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Background and Introduction

The Monarch butterfly migration is one of the most spectacular natural phenomena on Earth. Each fall, Monarch butterflies leave their breeding grounds in the northern U.S. and Canada to travel south (up to 3,000 miles!) to their overwintering home in central Mexico. As conditions become unsuitable for their survival in northern latitudes, monarchs leave behind their feeding and breeding areas and fly south to look for a safe place to spend the winter. Millions of monarchs will spend the winter huddled together on the branches of oyamel fir trees high in the mountains of central Mexico. In the spring, surviving Monarch butterflies will begin heading north once again, but the journey north does not belong to a single generation of monarchs. As they travel, they will mate and lay eggs on milkweed plants. These eggs will hatch and the emerging larvae will gorge themselves on milkweed plants before pupating and transforming into adult butterflies. As the life cycle repeats, new generations of monarchs will gradually move north. As many as four to five generations of butterflies will be needed to reach their final destination in the northern U.S. and Canada.

Monarchs face daunting challenges as they migrate.

During this long and difficult journey, monarchs face numerous challenges including predators, poor weather, and changes to the landscape that impact their ability to find suitable habitat. Monarchs mainly rely on prairies, meadows, roadsides, and grasslands to survive. Intact prairies provide monarch populations with necessary habitat to survive including nectar-producing wildflowers for adult monarchs to feed upon and various milkweed species to lay their eggs upon and feed their young. Without healthy prairie habitat, the monarch migration faces an uncertain future.

Habitat restoration is essential to secure monarch migrations for future generations.

Once native prairie covered almost 40% of the U.S. and provided ample habitat for monarchs and other prairie wildlife, but today, prairie ecosystems are some of the most endangered ecosystems in the world. While large scale habitat restoration and conservation projects are generally undertaken by government agencies and conservation organizations, small scale efforts are also important. Backyards and schoolyards can provide small, but essential pockets of prairie to support monarchs on their migration.

How can you and your students get involved?

Milkweed in the Classroom is collaborative Nebraska Environmental Trust grant-funded project lead the University of Nebraska-Lincoln, Prairie Plains Resource Institute, and Pheasants Forever, Inc. that supports teachers and students across Nebraska in growing milkweed in the classroom and assisting in local restoration efforts.

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Meeting NGSS and Nebraska College and Career Ready Standards

A Framework for K-12 Science Education (NRC, 2012) sets forth a vision for science education in which students engage in “fundamental questions about the world and with how scientists have investigated and found answers to those questions”. This approach views science as more than simply what we know (a body of knowledge), it is also how we have come to know it (a set of practices). In this new approach, students will experience three-dimensional learning in which they engage in scientific and engineering practices and apply cross-cutting concepts to deepen their understanding of the disciplinary core ideas in key science areas.

The Milkweed in the Classroom lessons are designed to help students investigate a real-world phenomenon that is connected with students’ interests and experiences. In this unit, the monarch migration will act as the anchoring phenomenon and students will investigate the guiding question, “How has the monarch migration has changed over time and why?”

Milkweed in the Classroom Lessons mapped to *A Framework for K-12 Science Education*.

	Lessons					
Science Practices	1	2	3	4	5	6
Asking questions and defining problems	X				X	
Analyzing and interpreting data	X				X	
Constructing explanations and designing solutions		X				X
Engaging in argument from evidence	X				X	
Obtaining, evaluating, and communicating information		X	X	X		X
Cross-cutting concepts	1	2	3	4	5	6
Patterns	X		X	X		
Cause-and-Effect		X		X		X
Systems and System Models			X	X		X
Stability and Change	X				X	
Disciplinary Core Ideas	1	2	3	4	5	6
Ecosystems: Interactions, Energy, and Dynamics	X	X	X	X	X	X
Engineering Design						X

Nebraska's CCRS Performance Indicators Bundle

SC.3.7.2.C Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

CS: SC.3.7.2.D Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Additional Monarch Butterfly Resources

Nebraska Game and Parks' Monarchs on a Mission: <http://outdoornebraska.gov/monarchsonamission/> includes lesson plans, posters of the monarch life cycle, monarch migration route, and conservation actions that help monarchs.



Claim-Evidence-Reasoning

This unit calls on students to engage in argument from evidence. The following strategies may prove helpful in scaffolding students to use the Claim-Evidence-Reasoning structure to construct their scientific argument.

1. Help students to understand the difference between respectful scientific arguments and confrontational or competitive arguments.

- In a scientific argument, we can disagree about an idea, but we are not disagreeing with a person.
- The purpose of a scientific argument is not to “win”, but rather to come to a point of mutual understanding or consensus.

2. Make time for science talk.

- Students will need practice and feedback as they learn to construct scientific arguments. You can help guide them by modeling a Claim-Evidence-Reasoning conversation as a whole class.
 - Watch CER conversations in action:
 - (1) With 5th grade students: <https://www.teachingchannel.org/video/support-claims-with-evidence-getty>
 - (2) With 2nd grade students: <https://www.teachingchannel.org/video/t-charts-nsf>
 - Start with a non-science example. For example, this teacher uses a popular Doritos commercial to introduce a collaborative CER discussion: <https://www.modelteaching.com/education-articles/writing-instruction/claim-evidence-reasoning-cer>

3. Scaffold students’ use of CER in their writing.

- Post short definitions of CER in your classroom.
- Provide graphic organizers, sentence starters, or writing prompts.

Claim: Answers the key question. It tells us what you learned through your research or investigation.

Evidence: Backs up your claim. It tells us about the observations of patterns or details from your research or investigation.

Reasoning: Uses scientific terms or principles to explain the evidence.

Claim:

My claim is...

I think...

Evidence:

I observed/read/found....

My evidence is...

My proof is...

Reasoning:

I know this is true because...

This happened because...

The reason for this is...

Anchoring Phenomena: How has the monarch butterfly migration changed over time and why?

Lesson 1: Is the Monarch butterfly migration getting easier?

Objectives

- Identify challenges facing monarch butterflies during their migration
- Analyze a graph of overwintering monarch butterfly counts
- Recognize that the number of monarch butterflies at the overwintering site in Mexico is declining over time
- Make a claim supported by evidence about whether the monarch migration is getting easier, harder, or staying the same

Materials

- Book: When Butterflies Cross the Sky: The Monarch Butterfly Migration by Sharon Katz Cooper
- Monarch migration worksheet showing graph of overwintering monarch butterfly counts from 1997-2012 (1 per student)

Time required

- 60 minutes

Vocabulary

- **Claim:** The first part of a scientific argument. Answers the key question. It tells us what you learned through your research or investigation.
- **Evidence:** The second part of a scientific argument. Backs up your claim. It tells us about the observations of patterns or details from your research or investigation.

Engage

1. Engage students' prior knowledge of the Monarch butterfly.

Show students a picture of the monarch.

Ask:

- Who has seen one of these butterflies before?
- Does anyone know the name of this butterfly?
- This is a monarch butterfly. What do you know about the monarch butterfly?

2. Read a story about the monarch butterfly migration.

Read the story, When Butterflies Cross the Sky: The Monarch Butterfly Migration by Sharon Katz Cooper.

Discuss:

- In the story, what challenges did monarch butterflies face when they are migrating?
 - Not enough food to eat

- Become too tired to finish the trip
- Birds and other animals may try to eat them
- Bad weather (rain or cold) may make flying difficult or impossible
- The Monarch migration seems pretty dangerous. With all of the dangers they face, why do they do it? Why is it important for Monarchs to migrate to their overwintering home each fall?
 - It is a safe place to rest before mating in the spring.

3. **Introduce the anchoring phenomena.**

- In this unit, we are going to explore how the monarch migration has changed over and why and what impact humans can have on this amazing journey!

Explore

4. **Take a class poll.**

- Do you think the monarch migration has gotten easier, harder, or stayed the same over time? Have students indicate their answer with a thumbs up, thumbs down, or thumbs to the side.

Discuss:

- What information might be helpful in deciding if things are getting easier, harder, or staying the same for Monarchs?

Discuss students' ideas a whole class.

5. **Provide students with a graph of overwintering counts of monarch butterflies in Mexico and make observations.**

Show students the monarch butterfly count graph. Explain to students what the graph is showing. Scientists counted the number of monarch butterflies at their overwintering home in Mexico. They did this every year from 1997 through 2012.

Ask

- What patterns do you notice?
- What do you wonder?

Discuss what they are observing in the data:

- Numbers of monarch butterflies have gone up and down over the years, but overall, numbers have gone down.

6. **Gather students wondering questions on a discussion question board.**

- Examples:
 - I wonder why monarch numbers are going down.
 - I wonder what changes happened along the migration route after 1997.
 - I wonder if humans are involved.

Explain

7. Take the class poll again.

- Based on what you learned from the graph, do you think the monarch migration has gotten easier, harder, or stayed the same over time?

This time, help students to practice using data as evidence to support a claim. Discuss how we can be more confident in our answer if we have data to support our claim.

- If the migration is getting easier, would we expect to see the number of monarchs at the overwintering sites getting bigger or smaller? Why?
- What if the migration is harder? What pattern should we see in the data?
- What if the migration difficulty stayed the same?
- Which claim does our data support?

8. Highlight students' previous observations that fewer monarchs are successfully migrating based on a decreasing pattern in the data.

- We can use the decreasing monarch populations in the data as evidence to support the claim that the migration is getting harder over time, because fewer monarchs are surviving the migration and making it back to the overwintering site.
- This data does not tell us WHY monarch populations are lower.

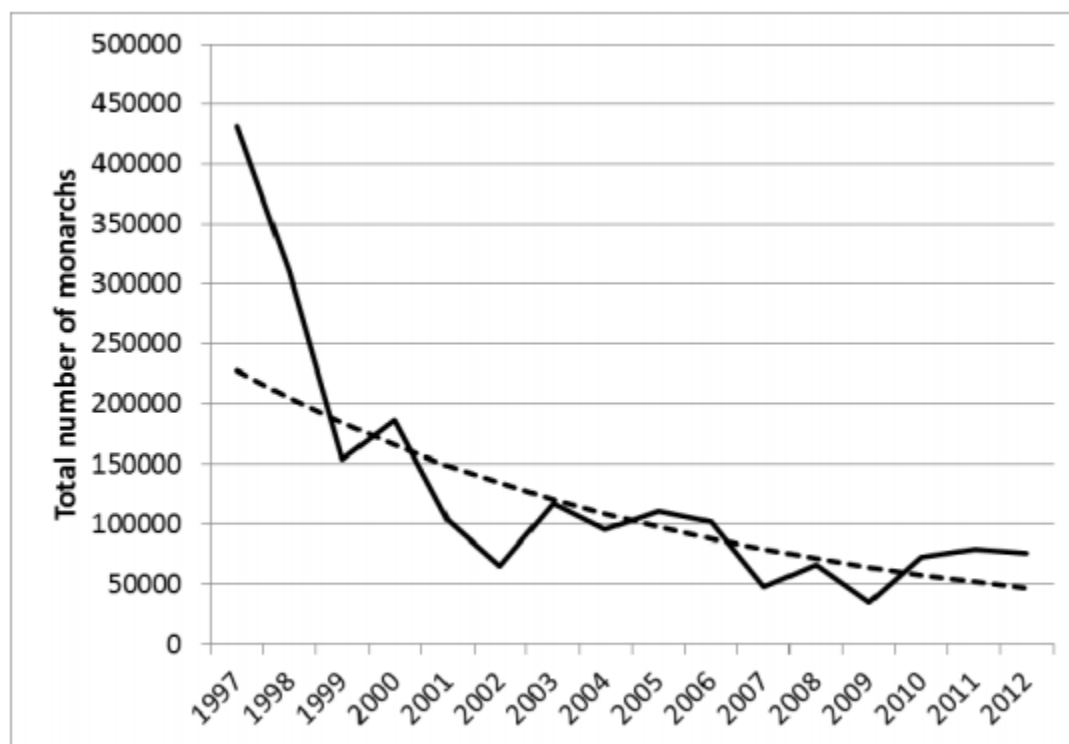
Wrap-up

9. Reflect and Discuss

- Based on the data and our claim that the migration is getting harder, why do you think it might be getting harder for Monarchs to survive their migration?
 - Have students write a written reflection or discuss with a partner.

Is the Monarch migration getting easier?

Name _____



Look at the graph above showing the total number of monarch butterflies counted by scientists at their overwintering home in Mexico every year from 1997 through 2012. Answer the questions below. Discuss your answers with a neighbor.

What do you notice?	What do you wonder?

Lesson 2: What does good habitat look like for monarch butterflies?

Objectives

- Research monarch butterfly survival needs
- Draw a picture of a suitable monarch habitat

Materials

- Monarch butterfly research materials (books, websites, magazines, etc.)
Suggested resources:
 - Monarch Life Cycle and Natural History from Nebraska Game and Parks: <http://outdoornebraska.gov/lifecycle/>
 - Monarch Butterfly from National Geographic Kids: <https://kids.nationalgeographic.com/animals/invertebrates/insects/monarch-butterfly/>
 - Monarch Habitat Needs: <https://monarchjointventure.org/monarch-biology/habitat-needs>
 - Types of Monarch Habitat: <https://monarchjointventure.org/monarch-biology/habitat-needs/types-of-monarch-habitat>
 - Monarch Butterfly by Gail Gibbons
- Paper and drawing utensils

Time required

- 45-60 minutes

Vocabulary

- **Habitat:** The home of an animal or a plant; includes food/sunlight, water, space, and shelter

Engage

1. Review prior learning about monarch migration:

- Monarch butterflies take part in dangerous migration through Mexico, the U.S., and Canada.
- Based on the data, we argued that their migration is getting more difficult because fewer monarchs are found at their overwintering home in Mexico.
- We ended by brainstorming ideas for what might be changing that is making it harder for Monarchs to survive their migration.

Ask volunteers to share out their ideas. Explain that in this lesson, we are going to learn more about what monarchs need to survive on their migration.

2. Introduce the monarch butterfly as a species that could become added to the list of endangered species due to habitat loss and other threats.

Explain that in 2014, a group of conservation organizations wrote a petition asking that a new species be added to the threatened or endangered species list: the Monarch butterfly. They gathered information to show that monarch butterflies were having trouble surviving and they identified that one of the major threats to monarch migration is habitat loss.

Write “Habitat Loss” on the board or chart paper. Review students’ understanding of habitat.

Discuss:

- What is habitat?
 - All animals have a habitat made up of food, water, shelter, and space. These four things must be accessible to the animal when they need it (for example, if a water source dries up during the hot summer this may not provide adequate habitat for animals who depend on it).
- What might happen if an animal’s habitat changes?

Explore

3. **Research monarch butterfly habitat and survival needs.**

Using print and online resources, have students research what Monarch butterflies need to survive and what their habitat looks like.

Questions to think about:

- What does a monarch butterfly’s home look like? Where do they live?
- What food do monarch butterflies eat? Do young caterpillars eat the same food as adult butterflies?
- Where do monarch butterflies lay their eggs?
- Key information students should collect:
 - Monarchs live mainly in prairies, meadows, roadsides, and grasslands.
 - As caterpillars, they feed exclusively on milkweed.
 - Adults are generalists and feed on a variety of blooming plants (containing great amounts of sugar). Female monarchs often lay their eggs on the underside of milkweed leaves.
 - Adult monarchs are seen flying in Nebraska from June through the fall, so having plants that bloom throughout the summer and fall are needed for the adults to thrive.

Explain

4. **Draw a Monarch Habitat.**

Provide students with paper, writing utensils, and crayons or markers.

Ask: If you were to design a habitat for monarch butterflies, what would you include?

Have students draw a picture and write a paragraph explaining their habitat design and how it meets the habitat needs of monarchs.

Wrap-up

5. **Ask volunteers to share with a partner the features of their monarch habitat drawing and explain how these features would support monarch survival.**

Lesson 3: What is a prairie and who lives there?

Objectives

- Recognize features shared by different prairie ecosystems (lots of grass, many wildflowers, little water, few trees)

Materials

- Computer with internet access
- Ecosystem cards (1 set per 3-4 students)
- Paper and drawing utensils

Time required

- 30-45 minutes

Vocabulary

- **Prairie:** An ecosystem full of grasses and wildflowers, with few trees, and little water

Engage

1. Review prior learning about monarch habitat.

- Monarchs live mainly in prairies, meadows, roadsides, and grasslands.
- Monarch caterpillars feed on the leaves of milkweed plants.
- Monarch butterflies feed on the nectar (sugars) of many different wildflowers.

2. Engage students' prior knowledge of prairies.

Display the word, Prairie, on the board or chart paper. Give each student a piece of paper, pencil, and markers or crayons and ask students to draw a picture of a perfect prairie.

Questions to think about:

- We learned that monarchs live mainly in prairies. What do you think a prairie looks like? What makes it a prairie?
- What plants and animals do you think live in a prairie?

Ask volunteers to share out their drawings with the class and point out the features of the prairie and the plants and animals they drew.

3. Introduce the lesson objective

- Today, we are going to do something that scientists do- we are going to conduct research. We know that monarchs migrate through Nebraska on their journey from Mexico to Canada and back. Our goal is to learn more about what the prairie is like in Nebraska and how it provides habitat for monarchs.

Explore

4. Compare pictures of prairie ecosystems to other types of ecosystems.

Divide students into small groups, give each group a set of the ecosystem cards (provided)

Ask:

- What patterns do you notice in all of the prairies?
- What similarities and differences did you observe when you compare the prairie ecosystems to the other ecosystems (ocean, forest, and desert)?

Have students share their ideas. As a whole class, come to a consensus about several features that all prairies share:

- Prairie have lots of grass, lots of sun, few trees, few water features

5. Help students to explore the diversity of plants and animals (beyond grasses) that live in prairies.

Play a video of photographs taken by Chris Helzer, director of science for the Nature Conservancy in Nebraska: <https://youtu.be/xsk5TdnVg0U>. This video shows just a fraction of diversity of wildflowers and animals that are important components of prairies.

Ask students to focus on observing all the living and non-living things Chris saw in a square meter of prairie in Nebraska.

6. Based on the videos and pictures they have viewed, have students create a list of living and non-living things found in the prairie.

- Discuss:
 - Was the prairie only full of grasses? What else did you observe?
 - (1) The prairie is full of colors and wildlife. The video showed animals and lots of wildflowers also called forbs.
 - Why do you think you saw so many insects in the prairie?
 - (1) The prairie can be a good habitat for many insects. It provides necessary food, space, shelter, and water for these animals.

Explain

7. Ask students to revise or draw another picture of a prairie based on what they have learned.

Discuss:

- Look back at your drawing of the perfect prairie. Would you change anything about your drawing?
- Are there any plants or animals you would like to add?

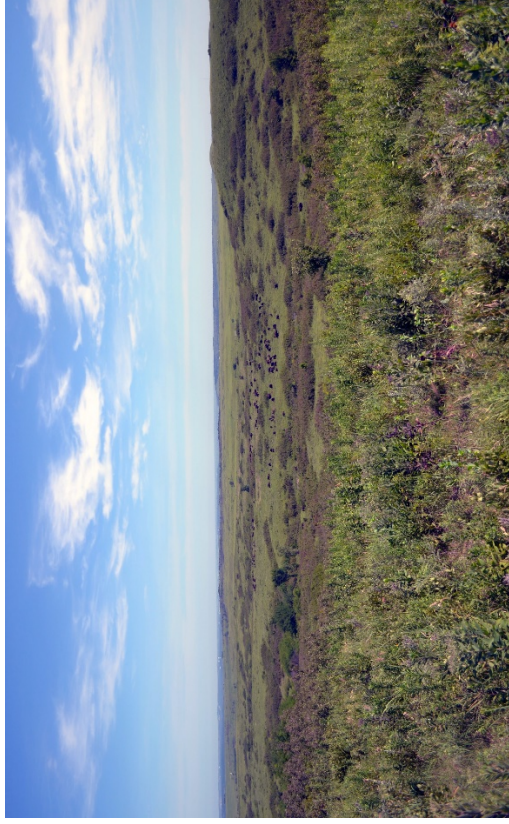
Give students time to revise or redraw their perfect prairie adding plants and animals that they may have missed in their first drawing.

Reflect: How did your drawing change? What did you add to your perfect prairie?

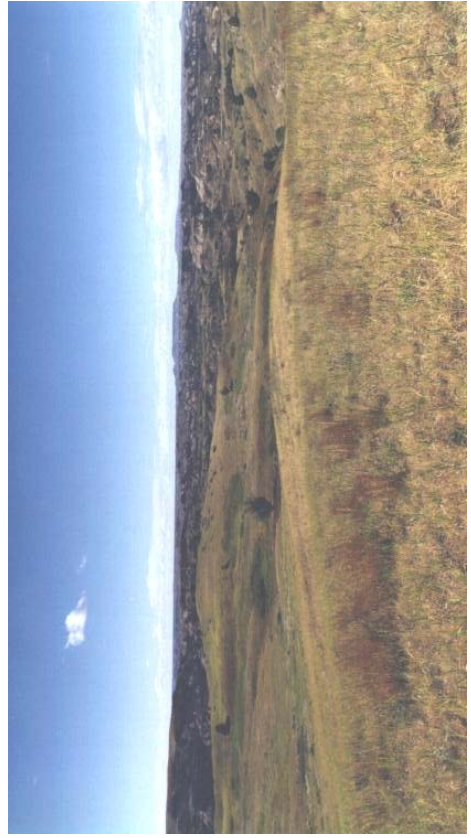
Sandhills Prairie



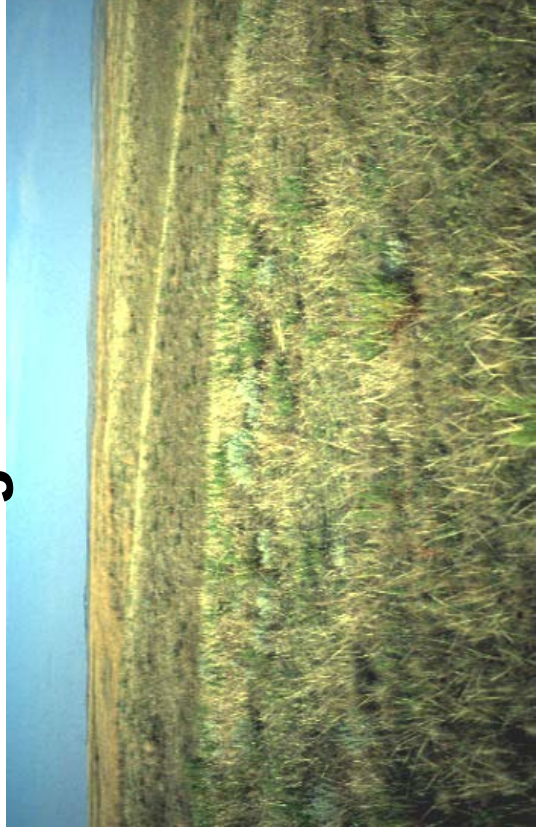
Tallgrass Prairie



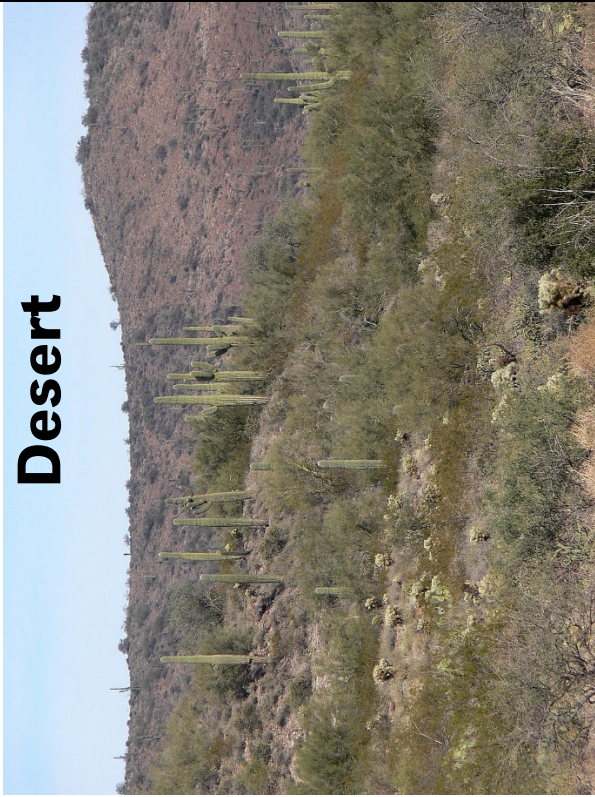
Mixedgrass Prairie



Shortgrass Prairie



Desert



Tropical Rainforest



Ocean



Temperate Forest



Lesson 4: Are all prairies the same?

Objectives

- Research Nebraska's prairie ecoregions
- Compare and contrast features and rainfall in Nebraska's four prairie ecoregions
- Make a prediction about which ecoregions would provide suitable habitat for monarch butterflies

Materials

- Researching Nebraska's prairies worksheet
- What is a Prairie? information sheet

Time required

- 45-60 minutes

Vocabulary

- **Ecoregion:** An area that shares similar land and water features and where similar plants and animals live.

Engage

1. Review features that all prairies share.

In our previous lesson, we talked about what makes a prairie a prairie and we drew pictures of our perfect prairie.

Discuss:

- What did all of our drawings share in common?
- Did all of our prairies look exactly alike? No, they didn't!
- What are some ways that prairies might be different from one another?
- What do you think causes these differences?

2. Introduce the lesson objective

Today, we are going to continue our prairie research, but we are going to focus on the ways that prairies can be different. We are going to talk about some differences that exist between prairies in Nebraska.

Explore

4. Conduct research on Nebraska's prairie ecoregions.

Introduce the term, *ecoregion*: areas where there are similarities in their physical features such as land and water and organisms that live there such as plants (trees, grasses, flowers) and animals.

Show students a maps of the four main ecoregions of Nebraska.

- What are the different areas called?

- In which area, do we live?

Provide students with various online or print resources such as the Nebraska prairie handout (provided), books, maps, pictures, Google images, and descriptions of Nebraska's different ecoregions.

- How is each area different from the others? How is it similar?

Explain

5. Compare differences in the ecoregions and discuss how differences may impact the different kinds of plants that grow.

Discuss

- What differences did you notice?
- How might differences between the ecoregions affect the types of plants that grow there?
- How might this affect whether monarchs survive well or not?

Researching Nebraska's prairies

Name _____

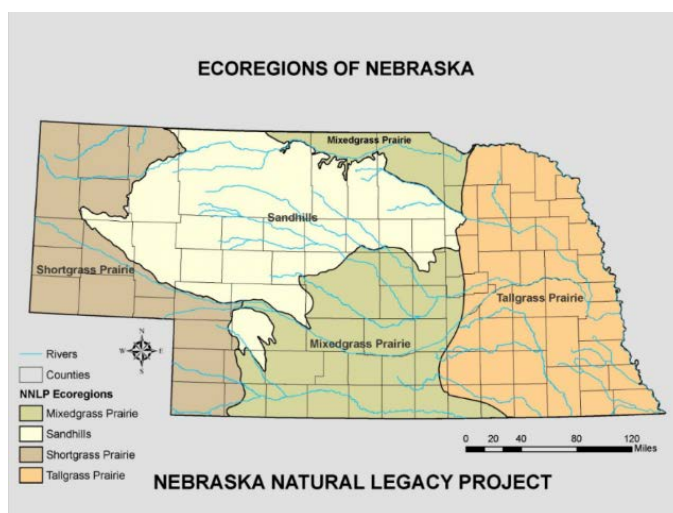
We already learned that all prairies are similar because...

But not all prairies are exactly the same!

Ecoregions are areas that share similar land and water features and where similar plants and animals live.

Nebraska has four prairie ecoregions.

Research each region and share what you learned below.

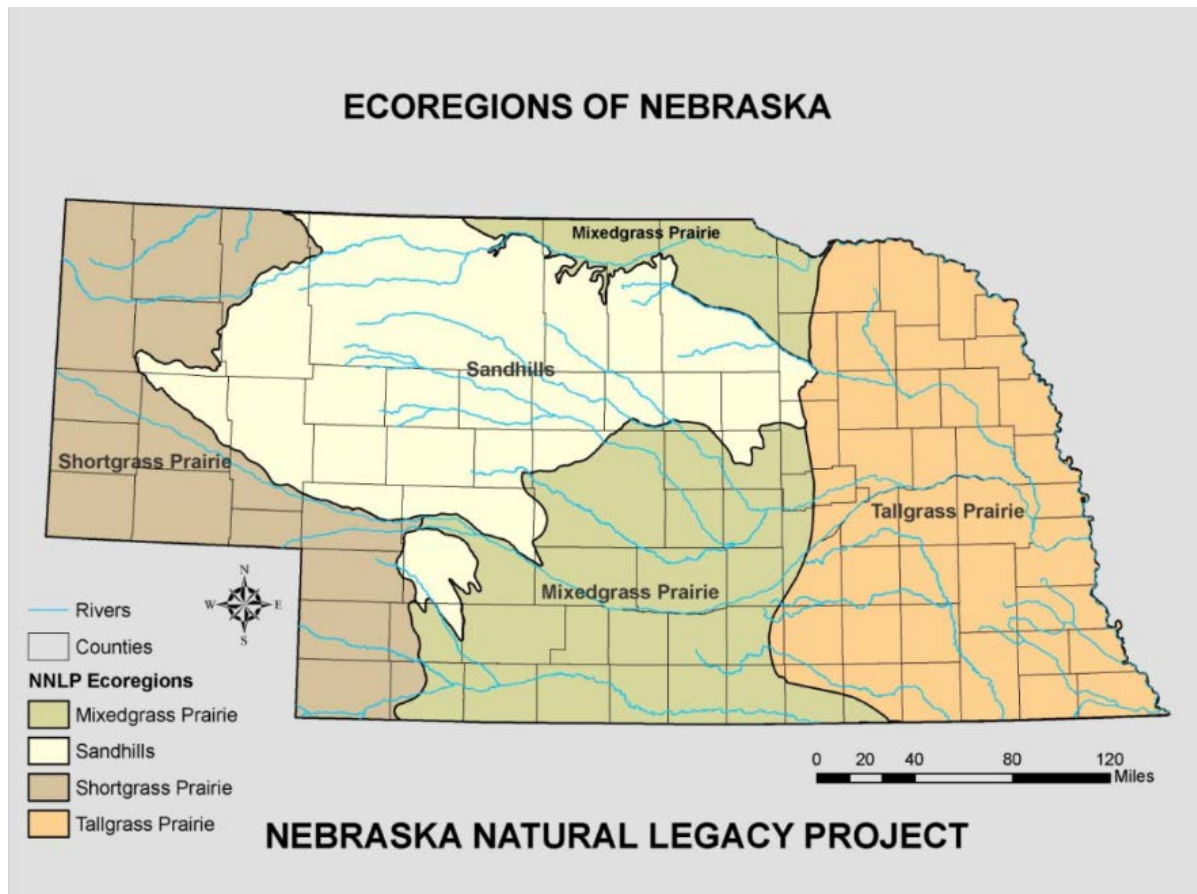


I live in the _____ prairie ecoregion.

Write 2 things you learned about each ecoregion.

<p>Shortgrass Prairie</p>	<p>Sandhills</p>
<p>Mixedgrass Prairie</p>	<p>Tallgrass Prairie</p>

What is a prairie?



In Nebraska, we do not have oceans, rainforests, or deserts, instead we have prairies. Nebraska is made up of four different types of prairies; the Tallgrass Prairie in the eastern part of the state, the Mixedgrass Prairie in the central part of the state, the Shortgrass Prairie in the western part of the state, and the Sandhills in the north-central portion of the state.

What makes a prairie, a prairie? By definition, a prairie:

- Has very few, or no trees
- Has rich, fertile soils full of organic matter (from dead and decomposing grasses and other plants)
- Can withstand, and actually benefit from fire
- Receives little rain or water
- Has plants that have adapted to living in full sun with little water

Nebraska's Four Prairie Ecoregions

The Tallgrass Prairie

The Tallgrass Prairie is located in eastern Nebraska. It is named for the types of grasses that can live there. The Tallgrass Prairie has taller grasses than the Mixedgrass and Shortgrass prairies. This ecoregion receives an average of 25-36 inches of rain each year. Some grasses here can grow to 6 feet or more!

The Mixedgrass Prairie

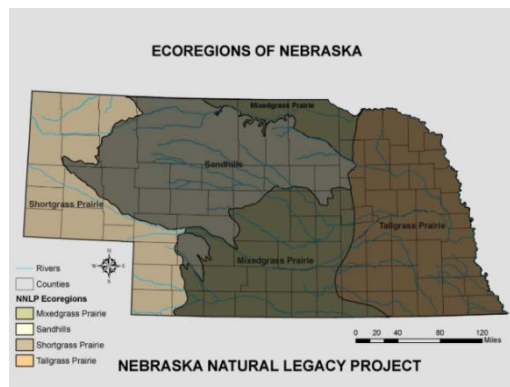
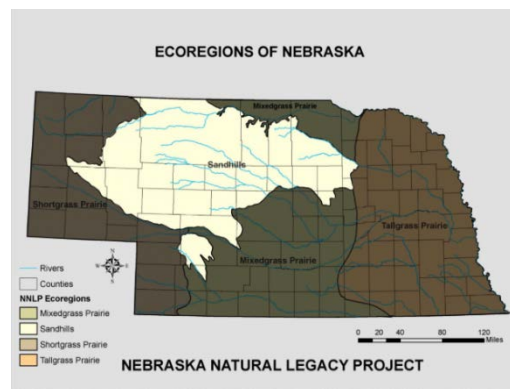
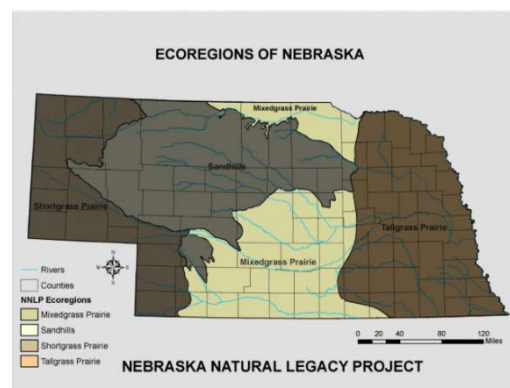
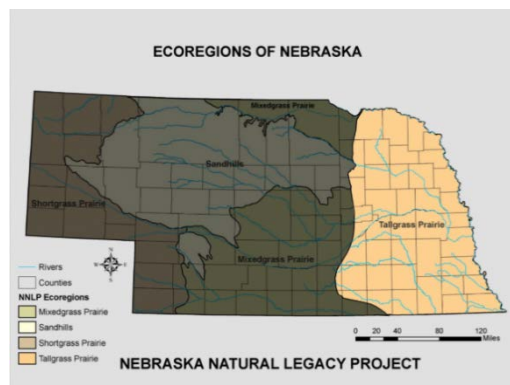
The Mixedgrass Prairie is located in central Nebraska. This type of prairie gets its name from having a mix of taller and shorter plants. In the eastern part of this ecoregion there will be taller plants, and in the western part there will be shorter plants. Usually the taller plants will be along the rivers and other water sources. This ecoregion receives an average of 20-28 inches of rain annually.

The Sandhills Prairie

The Sandhills Prairie is a unique landscape that can be found nowhere else on Earth! The Sandhills are found in north-central Nebraska. This prairie type has a mix of tallgrass, mixedgrass, and shortgrass plants. It also has wetland plant species which live in the wetlands and near small lakes dotting the ecoregion. The irregular dunes (hills of loose sand) and sandy soils set this ecoregion apart from other similar prairies in Nebraska. The sandy soils make this area poor for farming, which has left this ecoregion largely undisturbed by people and has left many acres of intact prairie.

The Shortgrass Prairie

The Shortgrass Prairie is found in western Nebraska, and it is given its name because of the short grasses that grow here. This area has mostly shortgrass plant species, but also has patches of mixed grasses and areas of wet meadows and tree-filled woodlands along rivers and creeks. This side of the state receives the smallest amount of rainfall, with only 12-17 inches a rain each year. This lack of water contributes to the type of animals and plants found in the area.



Lesson 5: How have Nebraska's prairies changed over time?

Objectives

- Identify patterns of developed and undeveloped land use in satellite images
- Identify patterns of land use change over time in different areas of Nebraska
- Make observations of historic vs. current tallgrass prairie land cover
- Identify pattern of declining tallgrass prairie land cover
- Construct a scientific argument to explain how and why the monarch butterfly migration has changed over time

Materials

- Computer with internet access
- White board or chart paper, markers
- Worksheet showing historic vs. current Tallgrass prairie range
- Writing utensils
- Claim-Evidence-Reasoning graphic organizer worksheet

Time required

- 60-90 minutes

Vocabulary

- **Claim:** Answers the key question. It tells us what you learned through your research or investigation.
- **Evidence:** Backs up your claim. It tells us about the observations of patterns or details from your research or investigation.
- **Reasoning:** Uses scientific terms or principles to explain the evidence.

Engage

1. Discuss how pictures can be used to see changes over time.

Ask:

Who remembers having their school picture taken? If you look at your previous school pictures, can you see how you have changed over time?

Have students share if they have noticed that they have changed a little or a lot over time by comparing their school pictures over time.

Explain:

Just like School pictures are taken every year and you can see how you change over time by comparing the pictures, the Earth also gets its picture taken every year too and we can see how the Earth has changed over time by comparing these pictures.

Explore

2. Introduce Google Earth Engine.

Navigate to the Google Earth Engine website- <https://earthengine.google.com/timelapse/>.

Explain to students that they can use the Google Earth Engine to see pictures of how the Earth looks from above. Have students stand up, look down at their feet, and pretend to take a picture. Explain that the pictures taken of Earth are called satellite images and they are taken by cameras that are looking down at the Earth. These pictures have been taken every year (sort of like how school pictures are taken each year) for the past 35 years! By comparing how these pictures look year after year, we can see how the Earth has changed over time.

3. As a class, make observations and identify patterns in natural and developed areas.

Using Google Earth Engine, explore an area that has experienced major changes from 1984-2018. You may want to explore a local area such as your town or school. If not much change has happened in your area, you may want to show an area from the left column which has experienced major changes.

Good examples include:

- [Deforestation in Nuflo de Chavez, Bolivia](#) to see changes that emerge when land is cleared for agriculture production.
- [Urban growth in Las Vegas, Nevada](#) to see changes that emerge when land is cleared for urban development.

Ask:

- What do you notice about how the land changes or stays the same?

Have students write down their answers or discuss what they notice with a partner. Discuss observations as a whole class.

Make two columns labelled Big Changes and No (or Little) Change on a whiteboard or chart paper. Record and discuss the patterns that students observe when land has experienced big changes and the surrounding area that looks unchanged.

Big Changes	No Change
Examples: Changes shape- lots of squares or circles rather than squiggly, natural shapes Changes color- Land changes color (green to tan)	Examples: No shape change No color change- Land stays the same color

4. Compare changes in the Sandhills and Tallgrass prairie over time using aerial maps.

Explain that now that we have seen what major changes have looked like over time, we are going to look at different areas in Nebraska to see if we see areas that have changed very little or if we see patterns that suggest an area has changed a lot.

Explain that, as a class, you will be comparing how land changes over time in two of the prairie ecoregions in Nebraska, the Sandhills and the Tallgrass prairie.

Show several areas in Nebraska to observe how the land has changed over time.

- Areas in the Sandhills
 - o [An area where much of the prairie is intact such as Mullen, NE](#)
- Areas in the Tallgrass prairie
 - o [An area where many crops are grown such as Stromsburg, NE](#)
 - o [An area where a city is rapidly developing such as Omaha, NE](#)

Remind students to think back to the patterns they observed earlier.

Ask:

- In which area (Sandhills or Tallgrass prairie) did you observe the most change? How can you tell?

5. **View a map of historic vs. current Tallgrass prairie range.**

Explain:

When we observed the satellite images, we could only see how the Earth has changed over the past 35 years, but researchers can use satellite pictures and other sources of information to compare how land has changed over much longer periods of time. They can compare how land used to look before people settled here and what it looks like now.

Show students the map, Tallgrass Prairie Ecosystems: Then and Now. Explain that the light green color is the Tallgrass prairie before people settled in Nebraska and the dark green color shows where Tallgrass prairie is found now.

Use the Notice and Wonder strategy to help students make observations and ask questions about their observations.

- What do you notice?
- What do you wonder?

Have students take a few minutes to write down their answers. Divide students into partners or small groups and ask students to share their observations and describe what patterns they see in data.

Ask students what they think the map might be showing. Record students' ideas.

Explain that maps can be useful in showing how an area has changed over time. Discuss what the map is showing—the range of tallgrass prairie before settlers moved into the area (light green) and the range of tallgrass prairie currently (dark green).

Explain

6. **Model a claim-evidence-reasoning (CER) conversation as a whole class.**

Ask: How has the monarch migration changed over time and why do you think this is?

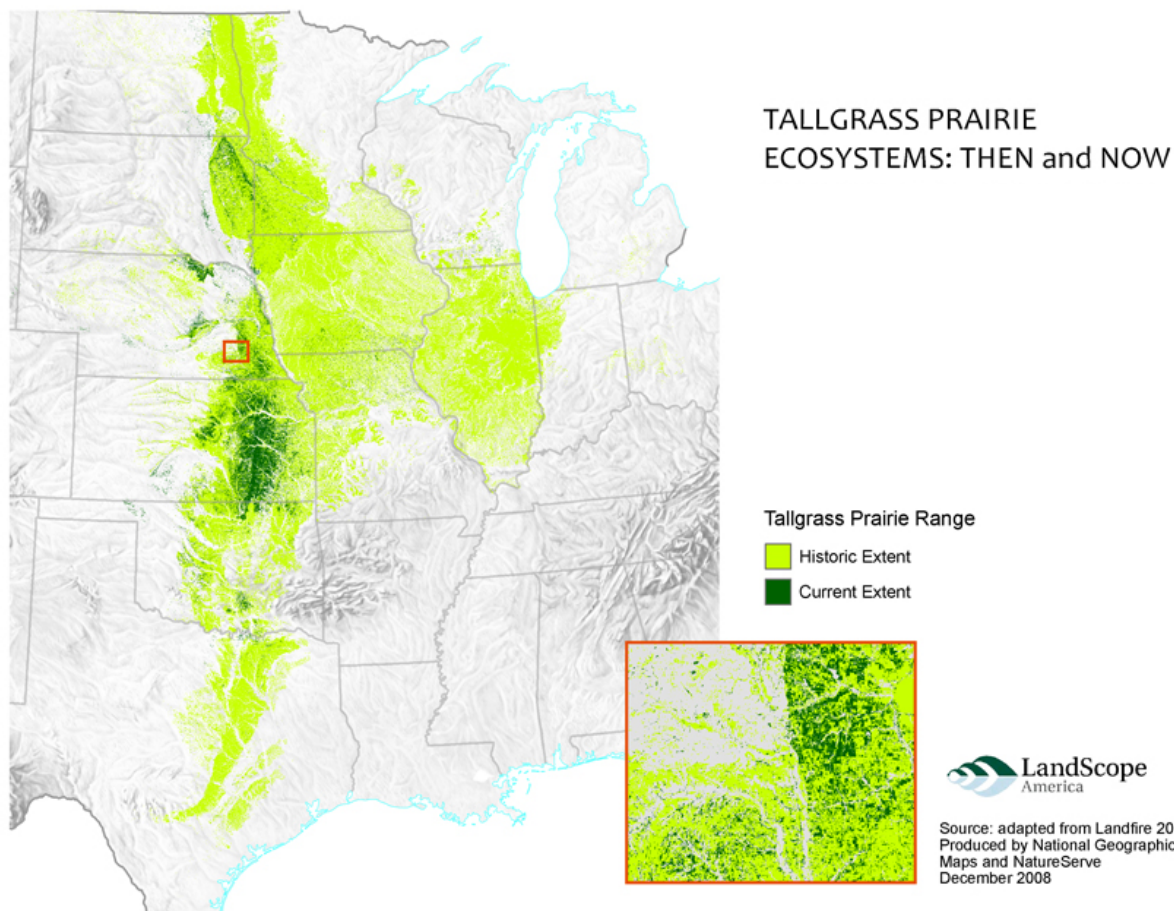
Have students make a claim about how Monarch migration changed. Do they think it is easier, harder, or the same?

Now have students think about HOW they know this. Ask students to think back on the evidence they have gathered so far- the graph of monarchs at their overwintering site, what they learned about monarch habitat and prairie, their observations of change over time, and the Tallgrass prairie map.

Conduct a CER conversation, where students discuss their claims, present their evidence, and introduce their reasoning. Work as a class to write an argument using the provided template.

Exploring Nebraska's changing prairie.

Name: _____



Look at the map shown above. Answer the questions below. Discuss your answers with a neighbor.

What do you notice?	What do you wonder?

How has the monarch butterfly migration changed over time and why?

Use the evidence you gathered from...

1. Your monarch butterfly habitat research
2. Your prairie research
3. The patterns you noticed when looking at Nebraska's Tallgrass prairie compared to the Sandhills
4. Your observations of the Tallgrass Prairie map

Construct a scientific argument supported by your evidence about how has monarch butterfly migration changed over time and why.

Claim: Answers the key question. It tells us what you learned through your research or investigation.

My claim is...

I think...

Evidence: Backs up your claim. It tells us about the observations of patterns or details from your research or investigation.

I observed/read/found....

My evidence is...

My proof is...

Reasoning: Uses scientific terms or principles to explain the evidence.

I know this is true because...

This happened because...

The reason for this is...

Claim: I think the monarch butterfly migration ...

Evidence:

Reasoning:

Lesson 6: How can humans help the monarchs as they migrate?

Objectives

- Analyze maps of monarch migration from Journey North to determine when monarchs fly through Nebraska and need access to milkweed and wildflowers
- Identify how planting prairie flowers provide habitat (food, water, space, or shelter) for prairie animals
- Write a recommendation (make a claim) about actions humans can take to help monarch butterflies on their migration

Materials

- Book: Plant a Pocket of Prairie by Phyllis Root
- White board or chart paper, markers
- Paper and writing utensils

Time required

- 60-90 minutes

Vocabulary

- **Habitat:** The home of an animal or a plant; includes food/sunlight, water, space, and shelter

Engage

1. **Engage students' prior knowledge of healthy foods and we need to have the right kinds of foods and the right amount of food to stay healthy.**

Discuss:

- I want you to think about making a meal for yourself that is healthy. What foods would you include?
- What if you went to the grocery store to buy food and there is only broccoli? Could you survive if you had to eat only broccoli for every meal?
 - Yes, you could probably survive, but you might not feel very good and you might get sick. Broccoli is a healthy food, but it isn't healthy to eat only broccoli and nothing else.
- What about if you went back the week after that and there was no food at all on the shelf? Could you survive if there is no food to eat?
 - No, humans need food to survive.

Explain that all living things need the right types of food and in the right amount to be healthy.

2. **Review what we have learned about monarch habitat and how it is changing.**

- Think back about what we learned about what monarch caterpillars and butterflies need to survive. What did we learn?
 - Monarch caterpillars eat only milkweed leaves.
 - Adult monarch butterflies eat nectar (sugars) from many different types of wildflowers.
- We also learned that monarchs live in prairies and that prairies are changing.

3. Introduce the lesson objective

- We have been learning about how monarch habitat is changing and this is affecting their ability to survive on their migration. Now we need to look at ways that humans can help monarchs during their migration.

Explore

4. When do monarchs need food? When are monarchs migrating through Nebraska?

Show students maps of adult monarch sightings by citizen scientists from Journey North. Explain that each dot represents an adult monarch being seen by someone as the monarchs are migrating north in the spring and south in the fall. The different colors represent when the monarch was seen.

- Moving north in the spring: <https://maps.journeynorth.org/map/?year=2019&map=monarch-adult-spring>
- Moving south in the fall: <https://maps.journeynorth.org/map/?map=monarch-adult-fall&year=2019>

Discuss

- What do you notice?
- Based on the maps, when are monarchs passing through Nebraska?
- What does this tell us about when food needs to be available?

5. Read a story about how planting prairie plants can provide a way to improve habitat not only for monarchs, but for other animals.

Read Plant a Pocket of Prairie by Phyllis Root

- As you read the story, ask students to look for ways that planting prairie flowers provides each of the four elements of habitat- food, water, space, and shelter- for prairie animals.

Individually or as a group, ask students place a mark next to each habitat element that is provided for prairie animals. This can be done individually in science notebooks or on small white boards, or as a whole class.

Food	Water	Space	Shelter

6. Learn from several experts from the Milkweed in the Classroom team as they take you on a tour of a prairie in Aurora, Nebraska and discuss how planting prairie plants can improve habitat for monarchs and other wildlife.

Watch videos featuring the following Milkweed in the Classroom team members:

- Anna Swerczek, Pheasants Forever, Inc.: <https://go.unl.edu/milkweed1>
- Sarah Bailey, Prairie Plains Resource Institute: <https://go.unl.edu/milkweed2>
- Doug Golick, University of Nebraska-Lincoln, Department of Entomology: <https://go.unl.edu/milkweed3>

Explain

7. Reflect and Discuss

- Do you think planting prairie plants is a good way to improve habitat for monarch butterflies? Why or why not?
 - Yes, planting prairie can provide Monarchs and other animals with many habitat elements that are needed for survival.

Elaborate

8. Write a recommendation for ways that humans can help protect Monarch butterflies through prairie conservation.

- Based on what you have learned, design an information pamphlet about prairie conservation for parents, the public, or businesses that outlines prairie conservation steps that can be taken.

Questions to think about:

- Why do monarchs need our help?
- How do we create quality habitat for monarchs?
- When do food resources need to be available?
- Which prairies in Nebraska are most in need of our help?

Extension Activities

For longer or more in-depth prairie conservation activities, consider one or more of the following:

- Grow milkweed plants in the classroom to be transplanted outside later.
- Examine existing milkweed plants (if available) to record the animals living on or visiting them.
- Design a high quality prairie plant seed mix that you think would help improve local wildlife habitat.
- Design a prairie garden that can be planted at or near the school, students submit designs that include:
 - Types of plants should be selected to match their location
 - Additional wildlife habitat supports (bird houses, native bee hotels etc.)
- Plan for a trip to a prairie.