

Butterflies, Hummingbirds, and Bees Oh My!

Pollinators on the Tallgrass Prairie



Background Information:

What is “Pollination” and What is a “Pollinator?”

- Pollination is a vital stage in the life cycle of all flowering plants. It occurs when pollen grains are moved between two flowers of the same species by wind, water or animals. Successful pollination, which may require visits from multiple pollinators to a single flower, results in the production of healthy fruit and fertile seeds, allowing plants to reproduce. Without pollinator visits to fruit and vegetable plants in our gardens and fields, we would have no produce!
- Pollinators are animals that move the pollen grains from flower to flower. Over 200,000 species of animals act as pollinators, and of those, about 1,000 are hummingbirds, bats (though not on the tallgrass prairie), and small mammals (Source: USDA Forest Service). The rest are insects, such as beetles, bees, ants, wasps, butterflies, and moths.

Why Are Pollinators Important to Us?

- Pollinators are essential to human survival. To produce seeds and reproduce, Almost 90% of the world’s flowering plant species rely on animal pollinators. Pollinators provide services to over 180,000 different plant species, and more than 1,200 crops. Foods and beverages produced with the help of pollinators include: apples, blueberries, melons, peaches, potatoes, pumpkins, and almonds (Source: Arkansas Natural Heritage Commission).
- In economic terms, pollinators add \$217 billion to the global economy (Source: Pollinator Partnership). In the U.S., pollination by honeybees and other insects produces \$40 billion worth of products annually (Source: USDA Forest Service).
- Without the actions of pollinators, agricultural economies, our food supply, and surrounding landscapes would collapse. Pollinator health affects everyone.
- Plants and their pollinators play a major and unique role in the ecology of ecosystems, including the tallgrass prairie.

Subject / grade level: Science – Tallgrass Prairie Pollinators / grades 4-12

Materials:

- Prairie flowers of different colors, sizes, and shapes (Any flowers or pictures of flowers will also work)
- Pollinators Meet Your Plants packet (1 per group) - copies of each page, folded in half and laminated. This is at the end of this document.
- Flowers found on a hike at the Tallgrass Prairie National Preserve, near Strong City, KS.

Important: No plant or animal specimens may be collected from the preserve!

Extensions/Resources:

An excellent PowerPoint slide show on pollinators and their importance: “Power of Pollinators” by Lindsay Rogers, Nebraska Game & Parks Commission Nebraska Project WILD is found at this link:

<https://outdoornebraska.gov/wp-content/uploads/2015/12/Power-of-Pollinators.pdf>

A detailed “Pollinator Syndrome” table with many examples and information on plant/pollinator interactions from the North American Pollinator Protection Campaign can be found at this link: http://www.pollinator.org/Resources/Pollinator_Syndromes.pdf

An interactive webpage from the United States Department of Agriculture Forest Service on pollination and pollinators:

<http://www.fs.fed.us/wildflowers/pollinators/index.shtml>

An excellent resource for identifying Kansas wildflowers and grasses:

<http://www.kswildflower.org/>

Next Generation Science Standards:

4-LS1-1, MS-LS1-4, HS-LS1-2

Common Core State Standards Connections:

ELA/Literacy – W.4.1, WHST.6-8.1, WHST.9-10.1, WHST.11-12.1

Lesson objective(s):

Students will learn about pollinators found in the tallgrass prairie and their importance.

Students will understand the interaction between prairie plants and their pollinators.

ENGAGEMENT

Show students the different flowers (or pictures) you have gathered. Ask them which one is their favorite. Have students write a paragraph in their notebook (or electronic device) stating their opinion, supporting their point of view with reasons. Tell them to be prepared to share their writing with the class. Go around the room and have several students share which flower is their favorite and why.

Explain to students that just like they prefer some flowers over others, so do pollinators. For example, because a butterfly has a long, slender mouth part (proboscis), they prefer flowers that are long and tube-like. Some flies, on the other hand, have short, round mouth parts much like a sponge. For these pollinators, a wide-open flower is preferred. Or, for other pollinators, like moths, a flower that is open at night is preferred because that is when moths are active. The concept of pollinators preferring some plants over others is known as Pollinator Syndromes. Just like we have symptoms or characteristics which are specific to a syndrome or illness, pollinators have characteristics that are specific to their preferred plants.

Brainstorm with students the different kinds of pollinators that are found in the tallgrass prairie ecosystem - bees, butterflies, moths, beetles, ants, birds, (note: bats are not pollinators in tallgrass prairie ecosystems, they are in other parts of the world, including pollinating saguaro cactus in desert regions of the southwest United States). Answers should be grade level appropriate and can be written in their notebook or electronic device.

EXPLORATION – Part I - In Class (Prefield trip)

This activity can be done individually, in pairs or in small groups. Give each student/group one “Pollinators Meet Your Plants” packet of cards. Explain to them that they are to use the characteristics of their pollinators and plants to find their match - each plant has a specific pollinator. (Note: for several plants, the matching pollinator is not the only pollinator to help pollinate this plant. Have students write their pairs in a notebook or electronic device.

Once students have found their matches, have them write/type explanations for the pairings they chose. When all students are done with their explanations have them report to the class their pairings/explanations and reasoning behind their answers.

Exploration Part II – Field trip to Tallgrass Prairie National Preserve in Chase County, Kansas (or other local prairie or natural area with flowering plants) Note: This activity must be done while flowers are blooming. This will vary with location but plants go dormant during winter on the Tallgrass Prairie National Preserve. The best time to observe flowers is early fall or late spring in Kansas and may vary from year to year. Call the preserve to ask if there are flowers blooming before you finalize a date. Please educate yourself and your students on the venomous, poisonous and allergy inducing plants and animals that may be encountered on your trip and be prepared for contact (rattlesnakes, poison ivy, ticks, mosquitos, bees etc.) with them. Be prepared for any allergic reaction and bring a first aid kit. Please identify students with severe bee sting allergies and make sure there is an EpiPen close by. Also note: Please call ahead and schedule a day and time for your field trip at 620-273-8494 ext. 0. Bus tours of the prairie and tours of the historical and cultural landmarks (ranch house, barn, and outbuildings) located at the preserve may be able to be scheduled with prior arrangement. Rangers will be able to answer any questions you may have as well as recommend other activities/events located here and in the area.

Field trip activities:

Note: The Southwind Nature Trail offers easy accessibility, a variety of habitats and is near the preserve visitor center but there are others to choose from.

- 1) Instruct students to spend 10 minutes observing a flower or group of flowers. Have them note types, numbers, and characteristics of pollinators that visit their flowers. Tell students to stay on the trail and to not disturb the pollinators they see. Have students regroup for discussion and instruction for part 2.
- 2) Instruct students to find 5 - 10 plant/pollinator pairs while hiking one of the trails (The Southwind Nature Trail offers easy accessibility, a variety of habitats and is near the preserve visitor center but there are others to choose from). They should document the flower and animal (insect) types. The details of which will vary with grade level. For example, elementary students may describe insects such as bees, beetles, etc. while high school students may be required to document common names and or scientific names of the animals (insects) and plant interactions encountered. They can also note what the pollinators hang on to while feeding and if a flower was visited by more than one type of pollinator. Students can also note the kinds of flowers that were bee-pollinated and conclude if those flowers had special characteristics (scent, certain color, size, etc.). You can also have students infer as to why a certain pollinator prefers a particular plant. Students may need to make observations and do further research when getting back to the classroom.
- 3) When students are finished with the Field Trip Activity Sheet, instruct them to reflect on their time and experiences on the field trip. Have them answer the questions on the Reflection worksheet. This can be done at the park, on the bus ride home, or upon returning to the classroom

EXPLANATION

- Have students explain why they prefer a certain flower over the others.
- Students explain why they paired the pollinators and plants the way they did.
- Explain the animal/plant interactions observed on the field trip.

ELABORATION

- Have students describe the plant/animal relationships they encountered on their field trip.
- Have students describe the general relationship between pollinator and flower.

EVALUATION

- Students will demonstrate that they have achieved the lesson objective by their verbal and written responses to the prompts for explanation of their pairings and by their understanding of the plant/animal relationships they encountered on the field trip.
- Students should also have written notes and inference of the flower/pollinator interactions while on the trail.
- Students should reflect on the trip and write and draw observations made on the Reflection worksheet.

Field Trip Reflection

1. Having visited the Tallgrass Prairie National Preserve, or other natural area, note below, things you noticed with your senses.

2 things I saw _____

2 things I heard _____

2 things I smelled _____

1 thing I touched _____

Did you taste anything? _____

2. Draw a picture of something you saw today in the space below.

Lesson plan adapted from: *Pollinators, Meet Your Plants* – Project Wild Nebraska – Nebraska Game and Parks Commission

Pollinators Meet Your Plants - Activity Sheets



Hummingbird

- I prefer flowers that are red in color.
- I do not land on the flower when drinking nectar, so I do not need a large landing spot.
- I seek flowers that are funnel shaped for my long, slender beak.
- I want flowers with plenty of nectar... I need a lot of energy to flap my wings this fast!



Bumble Bee

- I am able to regulate my own body temperature through shivering and basking in the sun. Many early spring and fall blooming plants rely on me for pollination.
- I like to land on the flower when seeking nectar, I do not hover.
- Because I am a heavier pollinator, I pollinate plants that must “open” to reveal their nectar.
- I like lightly sweet smelling flowers.



Regal Fritillary Butterfly

- I like flowers that grow in clusters so I have plenty of room to land.
- I prefer brightly colored flowers, mainly red, yellow, and orange.
- I want flowers with lots of nectar.
- Because I have a long tongue, I often visit flowers with the nectar hidden deep inside.



Ant

- I am not considered an important pollinator, but there are millions of me and we do visit flowers, so we do some pollinating.
- I cannot fly, so I visit flowers that are low to the ground.
- I often visit flowers with small, inconspicuous flowers.
- I only pollinate during the day.



Soldier Beetle

- As a beetle, I am an extremely important pollinator...beetles pollinate 86% of flowering plants.
- I often visit showy flowers and yellow in color.
- I am not too particular on the type of flowers... I can pollinate large, solitary flowers like the state flower of Kansas, the sunflower, or small, cluster flowers such as, yarrow.



Hawkmoth

- Unlike most moths, I am crepuscular, so I visit flowers at dawn and dusk. I am often mistaken for a hummingbird.
- I want flowers that have ample nectar. And, with my long tongue, I like the nectar to be hidden deep inside.
- I can be found feeding on hummingbird feeders, but I also like flowers that are purple, pink, white, or even blue.



Pollen Wasp

- I am a wasp yes, but I would prefer to visit flowers rather than sting you!
- My tongue is not nearly as long as most bees or butterflies, so I need shallow flowers.
- I will visit a wide variety of flowers, but prefer flowers from the Waterleaf and Figwort families.



Bee Fly

- I am actually a fly that mimics a bee.
- I do not land on the flower when drinking nectar to avoid predators (like spiders) lurking on the flowers, so I do not need a large landing spot.
- I am often one of the first pollinators out in the spring.
- Although I do not land on the flowers I pollinate, I do get some pollen on my legs to pass to other flowers.



Leafcutter Bee

- I am a solitary bee, not a colony bee like bumble bees and honey bees.
- I am named because I chew perfect circles out of leaves. I use this material to seal my eggs in their nest chamber.
- Although most leafcutter bees visit a wide variety of flowers, some species specialize in pollinating asters and pea flowers.



Butterfly Milkweed

- I am brightly colored and have lots of small flowers... this is called clusters of flowers.
- I can be found in a wide variety of habitats including prairies, wetlands, and even roadsides.



Snapdragon

- I can be found in a wide variety of colors including yellow, white, pink, red, and orange.
- I must be “opened” ... my large petal must be pushed down for pollinators to reach my nectar.
- I provide my pollinators with a large landing platform.
- My nectar is at the bottom of a long tube.



Honeysuckle

- I have no landing platform for my pollinators.
- I have a long funnel shaped flower.
- I can be red, white, yellow, or pink in color.
- I can grow as a bush or a vine.



Goldenrod

- I have clusters of flowers.
- Although there are lots of kinds of Goldenrod, my flowers are always bright, showy yellow.
- I bloom in the late summer.



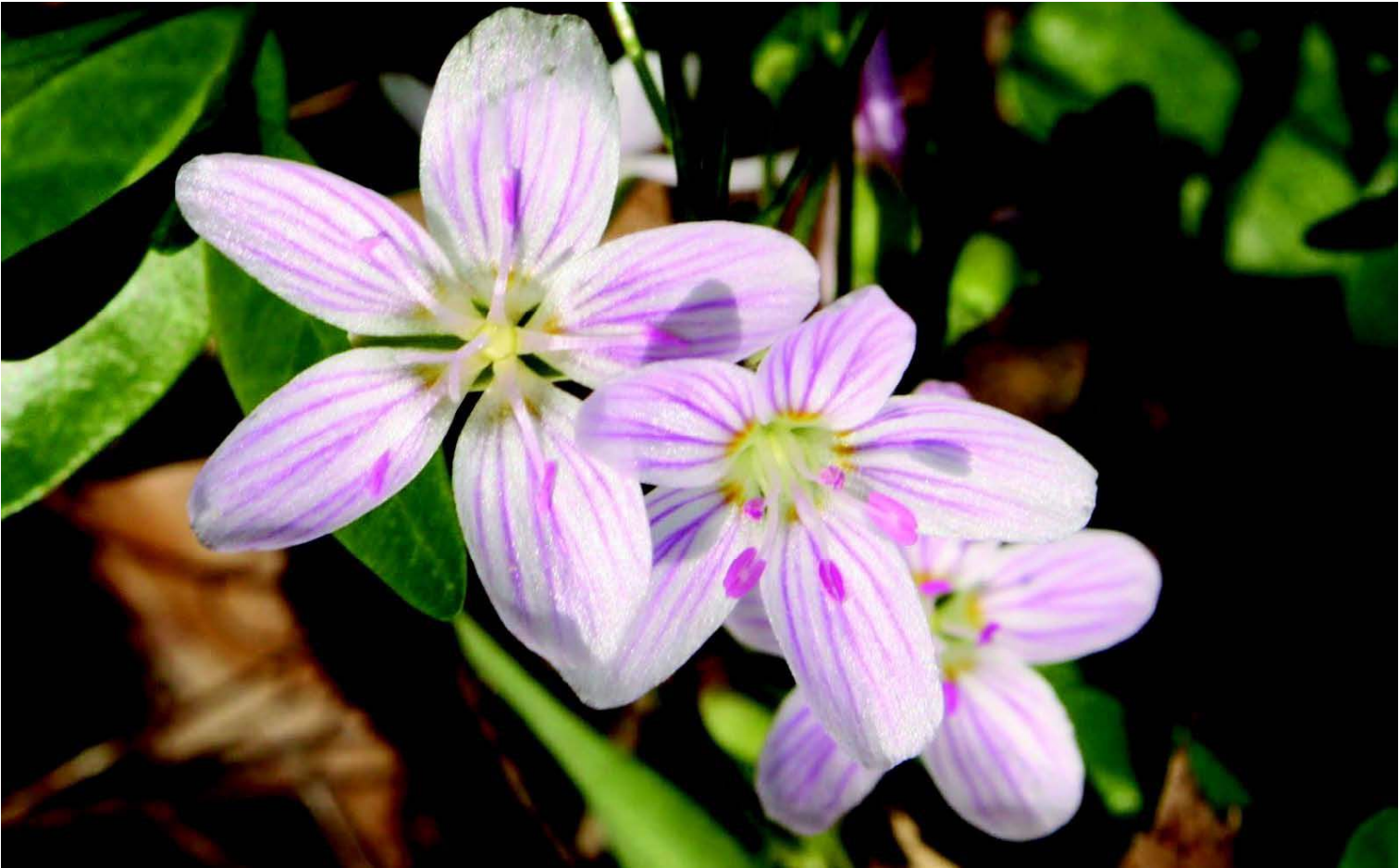
Morning Glory

- I can be blue, white, deep pink, or pale pink in color.
- I close my flowers at night, I open them first thing in the morning.
- I am a common garden flower and can be found climbing on fences or trellises.



Virginia Waterleaf

- I am a forest flower in Kansas.
- I grow low to the ground.
- My flowers are not too deep which allows many pollinators to get to my nectar.



Spring Beauty

- I am one of the first wildflowers to bloom in the spring.
- My flowers can be white, pink, or even striped.
- I am a small plant and do not grow very tall.



Wild Strawberry

- I grow low to the ground and am often visited by crawling insects.
- I have small white flowers that are not very showy.
- I am usually found in shaded areas with plenty of indirect sunlight.



Aster

- I am a small flower, but a single flower... I do not form clusters.
- I can be yellow, white, pink or purple in color.
- My petals are long and narrow, and although small, I have plenty of pollen and nectar.

