



UNIT: H13 TITLE: Researching a Plant, Animal or Fungus

TYPE: Lesson Plan

This activity is based on the US Forest Service's "FireWorks Northern Rocky Mountains & Northern Cascades" Curriculum

Overview

The Tallgrass Prairie Ecosystem is a diverse system with hundreds of grass and forb species and a wide diversity of wildlife. The health of the tallgrass prairie is supported by grassland fire and grazing, which naturally occurred with lightning strikes and roaming bison herds before this land was colonized.

Lesson Goals:

Students will develop an understanding of the species, populations and communities within the tallgrass prairie ecosystem and how fire and grazing impact those systems.

Objectives:

Students will be able to:

1. Complete a trophic level organizational chart for the tallgrass prairie ecosystem.
2. Using dataset from Konza Biological Station, analyze data for trends of bird species on grazed/un-grazed prairie or burn at different intervals.
3. Conduct an additional analysis of a chosen population using Konza data and including a graphic representation of findings as well as a written discussion of findings.

Anchoring Phenomena:

Use the introductory google slides to explore to explore the role of grazing and fire on the tallgrass prairie.

Subjects: Life Sciences

Duration: 2 Class Periods

Group Size: Whole Group or Small Groups

Setting: Indoors

Vocabulary: Ecosystem, Biome, Biosphere, Trophic Level



Academic Standards:

Standards		High School (9-12)
NGSS – Disciplinary Core Ideas	HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	
NGSS – Performance Expectations	Speaking and Listening	SL.9-10.5, SL.11-12.5
	Language	
	Writing	W.9-10.7, W.11-12.7

Teacher Background:

<https://keep.konza.k-state.edu/prairieecology/TallgrassPrairieEcology%20copy.pdf>

<https://www.nps.gov/tapr/learn/nature/fire-and-grazing-in-the-prairie.htm>

Materials and Preparation:

Laptops or tablets for each student

Familiarize yourself with the EcoregionMapping Teacher Pages and if desired, download the powerpoint instructions for use with class:

<https://sites.google.com/view/firemapping/ecoregion/ecoregion-teacher>

Procedure:

1. Engage:

A Sense of Place--where do you live? What is the ecoregion where we live?

With each student having a laptop or desktop computer with Google Earth loaded on the computer, provide students with an overview of how to create an ecoregion map and a map pin to identify the school using:

<https://sites.google.com/view/firemapping/ecoregion>

***If time permits, challenge students to use Google Earth and their avatars to create a photo of them on site within their ecoregion.

Once students have created their map, engage them in discussion. What do you, as a human, need consistently to be healthy? How do you think this might similar to what a tallgrass prairie ecosystem might need? How might it be different?

Use the Introductory slide show which introduces the concepts of grazing and fire as beneficial to the Tallgrass Prairie Ecosystem (Source, modified from:

<https://www.nature.org/en-us/about-us/where-we-work/united-states/minnesota/stories-in-minnesota/restoring-fire-to-native-grasslands/>):

SLIDE 1: Before Europeans settled the Great Plains, a vast tallgrass prairie stretched from what is now known as Canada south to Texas. These grasslands were historically grazed by large herds of bison and burned on a regular basis through both lightning strikes and intentional burning by Native Americans for hunting and agricultural purposes. Much of this original tallgrass prairie has been lost as prairies were plowed under for crop production and or developed. Some estimate that only 4-13% of tallgrass prairie remains today, with the majority in the Flint Hills of Kansas (Sampson, 2004). Grazing and fire are key components to preserving and maintaining the remaining tallgrass prairie ecosystem today.

SLIDE 2: Let's take a look at some comparisons. The fence separates a prairie that has been grazed (left) and one that has not been recently grazed (on the right). What do you observe? Which section of prairie seems "healthier?" Why do you think that?

SLIDE 3: Here's another opportunity to compare--The section of prairie on the right was burned in spring, the left, not burned since the previous year. This picture was taken in the fall, so one year after the left was burned and 5-6 months after the right patch was burned. What impact do you think that burning might have on the plant species of the tallgrass prairie? Which patch seems "healthier?" Why do you think that?

What do you think might be the impacts on other living populations within the ecosystem?

2. Explore:

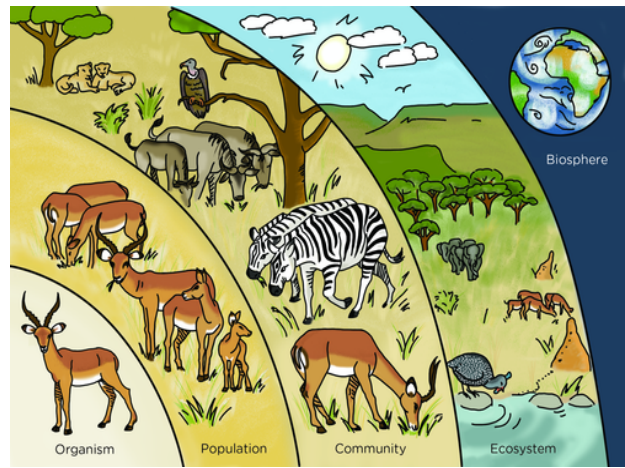


Divide students into prairie biologist research teams of four. Provide each team with the following:

Using the trophic levels of organization chart above, provide examples of specific species and describe populations and communities found on the Tallgrass Prairie. <https://keep.konza.k-state.edu/prairieecology/index.html>, What are the interactions between species in a population? In a community? How might fire impact your example species and populations and communities? How might lack of fire impact? Develop a visual that represents the levels and interactions, as well as potential interactions with fire for your exploration and be prepared to share your findings with another team.

Present your visual and share your findings on interactions between species in a population? In a community? How might fire impact your example species and populations and communities? Discuss how the two team findings might impact one another.

An example visual representation found here:
<https://socratic.org/questions/can-you-define-population-community-ecosystem-and-biosphere-how-are-they-each-re>



3. **Explain:**

Now that your teams have looked at some of the species, populations and communities found in the Tallgrass Prairie ecosystem, let's look at a specific population and explore the research data from the Konza Biological Station on the impact of burning and grazing on bird populations.
<https://drive.google.com/open?id=18uxp6YEUa-Xh-jQ6v9mZofbRAfUJhtfk>

Using original teams, assign half the teams' analysis of the impact of grazed/ungrazed on bird populations at the Konza and the other half on the impacts of burning every year, every two years and not burning on bird populations over time.

Key Questions to Explore:

1. How can you represent this data in a graphic format that helps to better understand the patterns and trends?
2. What are your key findings of the patterns and trends on bird populations? How does grazing or burning impact overall population? Diversity within the population?
3. What additional questions do you have after exploring the data?

4. **Elaborate:**

Using the dashboard of Data Collected at the Konza: <http://lter.konza.ksu.edu/data-explorer-dashboard>

Explore a different population within the Tallgrass Prairie ecosystem. How did this data compare to the bird population exploration? How was it different? What additional questions do you have?

Evaluate:

Evaluation based on graphic representations and analysis of chosen population.

Evaluation Rubric:

Prairie Biologist Team Rubric

Team Members:

0-5 Points	6-10 Points	11-15 Points	Points Awarded
Visual representation does not accurately depict specific examples of multiple species, populations and communities within the prairie ecosystem	Visual representation accurately depicts specific examples of some species, populations and communities within the prairie ecosystem	Visual representation accurately depicts specific examples of multiple species, populations and communities within the prairie ecosystem	
Group presentation involves only one or two team members and presentation does not discuss the interactions between species in a population, in a community and potential fire impacts	Group presentation involves most team members and team discusses some of the interactions between species in a population, in a community and potential fire impacts	Group presentation involves all team members and team discusses the interactions between species in a population, in a community and potential fire impacts	
Only one or two members actively engage with another team to discuss how each other's examples species, populations and communities might interact and/or impact one another	Most team members actively engage with another team to discuss how each other's examples species, populations and communities might interact and/or impact one another	Team members actively engage with another team to discuss how each other's examples species, populations and communities might interact and/or impact one another	
		TOTAL OUT OF 45 POINTS	

References/Resources:

Explore your EcoRegion! Find a site near your school and plan a field visit and population study:

https://docs.google.com/document/d/13OsYkKA6rIZ-5nWmvpjynXSWL0e4BqymGS1TMn2_Ck/edit?usp=sharing

