in animal and plant tissues.

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

captive breeding – carefully planned breeding of animals in a protective facility in order to increase the species' total population.

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

ecosystem – a unit of plants, animals, and nonliving components of an environment that interact.

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 currently represented by living creatures.

extinct – no longer existing.

habitat – the place where a plant or animal lives.

overpopulated – too many individuals inhabiting an environment.

overhunting – killing more animals than the species' population can replace through natural breeding rates.

poaching – illegal hunting or collecting.

pollution – harmful elements that alter an environment in a negative way, such as chemicals that poison water supplies, and trash that litters the ocean.

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.

species – a group of plants or animals that are genetically similar and so are able to reproduce with each other.

threatened – likely to become endangered.

Endangered Species 4–8 Teacher's Guide

PART OF THE
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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.

Want more information?

Visit the SeaWorld/Busch Gardens Animal Information Database at www.seaworld.org or www.buschgardens.org. Still have questions? Email us at shamu@seaworld.org or call **1-800-23-SHAMU** (1-800-237-4268). TDD users call **1-800-TD-SHAMU** (1-800-837-4268). Emails and phones are answered by SeaWorld Educators.

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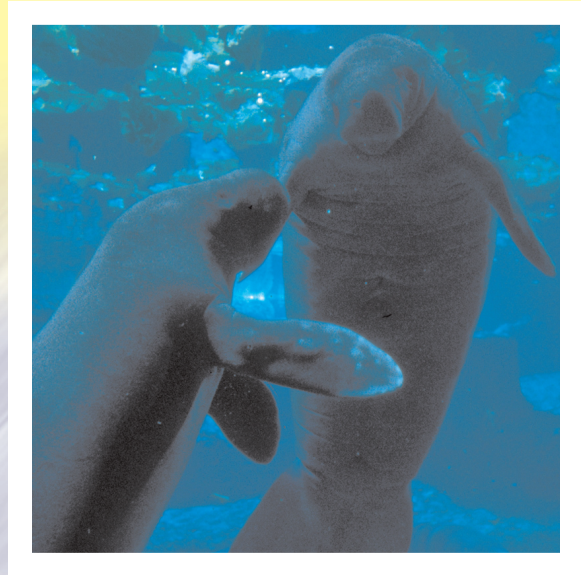
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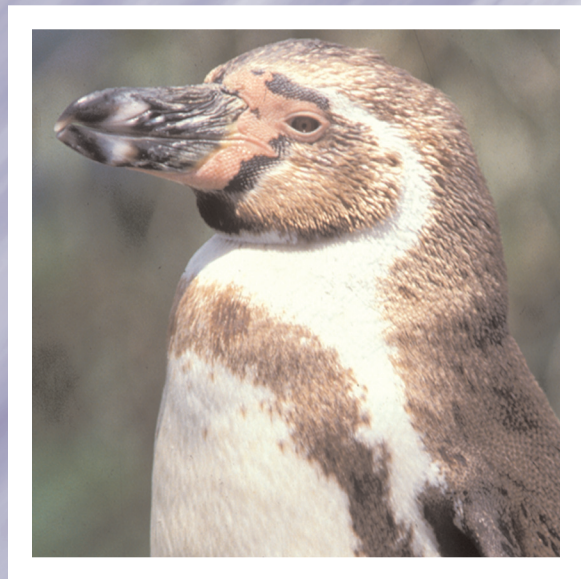
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