

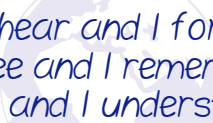


# **A World of Diversity: Big Bend, My Home**

**An Educator's Guide to Big Bend National Park's  
Second Grade Outreach Education Programs**

## Parks as Classrooms

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*"I hear and I forget.  
I see and I remember.  
I do and I understand."*

Boiled down to its purest essence, the National Park Service's *Parks as Classrooms* program is all about helping children understand their world. It is a concerted nationwide initiative to utilize the wonderful resources of the parks for teaching and learning purposes- in the process, making education active, experiential and fun.

The parks, after all, *are* classrooms. They are battlefields and Presidents' houses, where history was made. They are canyons and deserts, where geological processes have been played out eon after eon. They are historic trails, over which pioneers migrated and intermingled and resettled. They are monuments to civil rights leaders, where the lessons of cultural heritage are real and vivid. They are seashores and preserves, where a million forms of life offer daily lessons in biology, botany, evolution and survival amidst an endangered ecosystem. The national parks, in essence, help textbooks and lesson plans come to life. *Parks as Classrooms* is an idea whose time has come. Visit the National Park Service's homepage (<http://www.nps.gov/>) to explore these classrooms.

## PARKS AS CLASSROOMS<sup>SM</sup>

### Big Bend's Classroom

Big Bend National Park protects and preserves 801,000 acres of land in the State of Texas. The park, exhibiting the best Chihuahuan Desert expanse in the United States, shares a 118-mile border with the Mexican states of Coahuila and Chihuahua. Educating school children from the United States and Mexico on the importance of protecting this unique and fragile environment will encourage a sense of stewardship and ensure the protection of this ecosystem for future generations.

The park preserves three distinct ecosystems; riparian, desert, and mountain. Differences in elevation, rainfall, and temperatures throughout the park have created the biological diversity found here. There are 446 species of birds, 75 species of mammals, 3600 species of insects and 1500+ plants protected within the park's boundaries.

Big Bend National Park has initiated an intensive environmental education outreach program, bringing to area classrooms programs based on lesson plans designed to meet the Texas State Curriculum Guidelines. This guide, one in a series, was developed to help you prepare your students for an in class program by park staff. Through preparation, a student benefits so much more from this experience. This guide includes background information to help you, the educator, understand more about the subject matter being covered. The pre and post visit activities included in this guide are an important component of the program. We hope this program will encourage you to bring your students to the park to experience and utilize this valuable resource as part of your teaching curriculum.



# Visiting Your Class

We look forward to visiting your classroom and introducing your students to "Parks as Classrooms." Big Bend's outreach program is designed to encourage students to become active owners of the National Park System and impart a sense of ownership toward park resources. Through education, students will be inspired to learn more about the wonderful resources available in our national parks.

Each program has incorporated a variety of learning styles so that each student may assimilate information using his or her preferred learning style. Learning styles include hands-on, seeing, hearing, reading, and group discovery. Before our visit to your classroom, please review the background information provided and work with your students to complete the pre-visit activity.

Teachers are expected to participate with students during the presentation and provide discipline as needed. It is helpful if the students have name tags or name plates. We have included a list of the Texas Essential Knowledge and Skills (TEKS) covered in our programs. This list will help you meet the curriculum guidelines required by the state. Each program will last approximately one hour.





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# Texas Essential Knowledge and Skills (TEKS)

## Second Grade

### Science

#### 2.1 Scientific Processes-Student will:

- (A) demonstrate safe practices during classroom and field investigations.
- (B) learn how to use and conserve resources and dispose of materials.

#### 2.2 Scientific Processes-Student will:

- (A) ask questions about organisms, objects, and events.
- (E) construct reasonable explanations and draw conclusions using information and prior knowledge.
- (F) communicate explanations and investigations.

#### 2.3 Scientific Processes-Student will:

- (A) make decisions using information
- (B) discuss and justify the merits of decisions
- (C) explain a problem in his/her own words and identify a task and solution related to the problem.

#### 2.5 Science concepts-Student will:

- (A) classify and sequence organisms, objects, and events based on properties and patterns.
- (B) identify, predict, replicate, and create patterns including those seen in charts, graphs, and numbers.

#### 2.6 Science concepts-Student will:

- (A) manipulate, predict, and identify parts that when separate from the whole, may result in the part or the whole not working.
- (D) observe and record the functions of animal parts.

#### 2.8 Science concepts-Student will:

- (A) identify the characteristics of living organisms.
- (B) identify the characteristics of non-living organisms.

#### 2.9 Science concepts-Student will:

- (A) identify the external characteristics of different plants & animals that allow their needs to be met.
- (B) compare & give examples of the ways living organisms depend on each other & on their environments.

#### 2.10 Science concepts-Student will:

- (B) identify uses of natural resources.

# Biological Diversity

**B**iological diversity is simply the diversity of life. It includes species diversity, genetic diversity and ecosystem diversity.



A **species** is a group of interbreeding individuals living together in a similar environment and reproductively isolated from other groups. Today scientists realize that we are ignorant of how many different species exist, especially in the tropics and oceans. They also realize species diversity is declining faster than generally believed. Over 1000 species of animals are currently recognized as being under threat of extinction. Some scientist estimate one million species of plants and animals will become extinct by the year 2000. A species is considered **extinct** when all individuals of the species are dead. There are no survivors, there is no future, there is no life to be recreated in that form ever again. Extinction is final. Extinctions have been recorded throughout time in the geological records, (example - dinosaurs) but never at the rate they are occurring today. For in all but a few cases, it has been man through greed, cruelty, carelessness or indifference that has either directly or indirectly been the cause of modern extinctions. Man has accelerated the rate of extinction by several methods including; destruction of habitat, the introduction of exotic species, the extermination of predators, overhunting for food and fashion, the production of pollutants and the use of pesticides.

Luckily, man is becoming more aware of his affect on other species. Laws are being passed in an effort to protect those species at risk of extinction. The Endangered Species Act of 1973 classified plants and animals as **endangered** if there was immediate peril and possibility of extinction. **threatened** species were in trouble and if protected quickly could be saved. It is a very slow process to get species listed and to provide them with the additional protection under law.

Why bother to try and save species diversity? There are four main reasons man should change his ways and protect the species diversity of the world. They are ethics, esthetics, economics and ecological. Ethics dictate that other organisms have the right to an existence and compassion calls for their preservation. A true land ethic requires we understand the consequences of our actions for other living things, that we accept responsibility for them and that before we intervene in the functions of an ecosystem we make sure we have adequate justification. Ethical reasons also state we must acknowledge the right of other species to continue their existence in a natural state.



Aesthetic reasons reveal that species should be preserved because of their beauty, their intrinsic interest and symbolic value (example: bald eagle is the USA national bird). Charismatic species, the ones that are culturally popular, are most often helped but it is through them that awareness of other species peril may be accomplished.

It is however, the economic and ecological value of the species that most people relate to. They answer the question of "What's in it for me?" Economically many feel a species should be preserved for its actual or potential uses and the benefits it may provide humans. Almost everything we wear, eat and are surrounded by is a derivative

## BACKGROUND INFORMATION

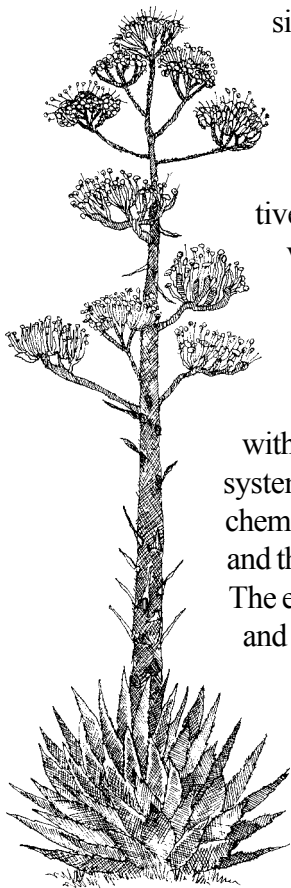
of some part of the plant or animal kingdom. Timber, shellfish, hunting, fishing, birdwatching, nature study, fertilizers, pollinators are some of the economic benefits of animals and plants. Of the 350,000 known plant species, 1 in 4 has a potential food value. We use only 1 in 30 and cultivate 1 in 20. So only 150 plant species are cultivated on a large scale and 20 of these provide 96% of the world's food. Wild plants provide the original genetic resources for revitalizing and improving the strains of food plants we grow. Medically, one half of all prescription drugs in the U.S. contain a substance of natural origin. The U.S. is dependent upon imported plant materials for these drugs. Most come from the tropics. Two percent of the plants in the world tested so far contain alkaloids that provide painkillers, stimulants, and muscle relaxants.



Studies on animals provide information about diseases affecting man. Studies on elephants provide clues to atherosclerosis, armadillos on leprosy, and desert pupfish are useful in kidney research. What of the undiscovered or little known plants and animals that have yet to be studied? Do they hold the key to curing cancer? Feeding the world? Economics reasons demand we protect biological diversity to possibly benefit man in the future.

The fourth reason to preserve biological diversity is ecological. The ecosystem and its plant and animal components provide ecosystem services such as production of oxygen, maintenance of the chemical composition of the atmosphere, and the decomposition of waste. They provide watershed storage, prevent flood and soil erosion and modify the climate. Ecosystems and their component organisms maintain the habitability of the earth. Our world's economy and well being is dependent upon the health of the planet. The bottom line is we should preserve as many species as possible regardless of how insignificant. We do not know enough to dismiss any species as having no value at all.

Genetic diversity is the variety of genes within a particular species, variety or breed. Genetic diversity is created, enhanced and maintained by evolutionary forces such as mutation, migration, selection and genetic drift. When we reduce genetic diversity we lose products and information. Genetic diversity enables organisms to adapt to a changing environment and is the basis of survival and evolution. We need to maintain plant genetic resources to revitalize agriculture in case of problems. By preserving the genetic diversity of our present food crops, their relatives and other potential food crops, it enables us to maintain crop variety and subsequently crop vitality and health. Genetic diversity helps a species withstand natural catastrophes, normal population changes and human influence.



The third type of diversity, ecosystem diversity deals with the larger picture and involves all the biotic and abiotic components of the environment. A stable ecosystem is one that can withstand changes without going haywire. Diversified ecosystems tend to have many overlapping systems of checks and balances to buffer the system against the impact of change. The physical and chemical conditions of the environment influence the well being and distribution of plants and animals and the functions of the ecosystem.

The energy flow in the ecosystem determines the abundance of organisms, the rate at which they live and the complexity of the system. All life, including human life depends on the flow of energy and the circulation of materials through the ecosystem.

The energy flow in an ecosystem involves complex processes of photosynthesis, respiration, herbivory, carnivory and decomposition. The starting point of this energy flow in the ecosystem is sunlight. Sunlight provides heat energy to warm the earth, heat the atmo-

## BACKGROUND INFORMATION



sphere, drive the water cycle, produce air currents, and water and photochemical energy. The water and photochemical energy are used by plants in photosynthesis. Plants fix water, carbon dioxide and energy into carbohydrates, oxygen and other components. This energy is stored by the plants and is passed along through the ecosystem in a series of eating and being eaten known as the **FOOD CHAIN**. At each step in the food chain a considerable portion of potential energy is lost as heat. As a result organisms in each level pass on less energy than they receive. This limits the number of steps in a chain to four or five. No one organism lives wholly on another. The resources are shared, especially at the beginning of the chain. Food chains become interlinked to form a **FOOD WEB**, the complexity of which varies within and between ecosystems.

A great amount of energy is stored in the plant tissues. Less than half of this is available to animals to utilize. Plants utilize much of the food they make in photosynthesis to produce energy for growth and reproduction. **HERBIVORES**, animals that feed on plant tissue, convert the energy stored in plant tissues into animal tissue. Herbivores typically have modified teeth, stomachs and intestines to help them digest the plant cellulose. Herbivores are so abundant that many animals depend on them for food. Feeding on the herbivores are **CARNIVORES**. Carnivores are usually larger organisms that kill and eat smaller prey. This **PREDATION** or one organism feeding on another living organism, the **PREY**, is aided by sharp teeth and claws. Not all consumers fit neatly into one category. Many species do not confine their feeding to one group alone. These **OMNIVORES** utilize both plant and animal matter. Their diets vary with the seasons, their stage in life, their size and growth rate. The final group of organisms in an ecosystem are the decomposers. **DECOMPOSERS** such as bacteria, fungi, insects, worms and slugs, reduce organic matter into the inorganic compounds from which it was synthesized. They also dissipate the energy fixed by the photosynthesizers back into the environment as heat.

Within the ecosystem a variety of plants and animals live. To survive in the ecosystem, all species basically need the same things to survive; air, water, shelter and food. Where the population lives and obtains the necessities for life, and its surroundings both living and nonliving are called its habitat. A **HABITAT** is the home of the organism. What the organism does in its habitat, its job, is called its **NICHE**. No two species in a community may occupy the same niche. When competition for this niche occurs, one of three possible things happen; A species may be replaced by another, an unstable equilibrium develops between the species or an equilibrium where the species share the resources occurs. Each organism occupies only those areas that can adequately meet its requirements for life. Animals and plants may divide up a habitat in many ways. They may utilize the same resources at different times of the day or even different times of the year or they may utilize different sections within the same habitat. Habitat is not just a single specific place. It encompasses an entire ecosystem with its complex food webs, sources of water and energy. A habitat is the sum total of all conditions necessary for life.

Habitat loss is the number one reason there has been a decrease in biological diversity worldwide. The easiest, most efficient and surest way to conserve biological diversity is to preserve habitat. Preserving habitat is a major goal and accomplishment of the National Park Service. The NPS along with other federal and state agencies protect (to various degrees), 30% of the United States. Scientists are now discovering this is not enough and with the help of private organizations, state and federal governments more land is being purchased and protected. The additional land is being used to create corridors in the U.S. to connect larger habitat patches. By preserving habitat our chances of protecting the biological, genetic and ecosystem diversity greatly increase.





# Visiting Your Classroom

The pre- and post-visit activities are important components of the Educator's Guide. Students will retain more information during the in-class presentation if they have completed the pre-visit activity. After the program, the post-visit activity will reinforce the concepts and ideas presented by the Ranger. Please ensure your students have completed the pre-visit activities before the in-class visit.

**Pre-Activity 1:**

**WORD SEARCH**

**Post-Activity 1:**

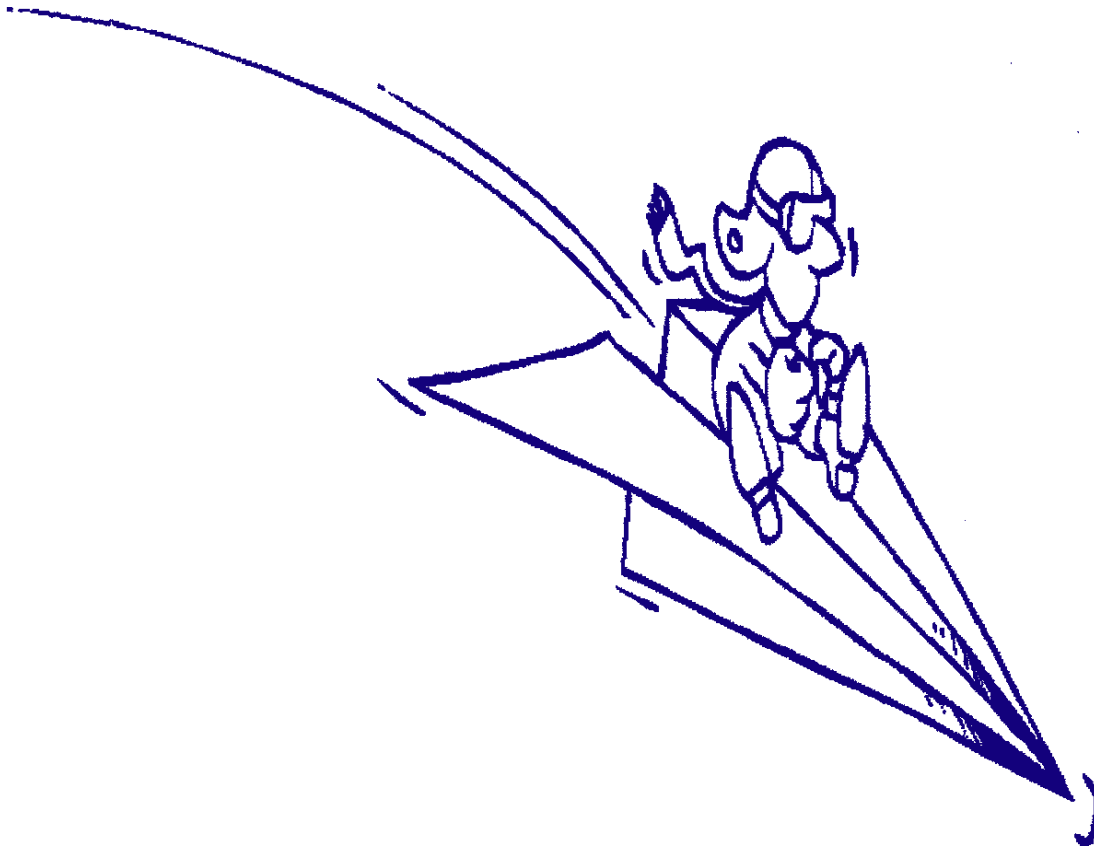
**HABITAT MATCH-UP**

**Pre-Activity 2:**

**LIFE IN THE WILD**

**Post-Activity 2:**

**IT'S AN AMAZING WORLD**



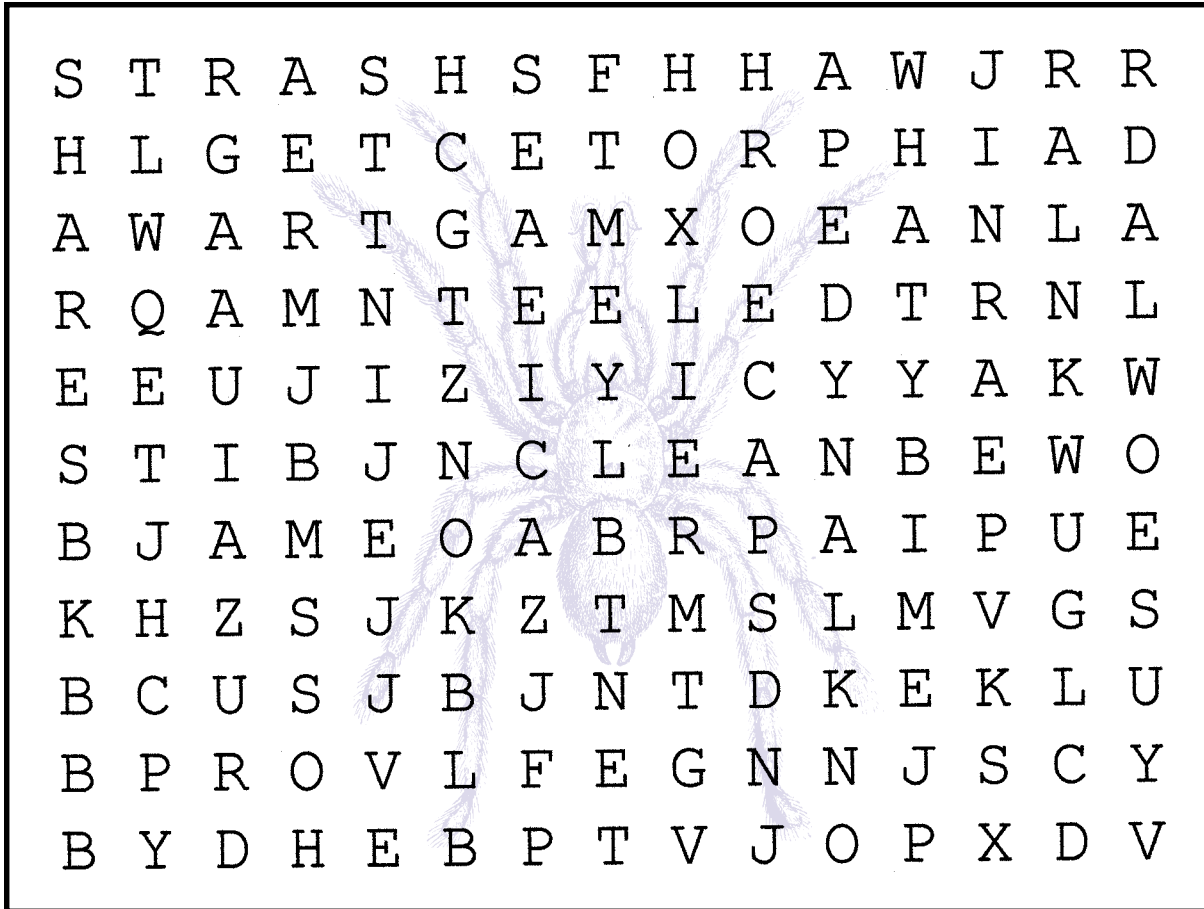




Take a closer

LOOK

# Word Search

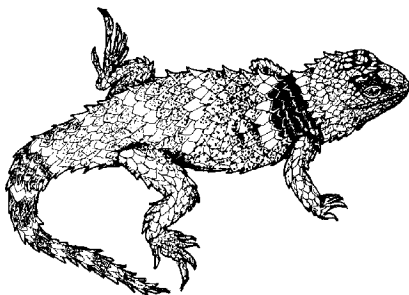


AIR  
ANIMALS  
CLEAN  
EARTH

FOOD  
HABITAT  
HOME  
LITTER

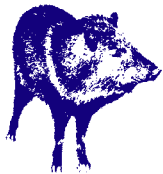
PARK  
PETS  
PROTECT  
SHARE

SPACE  
TRASH  
WATER  
WEB





# Habitat Match-Up



Javelina

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Tarantula

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



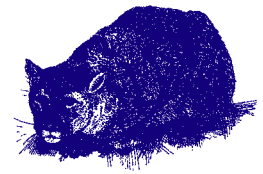
Bat

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Rattlesnake

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Mountain Lion

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Water

- ! Pond
- @ River
- # Raindrop
- \$ Puddle
- % Dewdrop
- ? Flower Nectar
- \* Cactus fruit
- > Spring

## Oxygen

- = Dissolved in water
- + Directly from the air

Directions: Above are five different animals. They need food, water, shelter, and oxygen to survive. Choose at least one item from each category and write the appropriate numbers, letters, or symbols from each category on the lines.

## Shelter

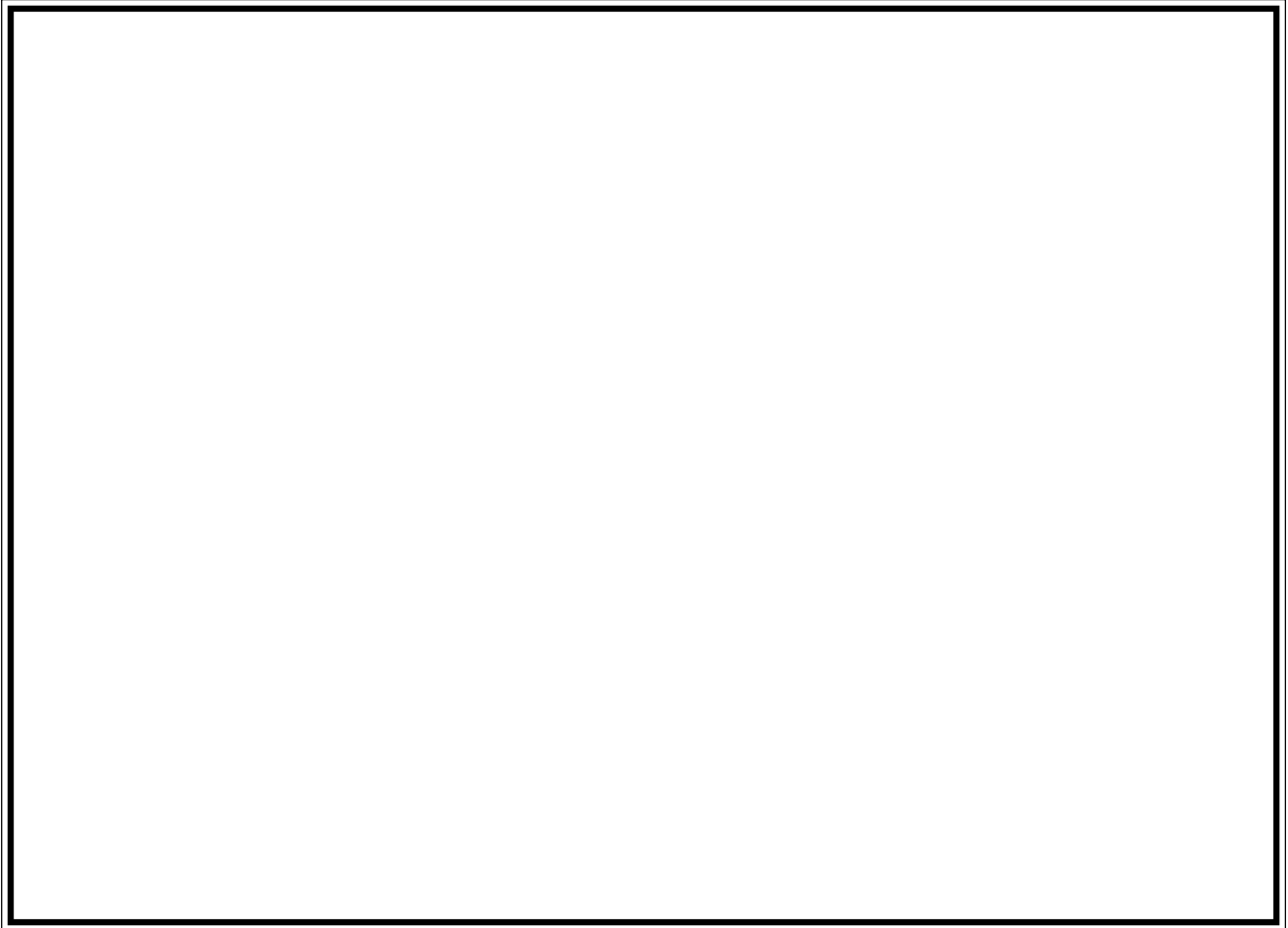
1. In a burrow
2. On a cactus
3. In a bush
4. Under a rock
5. In the Grass
6. In a pond
7. In a hollow tree
8. In a cave
9. Under a log

## Food

- A. Mice
- B. Leaves
- C. Insects
- D. Nectar
- E. Deer
- F. Seeds
- G. Berries
- H. Lizards



# Life in the WILD



**Directions:**

Choose a wild animal that lives in the Chihuahuan Desert.  
Draw a picture of that animal and answer the questions below.



1. Where does your animal live?
2. What does your animal eat?
3. Where does your animal go for water?
4. Where does your animal find food?
5. Who are the predators of your animal?





# It's an Amazing World

Directions: List all the ways plants and animals influence our lives. Discuss plants and animals we don't like and talk about the benefits they make in our lives. Cut pictures from magazines and make a collage of plants and animals to hang on your classroom wall.



Insects like bees and butterflies help pollinate plants.

Rattlesnakes eat rodents that could make people sick.

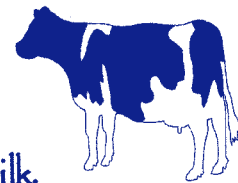


Spiders eat insects that could destroy crops.

Bats pollinate plants, eat insects, and have taught us about sonar.



Cows provide food and milk.





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# Suggested Reading

## Second Grade



Amosky, Jim. Crinkleroot's Guide to Knowing Animal Habitats.  
Simon and Schuster; ISBN: 0689805837. Published 1997.

Asch, Frank. The Earth and I.  
Harcourt Brace; ISBN: 0152004432. Published 1994.

Bang, Molly. The Water, Earth and Air We Share.  
Scholastic Trade; ISBN: 0590100564. Published 1997.

Brown, Laura Kransy and Mark Tolon brown. Dinosaurs to the Rescue! A Guide to Protecting Our Planet.  
Little Brown and co.; ISBN 0316113972. Published 1994.

Cutler, Waren. Creepy Crawly Creatures (A National Geographic Action Book).  
National Geographic Society; ISBN: 0792229754. Published 1996.

Greenway, Shirley. Where Do I Live?  
Ideals Children's Books; ISBN: 0590484133. Published 1992.

Harlow, Rosie. Nature in Danger.  
Kingfishers Books; ISBN: 1856976122. Published 1995.

Hewlitt, Sally. All Kinds of Habitats.  
Children's Press; ISBN: 0516211811. Published 1999.

Kalaman, Bobbie. Animal Worlds (In MY World).  
Crabtree Publishers; ISBN: 0865050716. Published 1986.

Lowrey, Linda. Earthwise at Play: A Guide to the Care and Feeding of your Plant.  
First Ave Editions; ISBN: 0876145861. Published 1992.

Relf, Patricia. The Magic School Bus Hops Home: A Book About Animal Habitats.  
Scholastic Trade; ISBN: 0590484133. Published 1995.

Suzuki, David. Connections: Finding Out About the Environment.  
Stoddart Kids; ISBN: 07703673571. Published 1996.

Talas, Terri. Exploring Land Habitats.  
Mondo Publications; ISBN: 1879531380. Published 1995.