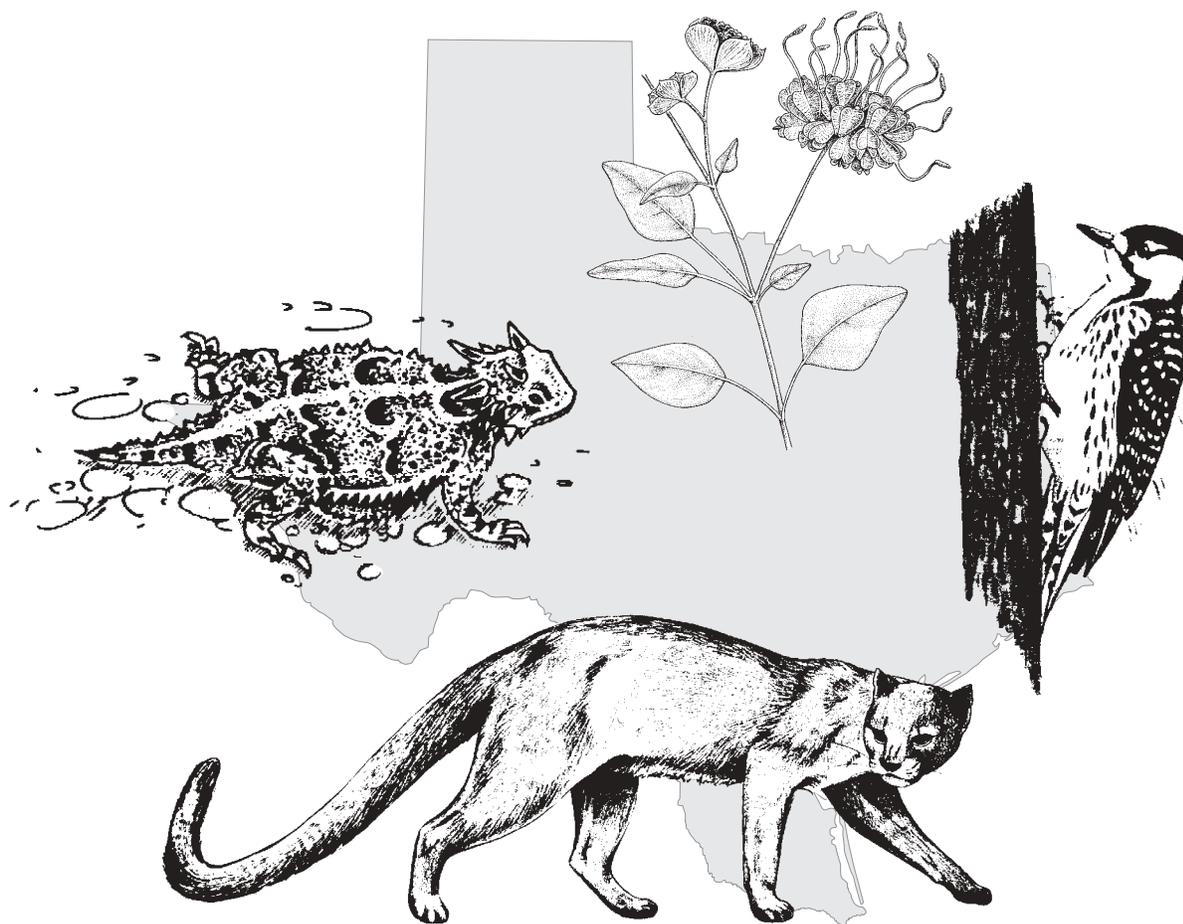


# Exploring Texas Ecoregions



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## INTRODUCTION

This curriculum guide is written as a seven to ten day unit to enable teachers and students to explore the vast natural resources, ecoregions, and heritage of Texas. The materials integrate science, social studies, language arts, and math. The eleven natural regions of Texas are featured in table format describing each region's size, topography, annual rainfall, vegetation, and rare plants and animals. A map of Texas divided into the ecoregions is provided for reference. The Texas Eco Trivia Game provides a tool for authentic assessment. A video, entitled "Ecoregions of Texas," describes the regions in seven, 10 minute segments. Each segment focuses on the unique cultural and natural heritage of the region. The [Texas Endangered Species Activity Book](#), available from Texas Parks and Wildlife, can be used to accompany this curriculum guide.

The purpose of this curriculum guide is to explore the natural and cultural resources that exist in each of the eleven natural regions or ecoregions of Texas. The purpose is to familiarize students with the resources of their state so that they will be better prepared to make informed choices regarding natural and cultural resource management and stewardship. The curriculum is written for students in grades 4 through 7. Both fourth and seventh grade curricula include the study of Texas history. Units on endangered species are often taught during the fifth or sixth grade year.

The goals of the curriculum guide are for students to:

1. Become familiar with regional ecosystems
2. Discern the ecological reasons for the unique attributes of each ecoregion
3. Understand the importance of diversity in living communities
4. Detect symbiotic relationships among particular Texas organisms
5. Understand the interdependency of humans and natural systems
6. Understand factors relating to the decline of some native plants and animals
7. Learn about the people that have shaped the character of Texas

This guide can be used to supplement state adopted text books and materials. It can also serve as an integrated unit with social studies, language arts, and math. The activities can be used in conjunction with the study of Texas history. Finally, the guide can be used as the basis for teaching separate units on ecology, natural regions, or endangered and threatened plants and animals of Texas.

Format of the guide:

1. Descriptions of the Natural Regions of Texas
2. Ecoregion Map
3. Table - Features of the Natural Regions of Texas
4. Lesson Plan
5. Suggested Questions from Ecoregion Video
6. Evaluation Activity
7. Appendix I - References and Resources
8. Appendix II - Other Suggested Activities for Daily Lesson Planning

## BACKGROUND INFORMATION

The organization of Texas into ecoregions or natural regions enables us to inform students about the diverse areas of Texas in a distinct way. By studying the similarities and differences of the various natural regions, students gain a practical and relevant perspective concerning how nature (rainfall, geology, plants and animals) and humans throughout history have shaped the Texas we know today.

Due to its size and geographic location, Texas is unique among states. Covering 266,807 sq. miles, 15 of the 50 states could fit within its borders. A large area of land will usually have a great deal of variation in climate and landscapes, factors influencing habitat diversity. The state has impressive topographic diversity, including 91 mountain peaks that are a mile or more high. Our geographic location is also important in that eastern habitats meet western ones and southern subtropical habitats meet northern temperate ones.

The natural regions of Texas look different from one another, both in terms of the living aspects (plant and animal communities) and the non-living attributes (topography, geology, soils). Texas is divided into the following eleven natural regions:

1. Pineywoods
- [ 2. Oak Woods and Prairies
- [ 3. Blackland Prairies
- [ 4. Gulf Coast Prairies and Marshes
- [ 5. Coastal Sand Plains
6. South Texas Brush Country
- [ 7. Edwards Plateau
- [ 8. Llano Uplift
- [ 9. Rolling Plains
- [ 10. High Plains
11. Trans Pecos

The accompanying table entitled Features of the Natural Regions of Texas highlights the unique features of each ecoregion, such as size, topography, rainfall, soil types, predominant vegetation, native plant communities, and rare plants and animals.

It may be convenient to group some ecoregions in order to satisfy a 7 or 10 day schedule. The brackets on the list above suggest one way to group the natural regions for study. An interdisciplinary approach may be used by teaching the science portion of the unit in parallel with social studies, integrating the cultural aspects and geography of the regions into the social studies curriculum.

The following is a brief description of each of the ecoregions of Texas.

## Region 1: Pineywoods

Rolling terrain covered with pines and oaks, and rich bottomlands with tall hardwoods, characterize the forests of the east Texas Pineywoods. This region is part of a much larger area of pine-hardwood forest that extends into Louisiana, Arkansas, and Oklahoma.

The average annual rainfall of 36 to 50 inches is fairly uniformly distributed throughout the year, and humidity and temperatures are typically high. The soils of the region are generally acidic and mostly pale to dark gray sands or sandy loams. Elevations range from 200 to 500 feet above sea level.

The Pineywoods region can be described as pine and pine-hardwood forests with scattered areas of cropland, planted pastures, and native pastures. Timber and cattle production are important industries in the region. Farms and ranches are relatively small in size compared to the state average.

Longleaf pine forests once dominated the southeastern part of the Pineywoods. A few pockets of longleaf pine may still be seen today. Mixed pine-oak forests occur to the west and north of the longleaf pine area. Dominant trees include loblolly pine, blackjack oak, and post oak. Hardwood forests of sweetgum, magnolia, tupelo, elm, and ash occur in the lowlands. Swamps are common and are most outstanding in the southern part of the pine-oak forest.

## Region 2: Oak Woods and Prairies

The Oak Woods and Prairies region is a transitional area for many plants and animals whose ranges extend northward into the Great Plains or eastward into the forests. This region, sometimes called the Cross-Timbers, was named by early settlers, who found belts of oak forest crossing strips of prairie grassland.

Average annual rainfall averages 28 to 40 inches per year. May or June usually brings a peak in monthly rainfall. Upland soils are light colored, acidic sandy loam or sands. Bottomland soils may be light brown to dark gray and acidic with textures ranging from sandy loams to clays. The landscape of the region is gently rolling to hilly and elevations range from 300 to 800 feet above sea level.

The region can be described as oak savannah, where patches of oak woodland are interspersed with grassland. Cattle ranching is the major agricultural industry in the Oak Woods and Prairies. Introduced grasses such as bermudagrass are grazed along with forage crops and native grasslands.

## Region 3: Blackland Prairies

The Blackland Prairies region is named for the deep, fertile black soils that characterize the area. Blackland Prairie soils once supported a tallgrass prairie dominated by tall-growing grasses such as big bluestem, little bluestem, indiagrass, and switchgrass. Because of the fertile soils, much of the original prairie has been plowed to produce food and forage crops.

The average annual rainfall ranges from 28 to 40 inches. May is the peak rainfall month for the northern end of the region; however, the south-central part has a fairly uniform rainfall distribution throughout the year. Typically, soils are uniformly dark-colored alkaline clays, often referred to as "black gumbo," interspersed with some gray acidic sandy loams. The landscape is gently rolling to nearly level, and elevations range from 300 to 800 feet above sea level.

Crop production and cattle ranching are the primary agricultural industries.

### **Region 4: Gulf Coast Prairies and Marshes**

The Gulf Coast Prairies and Marshes region is a nearly level, slowly drained plain less than 150 feet in elevation, dissected by streams and rivers flowing into the Gulf of Mexico. The region includes barrier islands along the coast, salt grass marshes surrounding bays and estuaries, remnant tallgrass prairies, oak parklands and oak mottes scattered along the coast, and tall woodlands in the river bottomlands.

Average annual rainfall varies from 30 to 50 inches per year distributed fairly uniformly throughout the year. The growing season is usually more than 300 days, with high humidity and warm temperatures. Soils are acidic sands and sandy loams, with clays occurring primarily in the river bottoms.

Native vegetation consists of tallgrass prairies and live oak woodlands. Brush species such as mesquite and acacias are more common now than in the past. Although much of the native habitat has been lost to agriculture and urbanization, the region still provides important habitat for migratory birds and spawning areas for fish and shrimp.

### **Region 5: Coastal Sand Plains**

The Coastal Sand Plains is fairly level with elevations less than 150 feet above sea level. Average annual rainfall is 24 to 28 inches per year and the soils are primarily windblown sands. The vegetation can be described as tallgrass prairie with live oak woodlands, mesquite savannah, and salt marshes. Woody vegetation is more extensive now than in pre-settlement times.

Most of this region is grazed by cattle. In the past, the Coastal Sand Plains were called the "Wild Horse Prairie" because of the large herds of feral horses roaming here in the 19th century.

### **Region 6: South Texas Brush Country**

The South Texas Brush Country is characterized by plains of thorny shrubs and trees and scattered patches of palms and subtropical woodlands in the Rio Grande Valley. The plains were once covered with open grasslands and a scattering of trees, and the valley woodlands were once more extensive. Today, the primary vegetation consists of thorny brush such as mesquite, acacia, and prickly pear mixed with areas of grassland.

The average annual rainfall of 20 to 32 inches increases from west to east. Average monthly rainfall is lowest during winter, and highest during spring (May or June) and fall (September).

Summer temperatures are high, with very high evaporation rates. Soils of the region are alkaline to slightly acidic clays and clay loams. The deeper soils support taller brush, such as mesquite and spiny hackberry, whereas short, dense brush characterizes the shallow caliche soils.

Although many land changes have occurred in this region, the Brush Country remains rich in wildlife and a haven for many rare species of plants and animals. It is home for semi-tropical species that occur in Mexico, grassland species that range northward, and desert species commonly found in the Trans-Pecos.

Livestock grazing and crop production are the principal agricultural land uses.

## **Region 7: Edwards Plateau**

The Edwards Plateau region comprises an area of central Texas commonly known as the Texas Hill Country. It is a land of many springs, stony hills, and steep canyons. The region is home to a whole host of rare plants and animals found nowhere else on earth.

Average annual rainfall ranges from 15 to 34 inches. Rainfall is highest in May or June and September. Soils of the Edwards Plateau are usually shallow with a variety of surface textures. They are underlain by limestone. Elevations range from slightly less than 100 feet to over 3,000 feet above sea level. Several river systems dissect the surface, creating a rough and well-drained landscape.

The limestone of the Edward's Plateau is honeycombed with thousands of caves. Beneath the eastern edge of the Plateau lies a hidden world of underground lakes known as the Edwards Aquifer. This precious water resource also is home to a number of curious creatures, such as the blind salamander.

Today, the Edwards Plateau is characterized by grasslands, juniper/oak woodlands, and plateau live oak or mesquite savannah. Open grasslands and savannahs were more common in pre-settlement times than they are today. Ranching is the primary agricultural industry in the region.

## **Region 8: Llano Uplift**

The Llano Uplift is also known as the central mineral region. Although surrounded by the Edwards Plateau region, the Llano Uplift is distinguished by its unique geology. Home to some of the oldest rocks in Texas, the central mineral region contains unique minerals and rock formations. The region is characterized by large granite domes, such as Enchanted Rock near Fredericksburg.

Rainfall averages about 24 to 32 inches per year, peaking in May or June and September. The landscape is rolling to hilly and elevation range from 825 to 2,250 feet above sea level. Soils are predominantly coarse textured sands, produced from weathered granite over thousands of years.

Native vegetation consists of oak-hickory or oak-juniper woodlands, mesquite-mixed brush savannah, and grasslands. Open grassland and savannah were once more common than they are today. Ranching is the predominant agricultural industry.

## Region 9: Rolling Plains

Several Texas rivers begin in the gently rolling hills and broad flats of the Rolling Plains. These rivers and their numerous tributaries are responsible for the rolling character of the land. The rivers have cut canyons that shelter some plants and animals typical of the Rocky Mountains.

Average annual rainfall is 20 to 28 inches, with peaks in May and September. A summer dry period with high temperatures and high evaporation rates is typical. Soils vary from coarse sands along outwash terraces adjacent to streams, to tight clays and shales. Soil reaction is neutral to slightly alkaline. Elevations vary from 800 to 3,000 feet above sea level.

The original prairie grasslands included tall and mid-grasses such as bluestems and grammas. Buffalo grass and other shortgrasses have increased under heavy, uncontrolled grazing. Mesquite is a common invader on all soils. Much of the Rolling Plains today can be described as a mesquite-shortgrass savannah. Stream floodplains are dominated by various hardwood species, and juniper is common on steep slopes along rivers.

Steep slopes, cliffs, and canyons occurring just below the edge of the High Plains Caprock comprise the Escarpment Breaks area of the Rolling Plains. The Breaks are an ecotone or transition zone between the High Plains grasslands and the mesquite savannah of the Rolling Plains. Crop and livestock production are the major agricultural industries in this region.

## Region 10: High Plains

The High Plains region, together with the Rolling Plains, comprise the southern end of the Great Plains of the central United States. The High Plains is a relatively level high plateau, separated from the Rolling Plains by the Caprock Escarpment. Elevations range from 3,000 to 4,500 feet above sea level.

Average annual rainfall is 15 to 22 inches. Rainfall is lowest in winter and mid-summer and highest in April or May and September or October. Extended droughts have occurred here several times this century. Surface texture of soils ranges from clays on hardland sites in the north to sands in the southern portion of the region. Caliche generally underlies these surface soils at depths of two to five feet.

Native vegetation of the High Plains is shortgrass prairie dominated by buffalo grass. Although historically a grassland, mesquite and yucca have invaded parts of the region. Shinnery oak and sand sage are common invaders on sandy lands, and juniper has spread from the breaks onto the plains in some areas.

Immense herds of buffalo and pronghorn antelope once thundered across vast prairies of blue grama and buffalo grass. Today, the plains are mostly irrigated cropland and the native vegetation includes more mesquite and juniper. Although much of the shortgrass prairie and the vast prairie dog towns are gone, large flocks of wintering waterfowl still come to the playa lakes (shallow, round depressions which spot the surface, sometimes covering more than 40 acres).

## Region 11: Trans Pecos

The Trans Pecos is perhaps the most complex of all the regions. It occupies the extreme western part of the state eastward generally to the Pecos River. This is a region of diverse habitats and vegetation, varying from the desert valleys and plateaus to wooded mountain slopes. Elevations range from 2,500 feet to more than 8,749 feet at Guadalupe Peak. Even the mountain ranges vary greatly in the environments they offer for plant and animal life. Some are characterized by volcanic rocks, others by limestone.

Over most of the area average annual rainfall is less than 12 inches, but varies greatly from year to year and from lower to higher elevations. July and August are usually the higher rainfall months. Mountain outwash materials have formed the soils of the Trans Pecos. Surface textures and profile characteristics are varied. Soil reaction is generally alkaline.

Due to the diversity of soils and elevations, many vegetation types exist in the region. The principal plant communities are creosote-tarbrush desert scrub, desert grassland, yucca and juniper savannahs, and montane forests of pinon pine and oak.

The various subregions reflect the diversity of the Trans Pecos. The Sand Hills area consists of shin oak and mesquite on wind-blown dunes. Flat-topped mesas and plateaus are intersected by steep-walled canyons and dry washes that comprise the Stockton Plateau. Soils with high salt content and gypsum dunes are typical of the Salt Basin area. The Desert Scrub subregion is an area of low rainfall and rapid drainage. Creosotebush flats with yucca, lechuguilla, and various small-leafed plants are common. The Desert Grassland area occurs in the central part of the region and is characterized by deeper soils with high clay content. Finally, the Mountain Ranges have higher rainfall and woody vegetation such as junipers, oaks, pinon pine, ponderosa pine, and Douglas fir.

Ranching is the primary industry in the Trans Pecos region.

## DAILY LESSON PLAN

### OBJECTIVES

Students will be able to:

1. Distinguish the ecoregions of Texas by the natural features they contain
2. Identify on the Texas map approximately where each ecoregion is located
3. Recognize the diverse cultural and natural history of Texas
4. Explain why plants and animals need a certain kind of habitat to survive
5. Name some rare plants or animals found in each ecoregion
6. Define the term "endangered" with regard to plant and animal species

### METHOD

One or two natural regions will be discussed each day. Grouping the eleven natural regions as follows will enable teachers to complete seven units in seven class sessions.

Day 1	Piney Woods
Day 2	Oak Woods and Prairies & Blackland Prairies
Day 3	Gulf Coast Prairies and Marshes & Coastal Sand Plains
Day 4	South Texas Brush Country
Day 5	Edwards Plateau & Llano Uplift
Day 6	Rolling Plains & High Plains
Day 7	Trans Pecos

The teacher will supply the tables and maps for students to complete as required. Teachers may wish to leave portions of the table blank for students to complete by taking notes. The amount left blank, if any, would vary by grade level and ability. Students should color the appropriate region on the map as each ecoregion is discussed. Activities from the [Texas Endangered Species Activity Book](#) can be used to supplement lessons on specific regions. The video, [Eco Regions of Texas](#), has a ten minute feature for each of the seven ecoregion groupings.

Students should keep the tables, map, and notes in a notebook or a section of their notebook to be used as references for the final evaluation.

### MATERIALS

Critter/Plant of the Day and Features of the Natural Regions of Texas tables

Ecoregions of Texas map

Ecoregions of Texas video

[Texas Endangered Species Activity Book](#)

### PROCEDURE

1. Daily WARM-UP with Critter/Plant of the Day

To begin the unit each day, use an animal or plant example from the specific ecoregion to be discussed. The example can be as simple as a laminated photograph of a particular species of plant or animal or a living specimen such as a grasshopper in a plastic jar. Pass this sample around the class in an assigned rotation to permit each student a close look. Describe the history of the object in a way to peak curiosity and show the special nature of each region. Students can jot down interesting facts about the organism on the Critter of the Day table. Examples of items to bring might include pine needles and pine cones from the Pineywoods, interesting rocks

from the Trans Pecos, shells from the Gulf Coast, photos of the Texas Blind Salamander or Black-capped Vireo for the Edwards Plateau, or mesquite leaves or pricklypear pads from the South Texas Brush Country. Teachers may also want to have students bring examples of plants and animals that can be found locally for the class to name and learn about.

2. After a short introduction of the unit (see description of each region, use critter/plant of the day, or show video segment of the region), each student will receive the ecoregion map and the blank table entitled Features of the Natural Regions of Texas. Students can take notes by completing the blank table as the teacher provides information and leads discussions on each ecoregion.

3. The map can be colored to coordinate with the video as follows:

Piney Woods - green

Oak Woods and Prairies & Blackland Prairies - black

Gulf Coast Prairies and Marshes & Coastal Sand Plains - blue

South Texas Brush Country - yellow

Edwards Plateau & Llano Uplift - purple

Rolling Plains & High Plains - red

Trans Pecos - brown

4. Choose the activity from the Texas Endangered Species Activity Book which corresponds to the region being discussed:

Piney Woods - p. 13, the Red-cockaded Woodpecker

Oak Woods and Prairies - p. 44, the Houston Toad

Gulf Coast Prairies and Marshes - p. 37, the Whooping Crane

South Texas Brush Country - p. 34, the Ocelot

High Plains - p. 4, the Black-footed Ferret

Trans Pecos - p. 22, the Greater Long-nosed Bat

5. To integrate math concepts and skills, have students graph the size and/or annual rainfall data for each ecoregion. Teachers may want to have students work together in small groups and check their work with others.

6. After viewing the video and upon completion of the tables, map, and activities have students discuss why some plants and animals are rare or have become endangered. What are some things people can do to help endangered species?

## **EVALUATION**

Texas Eco Trivia is a trivia game used as a final evaluation of the unit.

### **DAY 3: GULF COAST PRAIRIES AND MARSHES AND COASTAL SAND PLAINS**

#### *WHEEL OF TROUBLE*

From Nature Scope Endangered Species, this activity addresses why sea turtles are endangered.

#### *ARE YOU ME?*

From Aquatic WILD, this activity challenges students to match the various larval and juvenile stages of aquatic animals to their corresponding adult form.

### **DAY 4: SOUTH TEXAS BRUSH COUNTRY**

#### *IDENTIFYING SOME COMMON SHRUBS AND TREES*

From Texas Environmental Guide. Students learn to use a dichotomous key to identify plants. Besides learning a basic science skill, students can be challenged to create and use keys to identify plants in their local area.

#### *TOOTHPICK CAMOUFLAGE*

From Environmental Education Activities for Children and Youth. This activity shows how adaptations such as camouflage help animals like the Ocelot and Jaguarundi survive in their dense brushy habitat, and how lack of cover decreases their chances of survival.

### **DAY 5: EDWARDS PLATEAU AND LLANO UPLIFT**

#### *AQUIFERS AND SPRINGS AND PROTOZOA AND GREEN ALGAE IN A TEXAS POND*

From Texas Environmental Guide. These activities will help students recognize the significance of aquifers and springs, determine the environmental consequences of the loss of ground water contained in aquifers, and observe the diversity of microscopic organisms found in local ponds.

### **DAY 6: ROLLING PLAINS AND HIGH PLAINS**

#### *DESCRIBING A TEXAS PLANT COMMUNITY*

From Texas Environmental Guide. This activity teaches the concept of a "plant community" and helps students learn about the composition of a plant community in their area. The activity can be the basis for a discussion of plant communities in these ecoregions.

#### *WHAT ORGANISM AM I?*

From Texas Environmental Guide. This activity integrates art into the basic science lesson. Species such as the Black-footed Ferret, Texas Horned Lizard, Prairie Dog, Plains Spotted Skunk or Swift Fox can be used in this activity to enhance awareness concerning the loss grassland habitat for these animals.

## DAY 7: TRANS PECOS

### *TEXAS CACTI, POLLINATION IN TEXAS FLOWERS, AND MAKING DYES FROM TEXAS PLANTS*

From [Texas Environmental Guide](#). These activities will introduce the Trans Pecos flora, help create an awareness of Texas' cultural history, and help students recognize that materials used in our everyday life have natural resource origins.

### *WILDLIFE 3*

From NRCS [Suggested Environmental Education Lesson Plans](#), this activity integrates math by using percentages to calculate the survival and reproduction rates of wildlife species.

## ADDITIONAL RELATED ACTIVITIES:

### *WATER*

From NRCS [Suggested Environmental Education Lesson Plans](#), this activity integrates math by discussing how varying rainfall amounts affect the environment.

### *ENDANGERED SPECIES*

From [Texas Environmental Guide](#). This activity helps students develop an awareness of endangered and threatened plant species of Texas.

### *FOOD CHAIN GAME*

From [Environmental Education Activities for Children and Youth](#). This activity identifies the roles of individuals in a food chain and the proper proportions of individuals needed in a food chain.

### *ECO-ACTING PROBLEM SOLVING*

From [Environmental Education Activities for Children and Youth](#). This activity has students use given information, observation, inference, and nonverbal communication to recite an exact phrase.

### *WILDLIFE 4*

From NRCS [Suggested Environmental Education Lesson Plans](#). This activity introduces terms for use in describing aggregations of animals.

### *A TO Z WALK*

From [Environmental Education Activities for Children and Youth](#). This activity requires students to walk and record observations using all five senses. Observations are recorded using words starting with each letter of the alphabet.

### *MICROTREK TREASURE HUNT AND LITTER WE KNOW*

Adapted from [Project WILD](#), this activity emphasizes observation and categorizing skills.

*MAKE A COAT!*

From Project WILD. In this activity, students learn that plants and animals are important sources of clothing materials, both today and in the past. Students also collect and analyze data to infer the sources of most materials used in clothing today, and distinguish between some examples of renewable and nonrenewable natural resources.

*DRAWING ON NATURE*

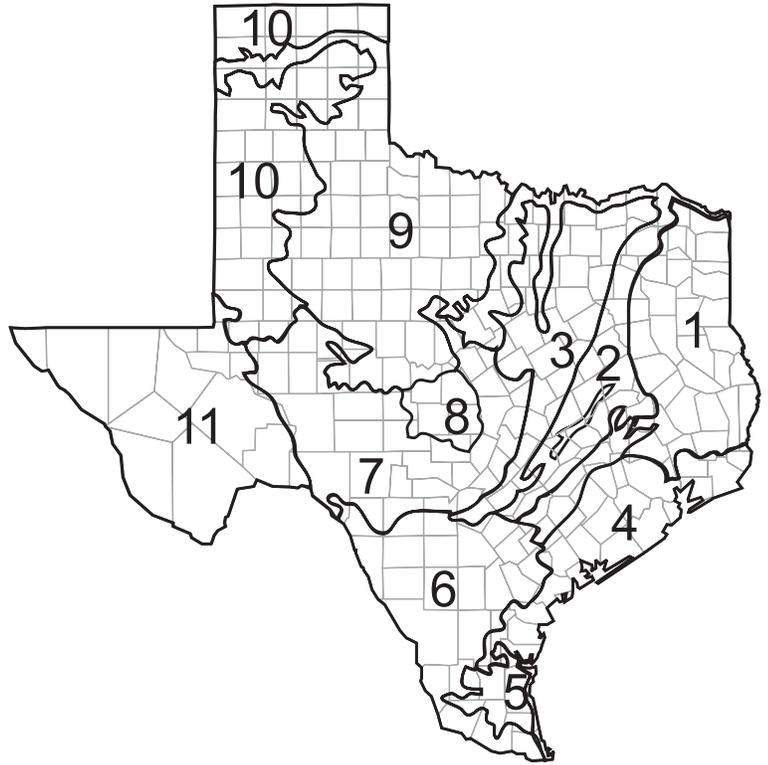
From Project WILD, this activity integrates art so that students will be able to generalize that wildlife and other animals are important inspiration for art as well as subjects of science.

*WHERE'S MY BABY*

From Educator's Activity Book About Bats, this activity shows how mother free-tailed bats find their babies.

# TEXAS ECO TRIVIA

1. Pineywoods
2. Oak Woods & Prairies
3. Blackland Prairies
4. Gulf Coast Prairies & Marshes
5. Coastal Sand Plains
6. South Texas Brush Country
7. Edwards Plateau
8. Llano Uplift
9. Rolling Plains
10. High Plains
11. Trans Pecos



## OBJECTIVES

Students will be able to demonstrate knowledge of the diversity of Texas' ecoregions.

## METHOD

Students team-teach ecoregion facts to the rest of the class and then compete in a trivia game.

## MATERIALS

Texas ecoregion fact sheets, notes, writing materials, scissors (optional), timer or watch with a second hand.

## PROCEDURE

1. Divide the class into three teams. Assign one of the trivia fact sheets to each team and give each team member a copy of the fact sheet. Each fact sheet contains ten questions and answers about the natural regions of Texas (the fact sheets can be cut into question cards, if desired). Tell the students that these questions will be the basis of a trivia game, so they should not let other groups see or hear their questions.
2. Instruct the teams to prepare a presentation of not more than 30 minutes to teach the rest of

the class the facts on their sheet. The presentation must include all of the facts listed on the sheet (in any order), but the information should be given so that the actual questions are not obvious. Teams also need to create two additional questions of their own from the materials given (for a total of 12 questions). Give the teams ample time to research their topics and plan their presentations. All team members should participate.

3. Have teams teach their Texas eco trivia to the rest of the class. It might work best to have team-teaching for 30 minutes, three days in a row, rather than all in one day. Students are allowed to take notes during the presentation.
4. Hold a Texas eco trivia study session. Teams should study their notes from the presentations and drill each other on facts.

5. Hold the Texas eco trivia competition according to the following rules:

- Each group asks all of their questions as a set. The order of the groups should be decided randomly.
- Questions are directed to the remaining two teams on an alternating basis.
- A team has 30 seconds to discuss the question before they are required to give an answer (there should be some sort of official timer, whether it is a student watching the clock, a mini-hourglass, etc.).
- One point is awarded for each correct answer.
- The team with the most points wins. Tie-breaker questions should be used in the case of a tie.

6. After the game is over, ask students to name the trivia facts they felt were most important. List these on the board and discuss them in more detail.

## ASSESSMENT

Ask students to name two important facts about the ecoregions of Texas.

## ENRICHMENT

As a class, develop a board game based on the ecoregions of Texas. Put the game in the library so other students may play and learn from it.

Create a list of terms that are significant in the study of the eco regions of Texas. Break the class into two teams and play a version of "Pictionary" by having students illustrate the concept/term while teammates guess. If the team does not guess the correct term within a certain time frame, the other team can earn points if they guess the word.

The questions and answers from this game make great work station or independent desk activity work when the questions and answers are copied separately, laminated and used as matching flash cards.

## TEXAS TRIVIA

Q. Texas is divided into eleven natural regions.

True or False?

## TEXAS TRIVIA

Q. Blackland Prairies are found in far west Texas.

True or False?

## TEXAS TRIVIA

Q. The Pineywoods is located in South, West or East Texas?

## TEXAS TRIVIA

Q. The tallest mountains are found in which ecoregion?

## TEXAS TRIVIA

Q. The Red-cockaded Woodpecker is found in which ecoregion?

## TEXAS TRIVIA

Q. Name one plant community or ecosystem that has become rare in Texas.

## TEXAS TRIVIA

Q. The Houston Toad is found in which ecoregion?

## TEXAS TRIVIA

Q. The Attwater's Prairie Chicken is found in which ecoregion?

## TEXAS TRIVIA

Q. The Oak Woods and Prairies are flat and dry.

True or False?

## TEXAS TRIVIA

Q. The Coastal Sand Plains and the \_\_\_\_\_ are ecoregions located along the Gulf Coast of Texas.

## TEXAS TRIVIA

Q. Name one rare plant found along the Gulf Coast.

## TEXAS TRIVIA

Q. The Concho Water Snake may be found in which ecoregion?

## TEXAS TRIVIA

Q. The Ocelot may be found in \_\_\_\_\_ region of Texas.

## TEXAS TRIVIA

Q. The Llano Uplift and the \_\_\_\_\_ are the smallest ecoregions in size.

## TEXAS TRIVIA

Q. The "Texas Hill Country" refers to which ecoregion?

## TEXAS TRIVIA

Q. The largest ecoregions by size are the Trans Pecos and the \_\_\_\_\_.

## TEXAS TRIVIA

Q. Lots of thorny brush like acacias and mesquite are found in the \_\_\_\_\_ region.

## TEXAS TRIVIA

Q. The Texas poppy-mallow is a rare plant found only in the Rolling Plains region.

True or False?

## TEXAS TRIVIA

Q. Name one rare animal found in the Edwards Plateau region.

## TEXAS TRIVIA

Q. The area of Texas with the largest number of rare plants and animals is the \_\_\_\_\_ region.

## TEXAS TRIVIA

Q. The region of Texas with the least amount of rainfall per year is the \_\_\_\_\_.

## TEXAS TRIVIA

Q. The Greater Long-nosed Bat is found in the \_\_\_\_\_ region of Texas.

## TEXAS TRIVIA

Q. Prairie dog towns can be found in the \_\_\_\_\_.

## TEXAS TRIVIA

Q. The word endangered means:  
\_\_\_\_\_

## TEXAS TRIVIA

Q. Loss of habitat is a main reason that plants and animals become endangered.

True or False?

## TEXAS TRIVIA

Q. The Golden-cheeked Warbler and the Black-capped Vireo can both be found in the \_\_\_\_\_ region of Texas.

## TEXAS TRIVIA

Q. Bald Eagles may be found in a number of regions, but they breed in the \_\_\_\_\_.

## TEXAS TRIVIA

Q. The Texas snowbells is a rare plant found in the \_\_\_\_\_ region of Texas.

## TEXAS TRIVIA

Q. Whooping Cranes can be found in the \_\_\_\_\_ region.

## TEXAS TRIVIA

Q. The most common trees found in the forests of East Texas are \_\_\_\_\_.

<p>A. False. The Blackland Prairies are found in east-central Texas.</p>	<p>A. True. There are eleven natural or ecoregions of Texas.</p>
<p>A. The tallest mountains are found in the Trans Pecos region.</p>	<p>A. The Pineywoods region is located in East Texas.</p>
<p>A. The Blackland Prairies, the Shortgrass Prairies, and Longleaf Pine Forests are examples of plant communities that have become rare in Texas.</p>	<p>A. The Red-cockaded Woodpecker is found in the Pineywoods region.</p>
<p>A. The Attwater's Prairie Chicken is found in the Gulf Coast Prairies and Marshes region.</p>	<p>A. The Houston Toad is found in the Oak Woods and Prairies region.</p>
<p>A. Gulf Coast Prairies and Marshes are also found along the Gulf Coast.</p>	<p>A. False. The Oak Woods and Prairies are gently rolling to hilly and receive 36 to 40 inches of rain annually.</p>

<p>A. The Concho Water Snake can be found in the Rolling Plains region.</p>	<p>A. Some rare plants found along the Gulf Coast include: Texas prairie dawn, slender rush pea, South Texas ambrosia, and black lace cactus.</p>
<p>A. The smallest regions in size are the Coastal Sand Plains and the Llano Uplift.</p>	<p>A. The Ocelot may be found in the South Texas Brush Country region.</p>
<p>A. The largest regions in size are the Trans Pecos and the Rolling Plains.</p>	<p>A. The Edwards Plateau is sometimes called the "Texas Hill Country."</p>
<p>A. True. The Texas poppy-mallow is found only in the Rolling Plains.</p>	<p>A. These plants are found in the South Texas Brush Country.</p>
<p>A. The Trans Pecos has the largest number of rare plants and animals.</p>	<p>A. Rare animals found in the Edwards Plateau are the Black-capped Vireo, Golden-cheeked Warbler, San Marcos Salamander, Texas Blind Salamander, San Marcos Gambusia, Fountain Darter, and the Clear Creek Gambusia.</p>

<p>A. The Greater Long-nosed Bat is found in the Trans Pecos.</p>	<p>A. The Trans Pecos has the least amount of annual rainfall.</p>
<p>A. Endangered means: in danger of becoming extinct.</p>	<p>A. Prairie dog towns are found in the High Plains region.</p>
<p>A. The Edwards Plateau is the region where the Golden-cheeked Warbler and the Black-capped Vireo can be found.</p>	<p>A. True. Loss of habitat is a main reason that plants and animals become endangered.</p>
<p>A. The Texas snowbell is found in the Edwards Plateau</p>	<p>A. The Bald Eagle breeds in the eastern half of Texas.</p>
<p>A. The most common trees are pines.</p>	<p>A. Whooping Cranes can be found in the Gulf Coast Prairies and Marshes region.</p>

## Suggested Questions for Ecoregion Video

### Pineywoods

- Dating back to 700 A.D., the Texas Piney Woods are the original home to what 1,000 year old culture?
- Where were the Caddo Indians moved when they were threatened by early Texas settlers?
- How few Caddo Indians attended the traditional churches in Texas now?
- How old are the live pine trees that the red-cockaded woodpecker chooses for its home?
- How long does it take for the Red-cockaded Woodpecker to excavate its nest?
- What is the only natural lake in Texas?

### Blackland Prairies/Oakwoods

- How are wildlife management areas different from state parks?
- Who was the last Comanche Chief?
- Fort Parker is located near what city?
- Where is Monument Hill located?
- What happened to the spring water that was at one time used for brewing the beer at the Kreische Brewery?



### Texas Gulf Coast

- Name a rare plant of the coastal prairies.
- What happened to the coastal prairies?
- What bird species has increased in numbers from only 18 in 1939 to over 160 in 1995?
- Where is the Fulton Mansion found?

### South Texas Brush Country

- What is the brush of the South Texas Brush Country called?
- What is the oldest town north of the Texas/Mexico border?
- What is Texas' official state reptile?
- How can you protect the Texas Horned Lizard?
- Name a rare plant found in the South Texas Brush Country.

### Edwards Plateau/Llano Uplift

- Name three rare or endangered plants or animals in the Edwards Plateau region.
- What was the first plant to be listed as endangered in Texas?
- What natural element created Longhorn Cavern?

### Rolling Plains/High Plains

- Name a type of grass that was once abundant on the High Plains of Texas.
- What natural elements shaped Palo Duro Canyon?
- Referring to the cedar trees that grow throughout the canyon, what does Palo Duro mean?
- Name some other animals that make their homes in prairie dog burrows.
- Name a rare plant found in the Rolling Plains.

### Trans Pecos

- Which region has the most rare plant and animal species?
- What is the main reason that so many cacti are endangered?
- There is evidence that people have lived in the Trans Pecos for how long?
- What are Huecos?

## Answers to Ecoregion Video Questions

### Pineywoods

- The Texas Pineywoods was the original home for the Caddo Indians.
- When threatened by early settlers, the Caddo Indians were moved to Oklahoma.
- Now, only 10-12 Caddo Indians attend the traditional churches.
- Red-cockaded woodpeckers nest in living pines that are 70 years old and older.
- It takes the red-cockaded woodpecker up to 2 years to excavate its nest.
- Caddo Lake is the only natural lake in Texas.

### Blackland Prairies/Oakwoods

- Wildlife management areas focus on maintaining habitat for the plants and animals of that area where as the state parks focus more on recreation.
- Quana Parker was the last Comanche Chief.
- Fort Parker is located near Waco
- Monument Hill is in La Grange.
- The spring that was once used for brewing beer at the Kreische Brewery is dry now.

### Texas Gulf Coast

- The prairie dawn is a rare plant on the coastal prairie.
- Coastal Prairies were used for farm land and cities.
- The Whooping Cranes' numbers were successfully increased from only 18 birds.
- Fulton Mansion is north of Corpus Christi.

### South Texas Brush Country

- Brush of the South Texas Brush Country is called chaparral.
- Laredo is the oldest town north of the Texas/Mexico border.
- The Texas Horned Lizard is the official reptile of Texas.
- You can protect the Texas Horned Lizard by not picking them up or collecting them.
- The ashy dogweed is a rare plant found in South Texas Brush Country.

### Edwards Plateau/Llano Uplift

- The Golden-cheeked Warbler, Houston Toad, Blind Salamander, and Texas wild-rice are some endangered plants and animals of the Edwards Plateau Region.
- The first plant to be listed as endangered in Texas was the Texas wild-rice, which grows in the San Marcos River.
- Longhorn Cavern was created by water.

### Rolling Plains/High Plains

- Buffalo grass and blue grama are grasses that were once abundant on the High Plains of Texas.
- Water and wind erosion shaped Palo Duro Canyon.
- Referring to the cedars in the canyon, Palo Duro means "hard wood."
- Burrowing owls, rabbits, snakes, and Black-footed Ferrets make their homes in prairie dog burrows.
- The Texas poppy-mallow is a rare plant found in the Rolling Plains of Texas.

### Trans Pecos

- The Trans Pecos region has the most rare plant and animal species in Texas.
- Many cacti are endangered because they are gathered by collectors.
- There is evidence that people have lived in the Trans Pecos for ten to twelve thousand years.
- Huecos are basins or oases that fill with water.

Following the video, teachers may want to initiate a class discussion concerning what factors contribute to the endangered status of most of the plants and animals seen on the video.

Note: Most endangered plants and animals of Texas are affected by loss of habitat. Examples include loss of old pines due to commercial forestry practices (Red-cockaded Woodpecker) and loss of tall grass coastal prairie due to crop production and urban expansion (Attwater's Prairie Chicken).

## APPENDIX I

### REFERENCES AND RESOURCES

Aquatic WILD Activity Guide. 1993. Western Regional Environmental Education Council, Inc. Available to participants in Project WILD Workshops held throughout Texas. For information and workshop schedule, contact Project WILD Coordinator, Texas Parks and Wildlife Department.

Educator's Activity Book About Bats. 1991. Bat Conservation International, Austin, Texas (512-327-9721)

Endangered and Threatened Animals of Texas - Their Life History and Management. 1995. Written by Linda S. Campbell and produced by Texas Parks and Wildlife Press, Austin, Texas. Available through University of Texas Press or Texas Parks and Wildlife Department.

Environmental Education Activities for Children and Youth. 1994. Presentation to Environmental Education Skills Workshop, Castroville, Texas by Dr. Milton Payne, Science and Outdoor Education, Stephen F. Austin State University, Nacogdoches, Texas.

"Eye On Earth" video programs on endangered species and Texas ecoregions. 1994 and 1995. Production Texas Education Agency and the T-Star Network in cooperation with Texas Parks and Wildlife Department. Tapes available through the Regional Service Centers.

From Alligators to Whooping Cranes: A Texas Resource Guide to Endangered Species. 1994. Developed by Glenda Bell, Michael Bishop, Pat Merkord, Lonna Sanderson, and Dr. Kenn Heydrick, Austin Independent School District. Available from U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department.

Nature Scope Series. National Wildlife Federation

Playa Lakes Teaching Unit. Developed by the Playa Lakes Joint Venture and available by contacting the Project WILD Coordinator of Texas Parks and Wildlife Department.

Project WILD Activity Guide. 1992. Western Regional Environmental Education Council, Inc. Available to participants in the Project WILD Workshops held at locations throughout Texas. For workshop information and schedules, contact Project WILD Coordinator, Texas Parks and Wildlife Department.

Rare and WILD Texas - Project WILD Supplemental Activities for Texas. 1995. Available from Project WILD Coordinator or Endangered Resources Branch of Texas Parks and Wildlife Department.

Suggested Environmental Education Lesson Plans. Available from the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service), Temple, Texas (817-774-1228).

Texas Almanac. 1994-95. Dallas Morning News, Dallas, Texas.

Texas Endangered Species Activity Book. 1996. Available from the Endangered Resources Branch of Texas Parks and Wildlife Department.

Texas Environmental Guide. 1991. Holt, Rinehart, and Winston.

Texas Parks and Wildlife Magazine Articles on Rare Resources, October, 1995. Available from the Endangered Resources Branch of Texas Parks and Wildlife Department.

Texas Parks and Wildlife Department Toll Free 800-792-1112  
Endangered Resources Branch 512-912-7011  
Project WILD Coordinator 512-328-6035

## APPENDIX II

**OTHER SUGGESTED ACTIVITIES FOR DAILY LESSON PLANNING.** (Publishers and availability of these teaching tools are listed under "References and Resources")

### INTRODUCTION TO THE ECOREGION CURRICULUM

These two activities can be done outdoors or in a gym.

#### *QUICK FROZEN CRITTERS!*

Use this Project WILD activity for a fast moving and attention getting unit initiation. Objectives: to discuss predator/prey relationships, recognize limiting factors which affect wildlife populations, and the importance of adaptations in predator/prey relationships.

#### *HABITAT LAP SIT!*

Also from Project WILD. Objectives: to identify components of habitat and how humans and other animals depend upon habitat.

### DAY 1: PINEYWOODS

#### *THE CHANGING FACE OF TEXAS*

From Texas Environmental Guide. The features of each region are listed, adding information concerning what the Pineywoods and other regions were like prior to the first Spanish settlements of the 1680's.

#### *WILDLIFE 1 AND WILDLIFE II*

From the U.S. Natural Resources Conservation Service (NRCS), Suggested Environmental Education Lesson Plans, *Wildlife 1* introduces wildlife habitat management, and looks closely at wildlife habitat on a school site. *Wildlife 2* introduces students to outdoor recreational fishing.

### DAY 2: OAK WOODS AND PRAIRIES AND BLACKLAND PRAIRIES

#### *OH DEER!*

From Project WILD. Objectives include: identify and describe food, water, and shelter as three essential components of habitat; describe the importance of good habitat for animals; define "limiting factors" and give examples; and recognize that some fluctuations in wildlife populations are natural as ecological systems undergo constant change.

From Rare and WILD Texas--Project WILD Supplemental Activities for Texas, these activities were developed specifically for Texas by Texas Parks and Wildlife. Variations of Project WILD's popular activity entitled *OH DEER!* these activities challenge students to: define what it means for a plant or animal to be endangered or threatened; identify and name a number of Texas endangered and threatened species; describe factors which may cause species to decline and become endangered, and discuss why we should care about endangered and threatened species.