



## **THE PRAIRIE PUZZLE MYSTERY\* 2012**

**Grade Level:** 4<sup>th</sup>

**Setting:** Prairie

**Theme:** A healthy prairie ecosystem is an important place where many special animals and plants make their homes.

**Description:** Students learn what a healthy prairie ecosystem is by building a puzzle made up of various plants and animals indigenous to the short grass prairie.

**BIAS:** [Stewardship](#)

**Recommended Time:** 45 Minutes

**Recommended Group Size:** 15-20

**FOSS Kit:** Environments

**State Standards: Life Science 2.2:** Explain and illustrate with examples how living systems interact with the biotic and abiotic environment. There is interaction and interdependence between and among living and nonliving components of ecosystems.

### **Materials:**

- Picture of Puzzle board and puzzle pieces (Nat Note: **we used to use a puzzle board but it became too cumbersome in the wind so now we use a picture of the puzzle board. Some imagination required**)
- Riddle cards (12)
- Laminated photos to go with each riddle
- Background sheets about prairie animals, plants, insects, and soil for Master Naturalists

### **Getting Ready:**

1. Check out site
2. Read background information
3. Gather materials from resource room

### **Introduction:**

1. Introduce yourself, welcome students. Turn to the prairie and ask the students to describe what they see. Ask if the prairie looks empty. Ask why there are no trees. Ask if they know of any animals that live on the prairie. After they answer these questions explain that the prairie is a harsh environment. Life on the prairie must withstand high winds, violent thunderstorms, hail, very little rain, and extreme temperatures. The prairie is a semi-arid environment. Not an easy place to survive.

**Nat Note:** Check to see if the students understand the meaning of semi-arid. Explain that this dry environment means there is not enough moisture for trees, plants are shorter, and many animals live underground. These are some of the ways plants and animals have adapted for the prairie environment.

2. Ask them has anyone heard of an ecosystem? An ecosystem is made up of three elements. Can anyone tell me one? (*An ecosystem is a community of living and non-living elements interacting in their environment*). For example, a prairie dog/living element... digs/interaction between elements... in the soil/nonliving element. If time permits ask the students if they can look around and put together another 3-part ecosystem.
3. “eco”, comes from the Greek, *oikos* which means “house.” Ask the students to see if you can find any plants or animals making a home here. Ask, what is your home like? Let them come up with ideas about what makes up their ecosystem. (*food, safe shelter, space, family that cares for you*) All these things are like pieces in a puzzle and together they make your home complete.
4. Now ask what if a piece is removed? What if your home had no kitchen, bathroom or your room? Would your home be complete? Would it be as healthy?
5. Show puzzle of a home with a pieces missing. What is wrong with this puzzle? (*it is missing pieces*) Although we cannot see inside this house we can see it is not complete. The prairie ecosystem is also made up of many pieces. When pieces of the prairie ecosystem are missing, it is like our puzzle, incomplete. The prairie needs all its plants and animals to be complete and thrive.

### **Body:**

1. Today, we are going to discover what makes a healthy prairie home or a complete prairie ecosystem. Ask the students if they like to answer riddles and solve mysteries. Pass out the twelve riddle cards.
2. Ask the students to silently read their riddles and if they know the answer not to shout it out. The group will take turns hearing the riddles and deciding on the answers. Assure the group that it is OK if they do not know the answer. We will discover the answers together.

**Nat Note:** The riddles may be done in any order. As the riddles are answered use the corresponding photos and fun facts to help explain why each plant or animal is important to the prairie ecosystem. These facts are not all of the reasons but a selection of fun facts. The fun facts are numbered to match the numbers on the riddle cards for your convenience.

4. Riddles and information:
  1. **I may give you a warning sound of rattles. Please don't step on me!:** (*Prairie rattlesnake*) Snakes are very important to the ecosystem because they control the rodent population. There are more mice on the prairie than any other mammal species. Without

the snakes the prairie would be overrun with mice.... They could be running right across our feet!

2. **I have short curly leaves and my seeds look like your eyebrows.** (*Blue grama grass*) **and it is the Colorado state grass:** This is the most abundant grass on the prairie. As you look across the prairie you see grasses. But you are only seeing 1/3 of the total plant. The majority of the prairie grass is actually below ground. Two-thirds of the plant's total mass is below ground to survive the harsh prairie environment. The seed heads of the Blue grama grass look like human eyebrows.
3. **I hunt the prairie dogs from the sky.** (*Ferruginous hawks*) This is the largest hawk in North America. He hunts PD colonies in a special way. He lies down on the ground next to a PD burrow and waits. When the PD pops up the hawk captures dinner. Not many birds use this technique. The hawk also has feathers all the way down their legs to their feet.
4. **My Aztec name means “barking dog” and I am cunning.** (*Coyote*) This is the largest omnivore on the prairie. The fur of the coyote is extremely thick. This allows the coyote to live outdoors on the prairie, and survive the extreme weather: hot, cold, windy and wet. The coat is so thick that a person's fingers do not touch the coyote's skin. Coyotes do not have individual homes unless it is birthing time. The whole prairie is their home.
5. **I live in a town on the prairie and I kiss when I greet.** (*Prairie dog*) The photo shows the yip/jump behavior. It is a way to communicate with other prairie dogs. It is possible for a PD to jump so high up that they fall backwards. This communication is just one of many sounds the PDs make. Researchers have recorded 400 different “words” in their communication system.
6. **I sing a beautiful song from the top of a prairie plant.** (*Western meadowlark*): In the spring it is very possible to hear the meadowlark song. Lewis and Clark called the meadowlark song the “melody of the prairie.” The meadowlark is unlike most birds that build their nests in trees, it builds its nest on the ground. To make their ground nests safer they have adapted the structure to include a nest hidden in the grasses by a woven dome over the nest and a six foot woven grassy tunnel entrance. This entrance is called a skulk way. This allows the meadowlark to disappear into the grasses and flee from their predators. However, snakes do find the meadowlark's nests and as a result many eggs are eaten. To adapt for this predation the meadowlark will sometimes have up to 3 clutches of eggs in a season.

7. **I am a plant with long spikes. Don't get stuck!** (*Yucca*): The yucca is edible. Humans can eat the leaves, stems, fruits, and flowers, but not the roots. However, the roots are used to make shampoo and medicines. This plant is also eaten by prairie omnivores like the coyote. The tall stalks of the yucca also provide a needed high perch for birds like the meadow lark to sing their songs.
8. **I am active at night and depend on prairie dogs for food.** (Black-footed ferret): The black-footed ferret is one of the most endangered mammals in North America. It lives in abandoned prairie dog burrows. Ninety percent of its diet is prairie dogs. Colorado was once a native range for the BFF. However, the species was close to extinction. Loss of habitat due to farming, ranching and human development almost eliminated the BFF from the prairie. An extensive and successful captive breeding program has reintroduced the BFF back to the western prairie in select locations where there are large enough prairie dog colonies.
9. **I build my nests in prairie dog towns.** (*Burrowing owl*): The Burrowing owl migrates to our area in May and finds an abandoned PD burrow and builds its nest underground. It lines the nest with poop. They will use whatever poop they can find, most likely it will be cattle scat. This practice camouflages the scent of the nest from predators such as coyotes. The chicks when they are born make the sound of a prairie rattlesnake. This adaptation further camouflages the nest from predators.
10. **I have long ears and I have two sets of teeth.** (*Black-tailed jack rabbit*): This mammal is called a rabbit but is actually in the hare family. The difference is rabbits are born hairless, eyes closed and deaf. It takes three weeks for them to mature and emerge from the nest. Hares are born with a full coat, eyes open and leave the nest in four to five days. BTJR can run 35 miles per hour, which helps them escape the many predators on the prairie that want to eat them. They can also swim by doing a dog-paddle with their front and back legs at the same time.
11. **Our job is to vacuum the ground and there are many of us.** (*Harvester ants*): Most abundant ant on the prairie. These ants, present in the millions, keep the prairie clean. They harvest seeds and plant matter. They are red in color because the sting is toxic. They are actually more potent than a cobra but although the sting hurts, there is not enough venom in the bite to kill a human.
12. **My job is to hold the roots of the plants and I am made from the remains of ancient seas long ago.** (*Prairie soil*): Seventy million years ago this area was covered by a large, inland sea,

called the Greater Interior Cretaceous Seaway. Your feet would have been on the bottom of the sea and the top of the seaway would be 600 feet above you. The photo shows a depth of gray shale sediment layers composed of the plants and animals that inhabited those ancient waters.

5. Now the students have answered all the riddles, it is time for the picture of the puzzle board to be shown. Ask them to gather around and look for their riddle answer. Notice the connecting statements about how the various puzzle pieces fit together. The PD piece connects to everything it touches because it is a keystone species in the prairie ecosystem. There is no other piece which does this.
6. Next ask the students to notice that there is a piece missing. This is the mystery that needs to be solved. What piece is needed to make this puzzle complete? (YOU)

***Nat Note:** The kids may offer answers that could be correct. Water, bison, wolves are all logical and good answers. However, this puzzle piece introduces humans into the prairie ecosystem and addresses the stewardship and conservation issue. After allowing a few of their answers, remove the piece and reveal "YOU."*

7. Ask the students if they think they are a part of the prairie puzzle. Talk about conservation of the prairie. Except any ideas they have on how to be good stewards of the prairie and then give suggestions.
  - Learn everything you can about the prairie.
  - Visit natural areas like this one, and share what you know with your family and friends.
  - Pick up trash, and stay on trails to respect the plants and animals that live here.
  - The next time you are assigned a report for school, choose a native prairie species to learn about.

**Conclusion:**

1. Repeat the theme and ask the students if they agree.
2. Thank them for their attention and interest. As you dismiss them, ask each one to tell you their favorite prairie plant or animal.

This lesson was written by Kimberly Tamkun, Zoe Whyman, and Sue Schafer of the City of Fort Collins Natural Areas Department.