



Water Rocks Study Guide



Cameron Park Zoo Tour

The Brazos River System

At the Cameron Zoo in Waco we are going to study one particular ecosystem of Texas – the Brazos River System. The Brazos River is over 900 miles long and connects Lubbock to the Gulf of Mexico; it is both a plains and a coastal river. The Brazos Watershed encompasses more than 40,000 square miles – more area than any other Texas river.

The Brazos River Ecological System is important because on its journey to the Gulf of Mexico, the river is a tremendous source of water for power, irrigation and recreation. In addition, several major reservoirs tap drinking water from the Brazos and its tributaries. **The Brazos River passes through five ecological areas of Texas on its trip from Lubbock to the Gulf.** They are: **Gulf Coast, Piney Woods, Blackland Prairie/Post Oak Savannah, Prairie and Cross Timbers, and Edwards Plateau.**



Addition Information Before Zoo Tour

Bald Eagle

- Became the national emblem in 1782
- It takes about five years for their head and tail feathers to turn white

Galapagos Tortoise: Gilligan, Skipper and the Professor

- Can weigh 500+ pounds
- World's largest tortoise
- Don't reach full size until they are 40 years old
- They can live 100 years
- Can survive up to a year without eating and drinking

Capybara

- Largest rodent in the world
- Females are larger than males and can sometimes weigh over 100 pounds
- Excellent swimmers and can remain underwater as long as 5 minutes

*This information is not part of the tour, but you can incorporate it into your tour. You will pass these animals on the way to the Brazos exhibit.

GULF COAST REGION

- TANK - 50,000 gallon saltwater tank
- FISH - found off the Gulf of Mexico - GULF COAST

PUFFER FISH:

- Actually poisonous if not cooked correctly
- Marine water fish
- Coral reefs, open sand and grassy flats
- Four-toothed, beak-like structures divided into 4 “teeth”
- Fused teeth for crushing and grinding hard food
- Scales have been modified into spines
- Eat algae, inverts, sponges, urchins, and coral
- To “Puff Up”- they take large amounts of water into their stomachs. Only do this when under extreme stress or threatened and as a “last resort” (7-12 times in their lives) – the “puffing” has dramatic effects on blood circulation and digestion.

GULF ISLANDS AND SALT MARSH - Shore Birds Aviary:

- Enclosure is 20,000 Square Feet
- The birds have been “saved” - so as you look through this exhibit, you may notice a pelican with one wing, or a heron that can’t fly too well. They obviously could not catch their own food in the wild. As conservators of nature, we are doing our part to make sure that they still have rich, fulfilling lives.

BROWN PELICAN:

- Diving birds
- Eat mostly fish
- Marine and Freshwater
- 8-10 pounds
- 18 inch bill
- 7 foot wingspan
- Strictly coastal
- Buoyant because of air sacs in skin and bones
- Graceful in the air, but clumsy on land
- Plunge 20-60 feet in the air to catch fish
- 25-30 year lifespan
- lay 2-3 eggs
- Incubates eggs for 28-30 days

AMERICAN ALLIGATOR:

- Omnivores
- Males average length is 13 feet; Females 10 Feet
- 74-80 teeth
- 35-50 Years old in wild; 60-80 years in captivity
- Mostly fresh water
- Lay 20-50 eggs; 65-day incubation; body temperature determines sex
- Remain close to mom for up to 2 years
- Largest reptile in North America

BEAVER and BEAVER LODGE:

- large semi-aquatic rodent with webbed hind feet and a broad flat tail famous for constructing complex dams and underwater lodges
- excellent swimmers and divers
- extremely sharp teeth enabling them to cut trees and plants to build their dams
- excellent sense of smell, hearing and touch but very poor eyesight
- herbivores eating mainly tree bark, grass and ferns
- their fur is oily making it waterproof
- second largest rodent in the world and largest rodent in North America
- A beaver colony contains only one adult pair of beavers who mate for life

East Texas Piney Woods

Mountain Lion / Cougar: PASO & ROBLES

- Also known as Puma, Cougar, and Panther
- Can jump 30 feet forward and 18 feet straight up
- Eat deer as their primary food- antelope, elk, and bighorn sheep if no deer.
- Bury the carcass after first meal and return to feed until everything is gone or meat goes bad.
- 100-200 pounds
- Lifespan 15-25 years
- Solitary animals
- Cannot roar
- 2-4 kittens in litter; gestation 90-96 days (3-3 1/3 months)
- Stay with mom 1-2 years

Black Bear - BALOU & DONNA:

- Found only in North America
- Fur usually black or brown, sometimes blonde
- Females 90-300 pounds; males 125-500 pounds
- Bears can see in color and are near-sighted
- Omnivores - But prefer acorns, fruit, and insects
- Do not growl, but grunt
- Cubs stay with mom for 1- 1½ years before mom forces them away
- Man only predator. Few bears die of disease – either man or accidents cause their deaths
- Smallest bears in North America
- Great hearing, smelling
- Large brains, great long-term memory
- Lifespan 21-33 years
- 2-3 cubs per litter, ½ -1 pound at birth
- Good Swimmers
- Can run 30 MPH
- Do not hibernate in Texas since the winters are warmer

River Otter: JACK AND DORIS

- Exist on every continent but Australia, all of U.S. - except Hawaii
- Part of the weasel Family
- Dens underground or in a hollow tree near water supply
- Mark territory from glands near their tail
- Slick and waterproof fur coat with layer of fat to keep warm
- Carnivores - fish, snakes, snails, worms, small mammals, birds, frogs, eggs
- Lifespan- 10 years in the wild; 18-29 in captivity
- Male otters (dogs) 24 pounds; females 16 pounds
- 1-5 babies; gestation 2 months and babies are taught to swim at 2-3 months old
- Webbed feet help them swim
- Can dive up to 60 feet underwater
- Claws help them catch fish and climb- run 18 MPH
- Hold breath 8 minutes
- Intelligent, curious and social
- Nocturnal and nomadic
- Great memory and motor skills

BLACK LANDS

Fresh Water Aquarium area:

Soft-shelled Turtle:

- Freshwater species
- Eat insects, crayfish, and occasionally a fish.
- Males 5-9 inches long; females 9-19 inches long
- 50 year lifespan
- adults are killed and eaten only by humans
- lays 9-35 eggs
- Diurnal (active during the day rather than at night)
- Soft, flat rounded “shell” without scutes (bony plate or scale)

Desert Massassauga Rattlesnake:

- Habitat in Western Central Texas and extreme Southern TX Near streams, riverbeds, ponds and lakes

Alligator Snapping Turtle:

- Largest freshwater turtle and live in Deep water rivers (nest in sand) weigh 35-200 pounds, measure 15-30” long, and lay 8-52 eggs

HUECO INDIANS:

- **Waco** is named for the **Hueco** Indians, who were the first to live in this area and were indigenous. (historical ties to groups that existed in a territory prior to colonization or formation of a nation)
- Branch of the Wichitas and were closely related to the Tawakonis.
- The tribe lived in beehive shaped huts, 20-25 feet high made of poles, buffalo hides and rushes.
- The Huecos had approximately 400 acres of land under cultivation and planted corn, beans, pumpkins, melons, and peach trees.
- ****ASK - By looking at these types of lodging, do you think they traveled much?**
 - NO – they were different from the more nomadic Native Americans who built “tee pees” and traveled often to follow the herds of buffalo/bison

BUTTERFLY GARDEN

Observe the Butterfly Garden.

Share:

- The Texas State Insect is the Monarch Butterfly.
- They migrate south for the winter.
- Monarchs return to Texas each spring to lay their eggs on freshly sprouted milkweed.
- Monarchs cannot fly if their body temperature is less than 86 degrees.

When developers build over wetlands, prairies, etc. this can cause a chain reaction – like our “web of life” activity. Because Texas has fewer milkweeds in the wild, we have seen the migration of the monarchs decrease in numbers.

Ecosystems

Can you find two words in the bigger word, "ECOSYSTEM"? "Eco" means life forms and the environment in which they live. A "system" is a group of things that work together. An **ecosystem** is a group of things that work and live together in an environment. An example of an ecosystem is a rainforest, a pond, a city or even our Earth! They can be as small as a puddle or a handful of soil. Plants and animals live in ecosystems along with things that are too small to see. Everywhere you look, you can find an ecosystem.

The **composition** of an ecosystem describes everything that is part of an ecosystem. This includes both, living and non-living things, in other words, **biotic** things (living or once were alive) and **abiotic** things (non-living things).

When an ecosystem changes over a long period of time, it is called **succession**. The populations in an ecosystem change during succession. An ecosystem might change because of humans. When we develop land for houses, we cut down trees. We change the environment for all plants and animals. Some animals can adapt to the change; others cannot. Their population is then affected.

Prairies and Cross Timbers

Jaguar: NACON & TAKARI

- Jaguar confused with leopard because of its spots - Jag has small dots within the larger rosette markings, leopard does not
- Largest cats in North and South America
- 140-220 pounds, females slightly smaller
- Carnivores - Eats wild pigs, capybara, deer sloth, caiman, tapir, fish, small animals, occasionally domestic livestock
- Lifespan in the wild 12-16 years
- 1-4 cubs, stay with mom 2 years
- Swim and climb well
- Do not roar
- Solitary animals
- Powerful jaws
- Endangered- used to be hunted for their fur
- Deforestation is affecting the prey base

Coyote: JUDGE ROY BEAN AND MISS LILY

- Extremely clever and adaptable
- 19 subspecies; 16 in North America and Mexico and three in Central America
- Live up to 10 years in the wild and up to 18 in captivity
- 19-25 pounds
- Male pups leave six to seven months after birth / females stay to form the basis of the pack
- Once lived mainly on prairies and in deserts but now roam in forests and mountains even live in Los Angeles and are found over most part of North America
- Primarily carnivores BUT ALSO Omnivore - Will eat almost anything – rabbits, rodents, fish, frogs, deer, insects, snakes, fruit, grass, and carrion **sometimes kill lambs, calves, livestock, pets and ranchers/farmers see them as destructive.
- The yipping coyotes do at night is mainly for communication
- Man is main predator

Ocelot: CHICO

- Covered with black spots and rosettes
- Males 22-25 pounds; females 19-21 pounds
- Eat small to medium sized mammals and birds; will also eat amphibians, fish, and reptiles
- Lifespan in captivity is 20 years
- Primarily nocturnal and solitary
- Lives in Mexico, Central America and South America; sightings have been reported in TX
- Have been hunted since the time of the Aztecs for their fur
- Now protected by law

Herley Berg Brazos at Night Building

Great Horned Owl

- Utilizes the nests of other birds
- Largest of the “eared” owls and can take down prey two to three times its size

Porcupine

- Closest relative is the beaver and the third largest rodent in North America
- Long claws and can climb trees
- Herbivores but need more salt intake in diet, solitary, mostly nocturnal, and are good swimmers

Ring Tail Cats

- They are primarily carnivores. They eat birds, reptiles, insects, and fruits.
- Has alternating black and white rings on the tail
- They are expert climbers.
- They look like a mix between a fox and raccoon.
- They are very nimble and can reverse the direction they are moving by performing a cartwheel using their tail.
- Their hind feet can rotate 180 degrees.

Raccoon

- The male will stay with the female a month prior to mating till the young are born; otherwise, raccoons are generally solitary
- Tail is ½ the length of the whole animal
- Omnivores and are Dexterous, Excellent climbers BUT Not good swimmers - fur weights them down
- Found in woodlands near water, farmlands, suburban or urban areas and
- Den under trees, caves, main shafts, deserted buildings, barns, garages, sewers

Striped Skunk

- Anal glands carry about a tablespoon of musk; enough for five to six jets
- Nocturnal and solitary, omnivores and “opportunistic” feeders
- 5 partially webbed toes with claws

Jamaican Fruit Bat & Seba Island Fruit Bat

- Not native to Texas, native species, eat insects and are difficult to keep in captivity
- Seba Island bats are smaller than the Jamaican bats

Barred Owl

- Found in forests and mainly near water
- Eats rodents, frogs, birds, and crayfish
- Gives an instantly recognizable “Who cooks for you?” call

Barn Owl

- Large eyes and “binocular vision” - focus poorly at close range
- Nocturnal and eat small mammals
- Introduced in Malaysia to control rats with great success; each family killed around 1,300 rats per year.
- Most widely distributed species of owl.
- Also known as White Owl, Ghost Owl, and Monkey-faced Owl.

Screech Owl

- Keen eyesight and hearing BUT are poor nest builders
- Nocturnal and Carnivorous
- Their call is more of a weird trembling sound rather than a screech

HIGH PLAINS: BISON

- Herbivores
- Originally found on open prairie land
- Found on private and protect lands in Western U.S. and Canada
- The U.S. Government had the bison killed to destroy the livelihood of the Plains Indians.
By 1890, their numbers were reduces to <1000
- Are now listed as endangered
- Excellent sense of smell and hearing
- Good swimmers
- Migrate seasonally
- 1320 (female) to 2200 (male) Pounds
- 5-6 feet tall at the hump AND 7-12.5 ft long
- Lifespan 15-20 in wild/ up to 40 years captive
- Cloven-hoofed and can run up to 38.5 MPH
- Their coat is so thick that snow can land on their backs without melting

BISON vs. BUFFALO:

Bison classified under the genus: bison

Buffalo under the genus: Bubalus (for the Asian water buffalo and for the African cape buffalo).

Bison have a distinct hump on their backs

Buffalo do not have a hump

Bison have thick fur and is mainly because they are found in colder regions compared

Buffalo, which are found in warmer climates, have light or no fur at all.

Bison also have a thick 'beard' on their neck and facial areas

Buffalo have no such 'beard'.

Bison have a shorter life span as compared to buffaloes. - 13-19 years

Buffalo is known to live up to 25-30 years

Bison have small and sharp horns

Buffalo horns can be long but not sharp, as in the case of the Asian buffalo (longest horns) or of medium length with a head plate as in the case of the African buffalo.

Camouflage versus Mimicry

Camouflage is concealing by disguise or protective coloring.

- Camouflage allows animals to help hide from predators by appearing to be a part of the natural surroundings, by blending in.
- Example: chameleons changing their colors

Mimicry is the resemblance of one organism to another or to an object in its surroundings for concealment and protection from predators.

- Example: A stick bug – looks like a stick in order to hide.

Inner Space Cavern Activities

Rock Cycle

Sedimentary

Rocks are being worn down into smaller pieces of rock and minerals by wind and water all the time. Streams and rivers wash these pieces into lakes and seas. They settle in layers as sediments that are buried and squashed together. In time, the sediments harden into new rocks called sedimentary rocks.

Igneous

Igneous means “made by fire”. An igneous rock is a type of rock that forms when magma cools down and hardens. Sometimes magma flows through cracks away from all the volcanic activity to another place underground where it cools down slowly inside the Earth. Magma can also bubble up through cracks in the ocean floor and then cool down and solidify into rock under the sea.

Metamorphic

Rocks that have been changed by high temperatures and great pressure are called metamorphic rocks. They may have started off as sedimentary rocks, or igneous rocks, or even as older metamorphic rocks that are being changed for a second time. When they are heated, or squeezed by movements deep inside the Earth’s crust, new minerals grow inside the rocks. Geologists estimate how much a rock has been altered by studying the new minerals that have formed.

Cavern Formations

Flowstone resembles frozen waterfalls projecting from the ceilings, walls, and the floor of caves.

Stalagmites grow up from the floor. They are usually formed by dripping water from stalactites above.

Stalactites grow down from the ceiling. They form as calcite is deposited around the outside of the soda straws after the centers of soda straws become plugged.

Columns are formed when a stalactite and a stalagmite grow together from the floor to the ceiling.

Soda straws are thin hollow tubes that grow from the ceiling of caves as water runs down inside them and deposits rings of calcite at their tips.

Wetlands Demonstration

Importance of Wetlands to Clean Water

The Earth has its own way of cleaning polluted water. It is the wetlands way. Wetlands have shallow, standing water or, at the very least, wetlands are soggy some of the time. Marshes, swamps, tidal flats, prairie potholes and bogs are all types of wetlands. Some wetlands are even created by beavers as you saw at the Cameron Park Zoo. Wetlands are habitats with a lot of life in them that do a great job of cleaning our water and preventing flooding. They act like giant sponges holding back the water to clean it as it slowly passes through. Wetlands help handle erosion in the United States but half of the wetlands are being destroyed by the building of homes, businesses and recreation areas.

Click [here](#) for a video explaining wetlands.

Bus Activities

Landfill vs. Dump

A landfill is a facility operated by a city or county government that is designed to help dispose of different types of waste. Landfills are constructed by engineers to make sure they work properly and keep our land, air, and water safe.

A dump is a random spot where people leave objects they do not want. It can be in the woods, near a park, in a stream, or anywhere.

For more information on landfills click [here](#) and [here](#).

Recycling

For videos on recycling click [here](#) and [here](#).

Vermicomposting

Nature has its own way of recycling. Items such as leaves and food can be recycled by decomposers. These decomposers digest the leaves and food and turn it into nutrient-rich "black gold". What are these decomposers? They are worms!

Vermicomposting is another name for worm composting. The forest is made up of trees and plants which take their "food" from the ground and carry it to their leaves. The leaves eventually die and drift back to the ground. This is when the worms do their job. They turn the leaves back into nutrient rich soil. In other words, worms eat organic materials and turn it into the world's best plant food -- worm poop!

Here are some of the things worms can eat: vegetables, egg shells, greasy pizza boxes, fruit, hair, lint, and vacuum dust.

For more information click [here](#) and [here](#).