

# PRAIRIE 101

## GRADE LEVEL

3 – 5

## SUBJECT AREAS

Science, History

## DURATION

Science, History

## SETTING

Indoors

## CORRELATIONS

See page 13

## LESSON DONATED BY

Katy Prairie Conservancy,  
based on a lesson from  
*Naturescope: Wading into  
Wetlands Marsh to Marina.*

## SNAPSHOTS IN TIME

### *Exploring Greater Houston Land Transformation Over Time*



#### Introduction

Humans have always reordered and used wild nature to meet their survival needs and to build wealth. Sometimes this change happens gradually and sometimes this change occurs rapidly. This makes it difficult for citizens of a particular region to sense this change and they often believe that their neighborhood, town, or city looks at least something akin to what would have been found in the area before human settlement. Yet, this is often untrue.

A good example of this type of transformation is what occurred in and around Houston, Texas. Visitors to, and indeed many current residents of, Houston believe that the Bayou City was built on a swamp or was carved out of an immense forest. Houston's earliest explorers did indeed encounter swamps - near major rivers and bayous (including Buffalo Bayou where the City of Houston was founded in 1836). There were also extensive forests north of the city and along rivers, bayous, and creeks. Yet, Houston's signature landscape was the coastal prairie ecosystem - a distinct, beautiful, and wet tallgrass prairie.

This prairie was immensely useful. Its lush grasslands could be used to raise huge herds of cattle and its rich soils could be used to grow rice, corn, soybeans, sugarcane, satsumas, (a small citrus tree with fruit having a thin orange skin), melons, and other crops. The prairie's level and mostly treeless and rockless landscape could also be easily and inexpensively developed into farms and neighborhoods. So, there were many economic forces that made the transformation of the coastal prairie (in the same way as the prairies of the Great Plains) almost inevitable. Gradually, this grassland transformed from wild prairie, to rangeland, to farms, and lastly to new neighborhoods with many planted trees. As these trees aged it gave the impression that Houston was always a forested place.

The purpose of this lesson is to explore how humans change ecosystems over long periods of time and how those changes attract different types of people to the land. It is also designed to give Houston-area students a glimpse into their neighborhood's history, which we hope will give them a better sense of place.

#### Objectives (TEKS in resource section)

Students will:

- Explore how human beings transform ecosystems over long periods of time and the reasons for these changes
- Discern how changes in landscapes change human communities



[illegible]

- Identify Sam Houston as a leader important to the founding of Texas
- Construct a timeline showing changes to the landscape
- Describe and explain the differences between climate and weather
- Identify changes over time in climate in our snapshots
- Describe and compare natural resources in each snapshot
- Identify and describe how humans adapt to and modify the environment
- Describe the effects of human activity in shaping the landscape
- Describe how Native Americans lived and survived in the Houston area and how the loss of American buffalo affected their lives
- Describe and analyze factors that caused people to settle in the Houston area and eventually build a city including how people were able to meet their basic needs, transportation, and recreation
- Identify the impact of urbanization on life in Texas
- describe the positive and negative effects of human changes to the environment including the impact on habitat, wildlife, air, and water;
- express ideas orally on research and experiences using appropriate grammar, and sentence structure
- use social studies terminology correctly;
- incorporate main and supporting ideas in verbal and written communication

- Explain the possible origins of Native American groups in Texas
- Identify Native American groups in Texas before European exploration
- Describe the regions in which Native Americans lived
- Identify Native American groups remaining in Texas
- Identify challenges, opportunities, and contributions of various Native American groups
- Examine the effect upon Native American life resulting from changes in Texas including the loss of buffalo
- Explain the economic activities of various early Native American groups in Texas such as farming, trading, and hunting;
- Identify different points of view about historical events.
- Express ideas orally and in writing based on research and experiences using appropriate grammar, spelling, and sentence structure

### Materials for Individual Students

- Science journals or blank paper
- Crayons, map pencils, markers, watercolors, or tempera paint

- A Riddle Me This sheet for each group
- Snapshots in Time sheet, cut apart (one copy of each part per group)
- Glue, and 2 piece of large construction paper cut in half long ways so that they can glue them end to end and make a long piece for the timeline.
- Descriptions of Snapshots - one copy (cut apart) for each group to match to each snapshot
- Plastic jars with lids
- Measuring cups
- $\frac{1}{4}$  c of gravel
- $\frac{1}{2}$  c sand

- a few seashells,
- $\frac{1}{4}$  c of soil
- a pitcher of water
- 4 colors of clay for each group
- Pencils or popsicle sticks for each group to carve fossils into the clay layers

### ***Materials for the Class***

- Projector
- Laptop or desktop computer
- Photos of coastal prairie ecosystem
- Historic photographs of your neighborhood if they are available
- <http://www.prehistoricplanet.com/> has some nice Images and simple explanations of how
- Earth's various rock layers are deposited and eroded

### ***Materials for Extension Activity***

- Books from the library and websites on Tribal information including:
- Bullock Museum at: <http://www.thestoryoftexas.com/discover/campfire-stories/native-americans>
- Texas Almanac at: <http://texasalmanac.com/topics/culture/american-indian/american-indian>
- Texas Parks and Wildlife Department at:
- [https://tpwd.texas.gov/publications/pwdpubs/media/pwd\\_bk\\_p4000\\_0016.pdf](https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_p4000_0016.pdf)

## **ENGAGE**

### **Riddle Me This**

Provide a card with the riddle for each small group. Let students work in groups to try to solve the riddle. The master for copying the card is located at the end of the lesson.

We are about to explore an amazing place. See if you can guess where it is.

### ***Riddle Me This***

Where in the world is this place?

It is a place that is sometimes boiling hot and sometimes it is freezing cold.

It has been home to warriors, legendary heroes, and really wild animals.

It is sometimes super wet and sometimes it's on fire.

It is a place where elephants, camels, and longhorns have roamed.

It's a place where food is grown and sea waves have washed the shore.

It has tall buildings and neighborhood parks.

Where is this place?

If students have trouble figuring out the answer to the riddle, give them some other clues:

1. The description in the riddle takes place over millions of years.
2. This place is part of the space age.
3. It's named after a hero of the Texas Revolution.
4. It is the largest city in Texas.

After students guess that the place in the riddle is Houston, tell them that they will receive some drawings that will show some of the things described in the riddle.

# EXPLORE

## Making a Timeline

### Time Considerations

Allow approximately 30 minutes for this activity. Arrangement of 'snapshots' into their proper sequence will take approximately 15 minutes and follow-up discussion will take approximately 15-20 minutes.

### Making a Timeline

Give out snapshot page to each group (cut into individual snapshots). Tell students that they have been given eight 'snapshots' of a neighborhood in Houston showing changes to the landscape over time. Your group's task is to arrange those snapshots into the correct time sequence from most ancient snapshot of the area to newest snapshot of the area. You are making a timeline that shows changes over time to the landscape.

Note: Teacher answer key: The correct order from oldest to newest snapshot is: H, C, B, A, E, G, F, D,

### Ask students to:

1. Use Clues from each snapshot to help guide you in your arrangement.
2. **Look Carefully to Find the People** and identify the humans in the snapshots. How might they have lived in the landscape?  
What helped them to meet their needs and survive?  
Who are these people in each snapshot? What are they doing?
3. Note Water Use - How is water being used in each snapshot?  
What purpose does the water serve? Does the water or the purpose for which it is used change over time?
4. Biodiversity - Track how biodiversity is changing in each of the snapshots.  
What is biodiversity?  
How can you tell if it has changed over time?  
Why is it important that biodiversity changes over time?

Ask each group to work together to put their snapshots in order and glue their pieces in order on the timeline using the large pieces of construction paper cut in half lengthwise and taped or glued end to end to make a long strip. If there is time, students can color their timeline snapshots.

### Vocabulary

Some or all of the following vocabulary words may be used during this section or during the explanatory period.

- Biodiversity - the variety of life in the world or in a particular habitat or ecosystem.
- Coastal prairie - The native tallgrass prairie of coastal Texas and Louisiana
- Crop - a cultivated plant that is grown as food, especially a grain, fruit, or vegetable.
- Extinction - the death or ceasing to exist of all members of a species of organism
- Grain - a small, hard seed, especially the seed of a food plant such as wheat, corn, rye, oats, rice, or millet. Most grains come from grass type plants.
- Hunting blind - A structure which hunters use to hide from animals they are hunting. Often used by duck and deer hunters in Texas.
- Ice Ages - A series of glacial episodes during the Pleistocene period.
- Jurassic Period - A period of the Mesozoic Epoch, occurring from 210 to 140 million years ago and characterized by an abundance of dinosaurs and the advent of birds and mammals.
- Longhorn Cattle - A special wild breed of Texas cattle that originated in south Texas and spread throughout much of Texas during the 1700-1800s. This hardy type of cattle has changed over time through natural selection to become especially well suited to live and survive on the prairies of Texas.
- Oak Motte - A cluster of trees on an open prairie. Mottes were often used by travelers for camping and for directions. A motte is a place in the landscape that has trees that protect the area so that other species can grow there. A mound of soil builds up and seeds can take root protected from washing or blowing away.
- Pleistocene - is the geological epoch which lasted from about 2,588,000 to 11,700 years ago, spanning the world's recent period of repeated glaciations.

- Prairie - a large, mostly flat area of land that has few trees and is covered in grasses.
- Ranch or Rangeland - An open, grassy country used for grazing or hunting animals.
- Silo - A tower or pit on a farm used to store grain
- Succession – the series of changes that create a plant and animal community from colonization of bare rock to the establishment of a forest
- Transformation - A thorough or dramatic change in form or appearance
- Urbanization - The process by which cities grow or by which people move from the countryside to live in the city.
- Windbreak - A row of trees or a fence, wall, or screen, that provides shelter or protection from the wind In an open area

## EXPLAIN

### Changes in the Environment

Once students have arranged all eight snapshots in order in which they should appear from oldest to newest picture, the teacher should review the correct order.

Teacher Key for snapshot order: H, C, B, A, E, G, F, D.

When all groups have finished their timelines, assign 1 or 2 of the snapshots to each group to present their reasoning for the position they put the snapshot in.

### Sharing Ideas

1. Where did their snapshot fit on the timeline?
2. What were the physical characteristics of the environment?
3. How does the environment support the plants, animals and people pictured?
4. What food chains can you find?
5. Which clues did you use to make inferences and decide where each snapshot fit on the timeline?
6. What people, if any, were present in the 'snapshot'? What were they doing?
7. What changes if any occurred to the water between their snapshot and the previous one?
8. What changes occurred to the biodiversity of the area between the current snapshot and the previous snapshot?

### Discuss other ideas as a class

1. What environmental changes occurred from the first snapshot (H) to the second snapshot (C)?
2. What changes occurred in the environment from (C) to (B)?
3. How did the changes affect the animals and plants in each snapshot?
4. What adaptations help the animals in the first snapshot (H) survive? Snapshot (C), and snapshot (B)?
5. How did human caused changes affect the environments in (A), (E), (G), (F) and (D)?
6. What natural resources support life in every snapshot and what do they provide? (soil, water, air, plants, and animals supply oxygen for animals and carbon dioxide for plants, as well as food, clothing, shelter, and water)
7. What is the difference between weather and climate change? What climate change(s) are seen in the snapshots? How do the changing landscapes show climate change?
8. What are some slow changes that affect the landscapes in the snapshots? (Seas receding, glacial melting, extinction, succession)
9. What renewable resources are seen from the beginning to the end of our changes? (air, water, soil, plants)

### Matching Descriptions to Snapshots

Cut apart and give out the pages with descriptions of the different stages of changes to the landscape (separate sheet on webpage). Ask each group to match the snapshots to the descriptions. Or you may wish to make this a class project and have each group match one or two descriptions to their timeline. Alternately, simply ask students to order each snapshot from oldest to newest in age and then have them learn about each snapshot using the descriptions below.

**Jurassic Seas Period (H)** - Houston never had dinosaurs. This is because Houston was a shallow sea during the time of the dinosaurs. This shallow sea often dried up, leaving salt layers behind called Luann Salts. Over time these salts would become massive salt domes that would be squeezed up from below and would form mushroom shaped structures near the surface in and around Houston. These salt domes are where oil deposits would accumulate - giving rise to the Houston area oil industry.

**Ice Age Period (C)** - An ancient grassland once covered most of the Houston region during the Ice Age (also known as the

Pleistocene Period). This Ice Age grassland was truly a wild place with wild elephants, like the Columbian Mammoth pictured in this snapshot, camels, which evolved in North America, saber-toothed cats, giant tortoises, now-extinct horses, and even American lions and cheetahs. This was such a wild place it is sometimes referred to as the American Serengeti!

Curiously, local pollen records and fossil digs confirm that many of the prairie's current grass and wildflowers species were a part of this ancient landscape. Also, many of the creatures that are familiar to us today such as raccoons, coyotes, bobcats, cougars, and leopard frogs are also Ice Age survivors. It is now believed that human Ice Age hunters helped push the largest Ice Age mammals to extinction.

**Wild Prairie Period (B)** - The coastal prairie was once a highly diverse grassland featuring bison, red wolves, pronghorn antelope, whooping cranes, and many other animals. It was also home to over 1000 species of plants and covered 6.5 million acres in Texas and 2.5 million acres in southwestern Louisiana (where it was known as Cajun Prairie). These prairies were often not completely flat, but rather had small, sandy hills called pimple mounds (or mima mounds) and freshwater depressions called prairie potholes.

The prairie developed over the last 6,000 - 7,000 years. This is the landscape that greeted the earliest European/American explorers. The prairie's highly fertile soil and lush grasses, which could be fed to cattle, attracted settlers from the southern United States and from Europe.

This snapshot features a Native American hunters decorated with bird feathers. The Greater Houston region was home to a number of indigenous peoples. These bands and tribes went by various names including the Karankawa, Bidai, Coco, Han, and Atakapa. Houston area Native Americans often hunted prairies in the summer and fished Galveston Bay in the winter.

**Longhorns Period (A)** - Before large settlements of Americans/Europeans on the upper Texas coast, feral cattle began invading the prairies. Feral animals are those that were once domesticated, but have escaped and are now running wild. These feral cattle escaped from Spanish settlers further south and other settlers along the Sabine River of East Texas.

Over time through natural selection the wild Spanish cattle developed adaptations to increase their survival in this ecosystem. They grew longer legs, became more tick and heat-resistant, and grew enormous horns to protect their young against the cougars, bears, wolves, and jaguars that once lived throughout the eastern half of Texas.

We would come to call these cattle longhorns. Longhorns eventually made their way to the Houston region - competing with buffalo for food and space, perhaps bringing diseases to the buffaloes, and grazing the prairie in large numbers.

It is very likely that longhorns, and wild horses called mustangs, began to influence and change our local prairies even before permanent American and European settlers got here. One reason for these changes is that buffalo tend to graze as they are moving to migrate to other areas. Cattle and horses tend to graze while staying in one area, and they may graze the preferred plants down to the bare ground, overgrazing the area so that the plants can't regrow, or they may trample the plants down into the ground in the area where they stay.

**Ranching Period (E)** - Early settlers often used the prairie for cattle grazing and small-scale farming. Ranching on upper Texas prairies began on Bolivar Peninsula in 1819. Ranchers preferred the highly nutritious grasses along the coast. This grass is called Saltgrass and has given rise to the trail riding group called the Saltgrass Riders and the popular steak restaurant Saltgrass Steakhouse.

Eventually so many cattle were raised in the Greater Houston area that the region was overgrazed by the late 1800s. (Overgrazing means that all the grass has been eaten down to the ground and there is no crown to provide the opportunity for the grass to regrow.) This heavily affected the biodiversity and water-holding capacity of local prairies. This is the time period that featured the introduction of tough grasses from around the world. Because these plants are not natives, we call them exotic species. These exotic grasses continue to make prairie restoration difficult for ecologists because they are so well adapted now to our region.

**Rice Farming Period (G)** - The prairie's rich soils were also well suited for growing a number of highly profitable crops including rice, cotton, soybeans, sugarcane, and various fruits. Farming transformed the prairie greatly. Plowing the thick prairie sod

changed water flow on the prairie, opened the soil up to invasive species, and heavily reduced biodiversity.

Furthermore, the pimple mounds and potholes, which greatly add to the richness of the prairie, were leveled.

Farms today, retain some wildlife benefit and habitat. Prairie remnants on farm edges still provide habitat to prairie animals and wasted grain (like rice) feeds geese and other animals.

During both the ranching and farming periods people needed to protect their homes and crops from winds. To provide protection, they planted trees as windbreaks.

**Early Suburbanization (F)** - As urban areas pushed into traditional farming areas, land prices and property taxes skyrocketed. Many farmers had a difficult time paying taxes and had to sell their farms for land development (building homes, roads, stores and other businesses, etc.).

At this stage many trees were planted changing the openness of the prairie and helping to shade out any remaining patches of prairie grasses and wildflowers. When plants are shaded-out, it means that the amount of sunlight available for photosynthesis is limited and only shade tolerant plants can grow and survive.

**Later Urbanization (D)** - This period is often characterized by three processes, which fully eliminate any remaining prairie.

1. Land restrictions often mandate regular mowing of grasses, which finally exhausts any remaining prairie patches.
2. Shading by a heavy tree canopy, can shade out prairie plants even on development edges. People living in the housing developments lose any understanding that this landscape was ever a prairie, instead, they assume that it was a forest due to the mature trees that have grown over past decades.
3. While many people still live outside the main downtown area, during this time many tall buildings, roads, parking lots, and other concrete structures begin to develop in the central urban area limiting light and water available for plant growth.

#### **Extension: Researching Native American Tribes in Texas**

For students who are interested in Native American culture or to extend learning for G/T students, assign each student a tribe to research using books from the library and the following websites.

- The Bullock History Museum at: <http://www.thestoryoftexas.com/discover/campfire-stories/native-americans>
- Texas Parks and Wildlife Department website at: [https://tpwd.texas.gov/publications/pwdpubs/media/pwd\\_bk\\_p4000\\_0016.pdf](https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_p4000_0016.pdf) Texas Almanac website at: <http://texasalmanac.com/topics/culture/american-indian/american-indian>

Students may work individually, in pairs, or in small groups depending on the number of students involved. Students should research the following questions and write and illustrate a short story, poem, or song about how a particular tribe lived and survived in Texas answering the following questions:

- Where did the Native American groups originate?
- What was the life of Native American groups like before European exploration?
- How did their lives change after Europeans came to this country?
- Where did the tribe live? What were their economic activities?
- How did they get their food?
- How did they dress?
- Did they have a special type of housing?
- Are there artifacts that might have been found to give us information about the tribe?
- How did their lives change after the loss of the buffalo?
- Does the tribe still exist and if so, where does the tribe live today?
- What kinds of challenges faced Native American groups in the past? Today?
- How do you think Native Americans felt about the coming of Europeans? How did the Europeans feel about the Native Americans? How do these ideas reflect the point of view of each group?

**Assign one of the following tribes to each person:**



- Lipan and Mescalera Apache
- Karankawa
- Caddo
- Kikapoo
- Alabama-Cushada
- Tiguas at Yslete Del Sur Pueblo
- Comanches
- Tonkawa
- Coahuitecan
- Atapaka

## Elaborate

### Time Capsules Buried in the Earth

Students may ask how we know the snapshot order to be accurate.

#### Making a Model of Sediment Formation

Make sediment jars in each group. Give out sand, aquarium gravel or other small gravel, small shells, and soil. Provide each group with a pitcher of water and a plastic jar with a lid. Ask each group to put all of their substances into their jar, adding water last. Then put the lid on and shake up the bottle. Watch as the various substances settle out. Which materials are deposited first, which things are deposited next, which are deposited last? Those that went down first are the oldest layers, and those that went down last are the newest layers.

This is how sedimentary rock forms. Sedimentary rock is the rock that contains fossils. The sand and soil, shells, dead organisms and other sediment are deposited on the bottom of a sea, or lake with the oldest layers containing the things that settle down to the bottom first. Then other layers fall on top of that covering it up. Another layer forms on top of that, and so on through time up to the present day.

Scientists who study the Earth have learned that the rock layers are laid down from oldest to newest in the same way as layers were deposited in your jar. That is one way they can tell the sequence of changes in an environment. The layers on the bottom then, contain the oldest fossils. These animals and plants lived much longer ago than the layer on top of the ground that we walk on. Look at the illustrations on a website such as: <http://www.prehistoricplanet.com/> scroll down and click on Rock Layers: Timeline of Life on Earth. Scroll down the Rock Layers page and look at the image showing the Law of Original Horizontality and the Law of Superposition. Scroll a little farther down to the Three Layer Cake and see a geological cross section that shows fossils embedded and illustrating the Paleozoic, Mesozoic, and Cenozoic eras.

#### Making a Geological Model

So how could we use our timeline to help us make a geological model of the changes in the environment where we live?

Provide 4 colors of clay to each group.

Ask each group to use clay to make the layers of the geologic profile as described in their timeline.

Instructions to Students: Using your timeline and the 4 colors of clay provided to your group, make a clay model of the geologic history of the time periods from your timeline, alternating colors of clay so that changes are obvious. (Each color of clay will make 2 geologic periods. Don't put the same color layers next to each other.) Use a pencil or Popsicle stick to carve in artifacts appropriate to each level in your geological structure. Remember that layers at the top are still being built and may have artifacts in the soil at the top of the geologic structure.

(Note: If you have small seashells or appropriate plastic animals you could use those to embed footprints or imprints in the clay to indicate the appropriate fossils.)

Students will look at their timelines to see how the layers would have formed. Allow students to work and discover that the oldest landscape would be on the bottom so the Jurassic fossils would be deposited first and show up on the bottom layer of the geological formation.



The Pleistocene animals such as saber toothed tigers, camels, and mammoths would come next.  
 The buffalo and arrowheads and other Native American artifacts would be next.  
 The longhorns would follow after the buffalo.  
 The artifacts from the ranching period, such as bottles or tools, would probably be near to or on the surface.  
 The farm artifacts, such as old plows or tractors would be on top of the soil.  
 Older homes may still be standing, along with businesses, and roads.  
 Newer homes, businesses, and roads that we use every day would be built in the places where the ranches or farms had been.

#### Discussion of our Models

1. How did our models help us understand how sedimentary rock forms and how rocks are ordered?
2. How did our models help us understand how to know which rocks are oldest?
3. How did our models help us understand how landscapes change over time and support different plants and animals as they change?
4. What are the limitations of our model?
5. How are our models different from the real thing?

## Evaluate

### Future Landscape

Assign students the task of creating a ninth snapshot for the future of the landscape in their areas. Provide students with the Grading Rubric. Supply large pieces of paper and give students choices of media such as colored pencils, markers, crayons, watercolors, tempera paint, or colored chalk. Write the answers to the questions on a separate sheet.

Students should be asked to consider the following:

In the future your town, area, or neighborhood will look different from the way it looks now. Draw a picture that illustrates the answer the following questions to show what the area will look like and how humans will interact with the environment. Answer the questions in words on a separate sheet of paper.

1. What activities will the people do while living in your town, area, or neighborhood?
2. What type(s) of natural areas will still exist?
3. How will people enjoy nature?
4. What types of water resources will exist?
5. What type(s) of transportation will exist?
6. What kind of work will people do to make a living?
7. What will the buildings, roads, and businesses look like?

Put up an art display of the future landscapes done by your class.

#### Grading Rubric:

Requirement	Up to 25 points each	Up to 23 points each	Up to 20 points each
1. Questions are addressed in the drawing and in words	At least 5 questions are addressed in both drawing and words	At least 4 questions are addressed in drawings and words	3 or fewer questions are addressed in either drawing and/or words
2. Natural areas are included	Natural areas are distinctive	Natural areas are addressed somewhat	Natural areas are not addressed
3. Manmade structures are included	Several manmade structures are included	Few manmade structures are included	At least one manmade structure is included
4. Humans at work and play are included	Both humans at work and at play are included	Humans are included either at work or at play	Humans may be included but it is not clear what they are doing

## *Student Cards*

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Riddle Me This

Where am I?

It is a place that is sometimes boiling hot and sometimes it is freezing cold.

It has been home to warriors, legendary heroes, and really wild animals.

It is sometimes super wet and sometimes it's on fire.

It is a place where elephants, camels, and longhorns have roamed.

It's a place where food is grown and sea waves have washed the shore.

It has tall buildings and neighborhood parks.

Where is this place?

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Student Pages

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## *Student Pages*

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We would come to call these cattle longhorns. Longhorns eventually made their way to the Houston region - competing with buffalo for food and space, perhaps bringing diseases to the buffaloes, and grazing the prairie in large numbers.

It is very likely that longhorns, and wild horses called mustangs, began to influence and change our local prairies even before permanent American and European settlers got here. One reason for these changes is that buffalo tend to graze as they are moving to migrate to other areas. Cattle and horses tend to graze while staying in one area, and they may graze the preferred plants down to the bare ground, overgrazing the area so that the plants can't regrow, or they may trample the plants down into the ground in the area where they stay.

**Jurassic Seas Period (H)** - Houston never had dinosaurs. This is because Houston was a shallow sea during the time of the dinosaurs. This shallow sea often dried up, leaving salt layers behind called Luann Salts. Over time these salts would become massive salt domes that would be squeezed up from below and would form mushroom shaped structures near the surface in and around Houston. These salt domes are where oil deposits would accumulate - giving rise to the Houston area oil industry.

**Ranching Period (E)** - Early settlers often used the prairie for cattle grazing and small-scale farming. Ranching on upper Texas prairies began on Bolivar Peninsula in 1819. Ranchers preferred the highly nutritious grasses along the coast. This grass is called Saltgrass and has given rise to the trail riding group called the Saltgrass Riders and the popular steak restaurant Saltgrass Steakhouse.

Eventually so many cattle were raised in the Greater Houston area that the region was overgrazed by the late 1800s.

(Overgrazing means that all the grass has been eaten down to the ground and there is no crown to provide the opportunity for the grass to regrow.) This heavily affected the biodiversity and water-holding capacity of local prairies. This is the time period that featured the introduction of tough grasses from around the world. Because these plants are not natives, we call them exotic species. These exotic grasses continue to make prairie restoration difficult for ecologists because they are so well adapted now to our region.

**Rice Farming Period (G)** - The prairie's rich soils were also well suited for growing a number of highly profitable crops including rice, cotton, soybeans, sugarcane, and various fruits. Farming transformed the prairie greatly. Plowing the thick prairie sod changed water flow on the prairie, opened the soil up to invasive species, and heavily reduced biodiversity.

Furthermore, the pimple mounds and potholes, which greatly add to the richness of the prairie, were leveled.

Farms today, retain some wildlife benefit and habitat. Prairie remnants on farm edges still provide habitat to prairie animals and wasted grain (like rice) feeds geese and other animals.

During both the ranching and farming periods people needed to protect their homes and crops from winds. To provide protection, they planted trees as windbreaks.

**Early Suburbanization (F)** - As urban areas pushed into traditional farming areas, land prices and property taxes skyrocketed. Many farmers had a difficult time paying taxes and had to sell their farms for land development (building homes, roads, stores and other businesses, etc.).

At this stage many trees were planted changing the openness of the prairie and helping to shade out any remaining patches of prairie grasses and wildflowers. When plants are shaded-out, it means that the amount of sunlight available for photosynthesis is limited and only shade tolerant plants can grow and survive.

**Later Urbanization (D)** - This period is often characterized by three processes, which fully eliminate any remaining prairie.

1. Land restrictions often mandate regular mowing of grasses, which finally exhausts any remaining prairie patches.
2. Shading by a heavy tree canopy, can shade out prairie plants even on development edges. People living in the housing developments lose any understanding that this landscape was ever a prairie, instead, they assume that it was a forest due to the mature trees that have grown over past decades.
3. While many people still live outside the main downtown area, during this time many tall buildings, roads, parking lots, and other concrete structures begin to develop in the central urban area limiting light and water available for plant growth.

# Texas Essential Knowledge and Skills

## Grade 3 Science

3.3 The student knows that information, critical thinking, scientific problem solving and the contributions of scientists are used in making decisions.

The student is expected to:

3.3 (C) represent the natural world using models such as volcanoes, or Sun, Earth, and Moon systems and identify their limitations including size, properties, and materials;

3.7 Earth and space. The student knows that Earth consists of natural resources and its surface is constantly changing.

The student is expected to:

3.7 (D) explore the characteristics of natural resources that make them useful in products and materials such as clothing and furniture and how resources may be conserved.

3.9 Organisms and environments. The student knows that organisms have characteristics that help them survive and can describe patterns, cycles, systems, and relationships within the environments.

3.9 (A) observe and describe the physical characteristics of environments and how they support populations and communities within an ecosystem;

3.9 (B) identify and describe the flow of energy in a food chain and predict how changes in a food chain affect the ecosystem such as removal of frogs from a pond or bees from a field; and

3.9 (C) describe environmental changes such as floods and droughts where some organisms thrive and others perish or move to new locations.

3.9.A Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments.

The student is expected to:

3.10 (A) explore how structures and functions of plants and animals allow them to survive in a particular environment;

## Grade 3 Social Studies

3.3 History. The student understands the concepts of time and chronology.

The student is expected to:

3.3 (A) use vocabulary related to chronology, including past, present, and future times;

3.3 (B) create and interpret timelines;

3.4 Geography. The student understands how humans adapt to variations in the physical environment.

The student is expected to:

3.4 (A) describe and explain variations in the physical environment, including climate, landforms, natural resources, and natural hazards;

3.4 (D) describe the effects of human processes such as building new homes, conservation, and pollution is shaping the landscape;

3.17 Social Studies Skills. The student applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.

The student is expected to:

3.17 (A) research information, including historical and current events, and geographic data, about the community and world, using a variety of valid print, oral, visual, and Internet resources;

3.17 (C) interpret oral, visual, and print material by identifying the main idea, distinguishing between fact and opinion, identifying cause and effect, and comparing and contrasting;

3.17 (E) interpret and create visuals, including graphs, charts, tables, timelines, illustrations, and maps;

3.18 Social studies skills. The student communicates in written, oral, and visual forms.

The student is expected to:

3.18 (A) express ideas orally based on knowledge and experiences;

3.18 (B) use technology to create written and visual materials such as stories, poems, pictures, maps, and graphic organizers to express ideas; and

3.18 (C) use standard grammar, spelling, sentence structure, and punctuation.

#### **Grade 4 Science**

4.3 The student uses critical thinking and scientific problems solving to make informed decisions.

The student is expected to:

4.3 (C) represent the natural world using models such as rivers, stream tables, or fossils and identify their limitations, including accuracy and size.

4.7 Earth and space. The student knows that Earth consists of useful resources and its surface is constantly changing.

The student is expected to:

4.7 (B) observe and identify slow changes to Earth's surface caused by weathering, erosions, and deposition from water, wind, and ice;

4.7 (C) identify and classify Earth's renewable resources including air, plants, water, and animals; and nonrenewable resources including coal, oil, and natural gas, and the importance of conservation.

4.9 Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment.

The student is expected to:

4.9 (B) describe the flow of energy through food webs, beginning with the Sun, and predict how changes in the ecosystem affect the food web such as a fire in a forest.

4.10 Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment.

The student is expected to:

4.10 (A) explore how adaptations enable organisms to survive in their environment such as comparing bird beaks and leaves on plants;

#### **Grade 4 Social Studies**

4.1 History. The student understands the origins, similarities and differences of American Indian groups Texas and North America before European exploration.

The student is expected to:

4.1 (A) explain the possible origins of American Indian groups in Texas and North America;

4.1 (B) identify American Indian groups in Texas and North America before European explorations such as the Lipan Apache, Karankawa, Caddo, and Jumano;

4.1 (C) describe the regions in which American Indians lived and identify American Indian groups remaining in Texas such as the Ysleta Del Sur Pueblo, Alabama-Coushatta, and Kickapoo;

4.1 (D) compare the way of life of American Indian groups in Texas and North America before European exploration.

4.3 History. The student understands the importance of the Texas Revolution, the Republic of Texas, and the annexation of Texas to the United States.

The student is expected to:

4.3 (C) identify leaders important to the founding of Texas as a republic and state, including Jose Antonio Navarro, Sam Houston, Mirabeau Lamar, and Anson Jones;

4.4 History. The student understands the political, economic, and social changes in Texas during the last half of the 19th

century.

4.4 (D) examine the effects upon American Indian life resulting from changes in Texas, including the Red River War, building of U.S. forts and railroads, and loss of buffalo.

4.5 History. The student understands important issues, events, and individuals of the 20th century in Texas.

The student is expected to:

4.5 (A) identify the impact of various issues and events on life in Texas such as urbanization, increased use of oil and gas, the Great Depression, the Dust Bowl, and World War II;

4.8 Geography. The student understands the location and patterns of settlement and the geographic factors that influence where people live.

The student is expected to:

4.8 (C) explain the geographic factors such as landforms and climate that influence patterns of settlement and the distribution of population in Texas, past and present.

4.9. Geography. The student understands how people adapt to and modify their environment.

The student is expected to:

4.9 (A) describe ways people have adapted to and modified their environment in Texas, past and present, such as timber clearing, agricultural production, wetland drainage, energy production, and construction of dams.

4.9 (B) identify reasons why people have adapted to and modified their environment in Texas, past and present, such as the use of natural resources to meet basic needs, facilitate transportation, and enhance recreational activities;

4.9 (C) compare the positive and negative consequences of human modification of the environment in Texas, past and present, both governmental and private, such as economic development, and the impact on habitats and wildlife as well as air and water quality.

4.10 Economics. The student understands the basic economic activities of early societies in Texas and North America.

The student is expected to:

4.10 (A) explain the economic activities various early American Indian groups in Texas and North America used to meet their needs and wants such as farming, trading, and hunting;

4.21 Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.

The student is expected to:

4.21 (B) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions;

4.21 (C) organize and interpret information in outlines, reports, databases, and visuals, including graphs, charts, timelines, and maps;

4.21 (D) identify different points of view about an issue, topic, historical event, or current event;

4.22 Social studies skills. The student communicates in written, oral, and visual forms.

The student is expected to:

4.22 (A) use social studies terminology correctly;

4.22 (B) incorporate main and supporting ideas in verbal and written communication;

4.22 (C) express ideas orally based on research and experiences;

4.22 (D) create written and visual material such as journal entries, reports, graphic organizers, outlines, and bibliographies; and

4.22 (E) use standard grammar, spelling, sentence structure, and punctuation.

## **Grade 5 Science**

5.3 The student uses critical thinking and scientific problem solving to make informed decisions.

The student is expected to:

5.3 (C) draw or develop a model that represents how something works or looks that cannot be seen such as how a soda dispensing machine works;



5.7 Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources.

The student is expected to:

5.7 (A) explore the processes that led to the formation of sedimentary rocks and fossil fuels;

5.7 (D) identify fossils as evidence of past living organisms and the nature of the environments at the time using models.

5.9 Organisms and environments. The student knows that there are relationships, systems, and cycles within environments.

The student is expected to:

5.9 (A) observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements;

5.9 (B) describe the flow of energy derived from the Sun, used by producers to create their own food, is transferred through a food chain and food web to consumers and decomposers;

5.9 (C) predict the changes in ecosystems caused by living organisms, including humans, such as the overpopulation of grazers or the building of highways;

5.10 Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them live and survive such as hooves on prairie animals or webbed feet in aquatic animals;

The student is expected to:

5.10 (A) compare the structures and functions of different species that help them live and survive such as hooves on prairie animals or webbed feet on aquatic animals;

## **Grade 5 Social Studies**

5.4 History. The student understands political, economic, and social changes that occurred in the United States during the 19th century.

The student is expected to:

5.4 (G) identify the challenges, opportunities, and contributions of people from various American Indian and immigrant groups.

5.8 Geography. The student understands the location and patterns of settlement and the geographic factors that influence where people live.

The student is expected to:

(5.8 (B) explain the geographic factors that influence patterns of settlement and the distribution of population in the United States, past and present;

5.9 Geography. The student understands how people adapt to and modify their environment.

The student is expected to:

5.9 (A) describe how and why people have adapted to and modified their environment in the United States, past and present, such as the use of human resources to meet basic need; and

5.9 (B) analyze the positive and negative consequences of human modification of the environment in the United States, past and present.

5.13 Economics. The student understands patterns of work and economic activities in the United States.

The student is expected to:

5.13 (B) identify and explain how geographic factors have influenced the location of economic activities in the United States.

5.22 Culture. The student understands the contributions of people of various racial, ethnic, and religious groups to the United States.

5.22 (B) describe customs and traditions of various racial, ethnic, and religious groups in the United States.

5.24 Social studies skills. The student applies critical thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.

The student is expected to:

5.24 (B) analyze information by sequencing, categorizing, identifying cause and effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.

5.24 (C) organize and interpret information in outlines, reports, databases, and visuals, including graphs, charts, timelines, and

maps;

5.24 (D) identify different points of view about an issue, topic, or current event;

5.25 Social studies skills. The student communicates in written, oral, and visual forms.

The student is expected to:

5.25 (A) uses social studies terminology correctly;

5.25 (B) incorporate main and supporting ideas in verbal and written communication;

5.25 (C) express ideas orally based on research and experiences;

5.25 (D) create written and visual materials such as journal entries, reports, graphic organizers, outlines, and bibliographies;

5.25 (E) use standard grammar, spelling, sentence structure, and punctuation.

## **North American Association for Environmental Education Standards**

Kindergarten through Fourth Grade

### **Strand 1: Questioning, Analysis and Interpretation Skills**

4.1.1 (D) Evaluating accuracy and reliability – Learners understand the need to use reliable information to answer their question. They are familiar with some basic factors to consider in judging the merits of information.

4.1.1 (E) Organizing information – Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics.

4.1.1 (F) Working with models and simulations – Learners understand that relationships, patterns and processes can be represented by models.

4.1.1 (G) Drawing conclusions and developing explanations – Learners can develop simple explanations that address their questions about the environment.

### **Strand 2: Knowledge of Environmental Process and Systems**

Strand 2.1 – The Earth as a Physical System

4.2.1 (A) Process that shape the Earth – Learners are able to identify changes and differences in the physical environment.

Strand 2.2 – The Living Environment

4.2.2 (A) Organisms, populations, and communities – Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat.

4.2.2 (C) Systems and connections – Learners understand basic ways in which organisms are related to their environments and to other organisms.

4.2.2 (D) Flow of matter and energy – Learners know that living things need some source of energy to live and grow.

Strand 2.3 – Humans and Their Societies

4.2.3 (B) Culture – Learners understand that experiences and places may be interpreted differently by people with different cultural backgrounds at different times, or with other frames of reference.

4.2.3 (E) Change and conflict – Learners recognize that change is a normal part of individual and societal life. They understand that conflict is rooted in different points of view.

Strand 2.4 – Environment and Society

4.2.4 (A) Human/environment interactions – Learners understand that people depend on change and are affected by the environment

4.2.4 (B) Places – Learners understand that places differ in their physical and human characteristics.

4.2.4 (C) Resources – Learners understand the basic concepts of resource and resource distribution.

4.2.4 (E) Environmental issues – Learners are familiar with some local environmental issues and understand that people in other places experience environmental issues as well.

