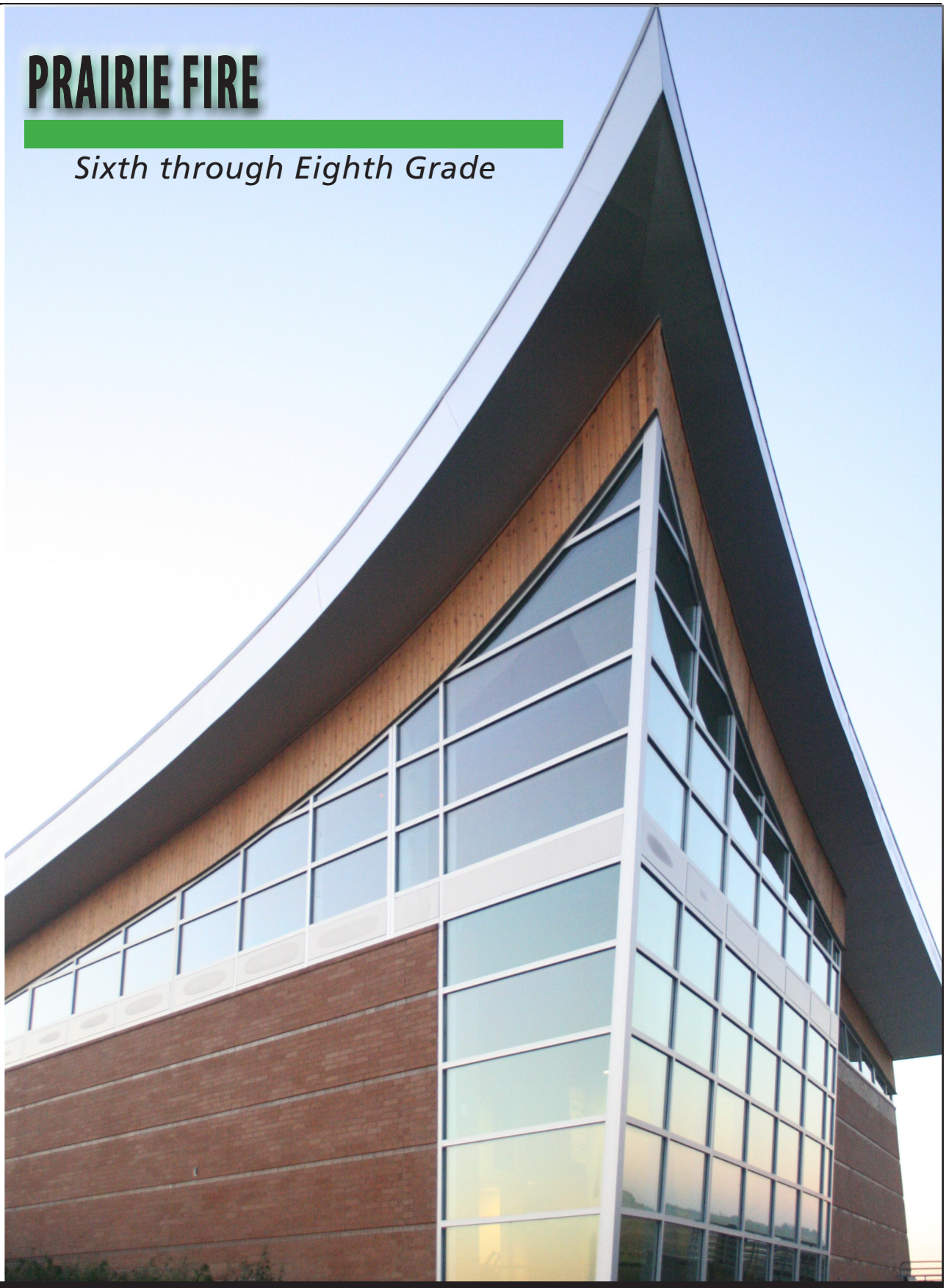
Free Land was the Cry!

PRAIRIE FIRE

Sixth through Eighth Grade



Homestead

National Park Service
U.S. Department of the Interior

Homestead National Monument
of America, Nebraska

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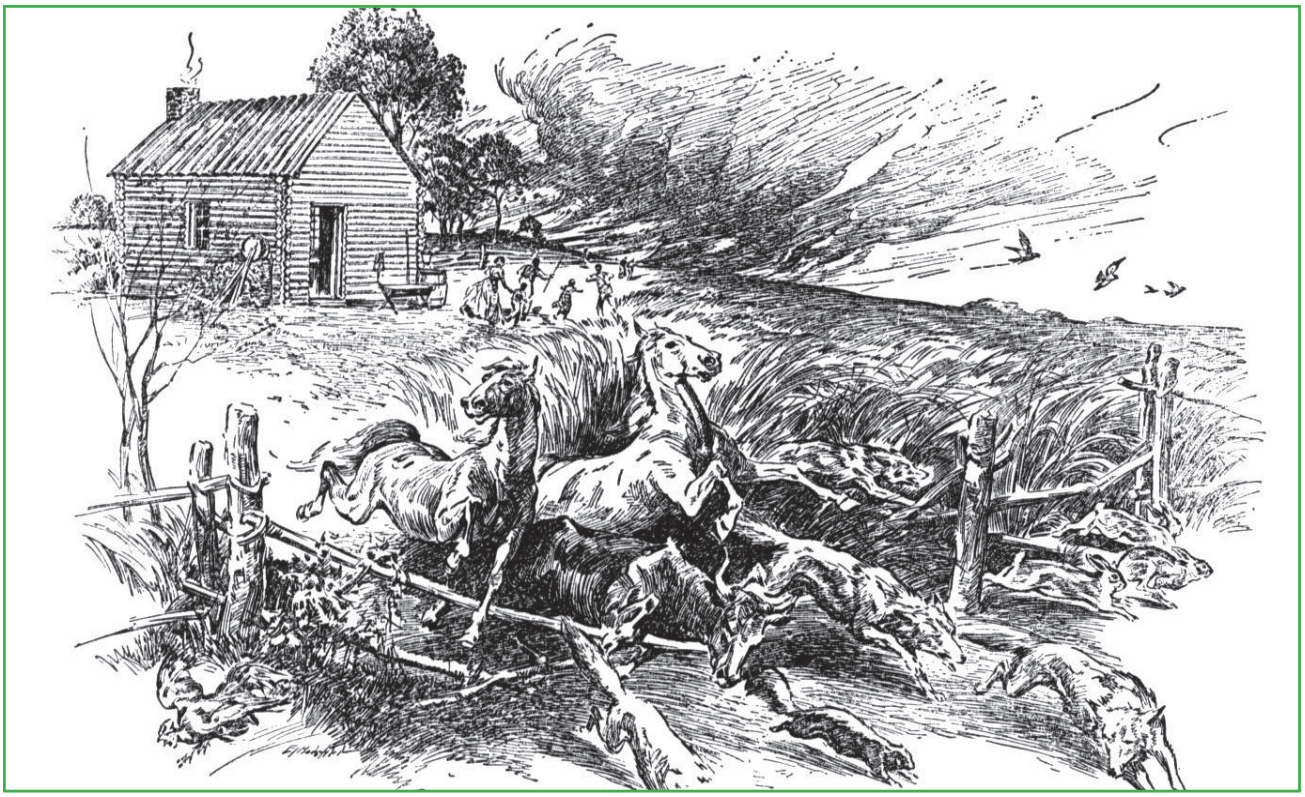
Some of the ideas in this lesson may have been adapted from earlier, unacknowledged sources without our knowledge. If the reader believes this to be the case, please let us know, and appropriate corrections will be made. Thank you.

PROGRAM DESCRIPTION



For homesteaders, prairie fires were a hazard that threatened their crops, their homes, and their lives. Methods of fire prevention and fire safety—such as fire breaks—were used in efforts to control and stop burns.

However, fires play a regenerative role for plants on the tallgrass prairie. Controlled burns are now used in prairie restoration projects. Native plants—such as grasses, with deep and established root systems—can handle fire better than invasive or exotic plants.

Scientists continue to study the effects of fire on different plant types (such as forbs and woody plants) and animal species, but it is generally believed that fire contributes to increased biodiversity in the tallgrass prairie ecosystem.

The meaning of "prairie fire" in America has changed and evolved throughout history. By studying this phenomenon, students learn about science, culture, and their ongoing intersections on the prairie.

CURRICULUM OBJECTIVES

- Students can identify different categories of fire.
- Students can use appropriate vocabulary to describe characteristics of fires and burns.
- Students can distinguish between invasive and native plants in the tallgrass prairie ecosystem, and identify common species within each category.
- Students can describe how and why fire is used to control invasive plants and restore native prairie species.
- Students can create a journal to contain their work.
- Students can observe species in a field setting.
- Students can record observed data in a self-designed chart.
- Students can artistically record observations.
- Students can define biodiversity.
- Students can name means of preserving biodiversity.
- Students can identify reasons to preserve biodiversity.

NATIONAL STANDARDS

NS.5-8.1 SCIENCE AS INQUIRY

As a result of activites in grades 5-8, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry.

NS.5-8.6 PERSONAL & SOCIAL PERSPECTIVES

As a result of activites in grades 5-8, all students should develop understanding

- Personal health
- Populations, resources, and environments
- Natural hazards
- Risks and benefits
- Science and technology in society.

NSS-G.K-12.5 ENVIRONMENT AND SOCIETY

As a result of activites in grades K-12, all students should

- Understand how human actions modify the physical environment.
- Understand how physical systems affect human systems.
- Understand the changes that occur in the meaning, use, distribution, and importance of resources.

SPECIAL ICONS

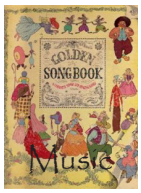
Indicates a reproducible handout is included

Indicates an additional science activity

Indicates an additional math lesson

Social Studies

Indicates an additional social studies lesson

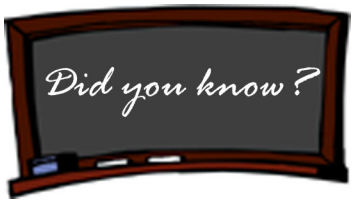


Indicates an additional music or art activity

Indicates an additional language arts lesson

Pre-Visit Activity #1 (suggested)

FINDING OUT ABOUT FIRE



The ongoing tallgrass prairie restoration at Homestead National Monument of America is the second-oldest in the United States. Prior to the acquisition of the Freeman homestead by the National Park Service, the prairie area had been heavily used for agriculture and grazing. It was decided to restore this area to tallgrass prairie to reduce soil erosion and to provide a visual link to the environment encountered by early settlers. The restoration was accomplished through a combination of seeding a mix of native grasses, installation of native plant plugs, and transplanting sod from local areas of unploughed prairie. Management for exotic species has involved mowing, selective herbicide application, and beginning in 1970, prescribed burning on a regular basis.

Assess how much the students know about fire by using the vocabulary list and the crossword available in the Additional Resources.
For other words and definitions related to fire, see the **Glossary of Fire Terms** at: http://www.pbs.org/wgbh/nova/fire/glossary.html.

Then have students learn about prescribed burns at the National Park Service's Fire and Aviation Management website.
The link is: http://www.nps.gov/fire/fire/fir_prescribedfire.cfm
After reading the page, have the students watch the flash video at the end of the page on prescribed fires.

Then have students watch the Homestead National Monument's 2009 Prescribed Fire Slideshow http://www.nps.gov/home/upload/2009 Fire Final_0003.wmv (.wmv file for Windows only, 4.32 MB), available for download here: http://bit.ly/aWn9yq

Discuss with students:

- Which terms best describe characteristics of wild prairie fires?
- Which terms best describe characteristics of prescribed burns?

Have students test their fire knowledge by taking the fire quiz on the National Park Service's Fire and Aviation Management website at: http://bit.ly/c65gt5

FLORA AND FIRE

Effects of Fire on Exotic and Native Plants

Based on what students know, review exotic species like musk-thistle, smooth brome etc. An exotic species is anything not native to the ecosystem. Review native species like big bluestem, milkweed, etc.

Ask students the following questions:

- What is the difference between exotic and native plants?
- Can you name plants that fit into one of these categories?

If students have no prior knowledge, assign them to research a particular species.

Ask students to hypothesize (verbally or in written form) about how these categories of plants might respond to burning, such as in a prairie fire. Discuss their reasoning. For example, if a student predicts bluestem would respond positively to fire, they might explain their reasoning by pointing to the root system of the plant.

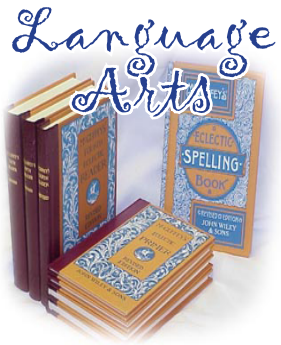
Individually, or as a class, have students read Stephen J. Pyne's short article "How Plants Use Fire (And Are Used By It)" at http://www.pbs.org/wgbh/nova/fire/plants.html.

Also have them view the short Homestead National Monument Fire Case Study (Flash Presentation) at http://bit.ly/c5qZG3

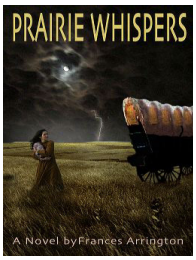
Have students revisit the hypothesis they stated about plants and fire. Ask them to evaluate their hypothesis based upon the information gained in the article and video.

For example: Why was or why wasn't your prediction accurate? Students could respond verbally or in writing.

Pre-Visit Activity #2 (suggested)

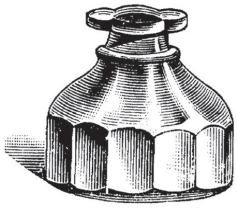


Individually, or as a class, students could read Frances Arrington's book *Prairie Whispers* and discuss. Amid the prairie grasses along the Missouri River in the 1860s, 12-year-old Colleen McCall finds a dying woman and her newborn inside a lonely wagon. Promising to protect the baby from the woman's negligent husband, she substitutes the infant for the stillborn her mother has delivered prematurely and takes a gold watch and strongbox at the woman's request. Trapped between her promise to the child's mother and the emotional trauma over her stillborn sister, she struggles to make things right on her own.



Pre-Visit Activity #3 (suggested)

Enrichment Activities



Have each group design a poster to support the opinion of the character portrayed in the role play.

FEELINGS ABOUT FIRE

Wildfires have positive and negative effects. Students will explore the positive and negative effects of wildland fire and will begin to explore their own positions toward, or opinions about, fire ecology.

Have students visit the Fire Feelings lesson on the National Park Service Fire and Aviation Management website at:
http://www.nps.gov/fire/educational/edu_tea_les_firefeelings.cfm
Complete the activity with the following information.
People have many different attitudes toward fire. Why would some individuals think wildland fires are harmful or bad? Why would others view wildland fire as okay or good?

Review the background information with the class. Discuss why some people view fire as a positive force and why others view it as negative.

Assign each group a role to play.

- Park/forest manager, "Ms. Oak"
- Owner of a home adjacent to the fire area, "Mr. Shingle"
- Elk, deer or other grazing animal, "Sir Elk"
- Timber company that wants to harvest the lumber from the area that is burning, "Mrs. Paper"
- Termites, millipedes and other critters who live in and eat dead wood, "Mr. and Ms. Leggs"
- Other characters added by students

How would each of these individuals feel about a fire in their area? Would they feel differently if it was a lightning-caused or human-caused fire?

Divide the class into groups of four or five students. Allow the groups a few minutes to discuss how their characters may feel about wildland fires.

Ask each group to share with the other groups what its character(s) might feel and say about a wildland fire.

Discuss the commonalities and differences between the groups' feelings. Ask each group to list some positive and negative feelings it has about wildland fire. Address how education about fire management may influence some people's opinions about wildland fire.

This lesson plan courtesy of National Park Service Fire and Aviation.

Prairie Plants and Animals

Homestead National Monument of America's prairie is teeming with life no matter what season your group visits. Based on the season of your visit to Homestead, choose several common prairie plant species that students should be able to identify. A PowerPoint that reviews the plant life found at Homestead National Monument of America can be found under the For Teachers section at: www.nps.gov/home or in the Additional Resources Section.

Review the chosen species in class. Students should take notes, either in a designated regular notebook or in "nature journals" of their own construction.

Materials

To make nature journals, provide students materials (different kinds of paper; tools such as scissors, stapler, hole punch, and glue; binding materials such as thread, twine, and ribbon; and drawing materials) with which to construct a 10-12 page nature journal to use in their study of plants and fire. The design can be of their choosing, or you could provide special instructions for design and binding techniques. The cover should include their name and should indicate the purpose of the journal.

Guide students in constructing tables in which they will tally the results of their count of the chosen species.

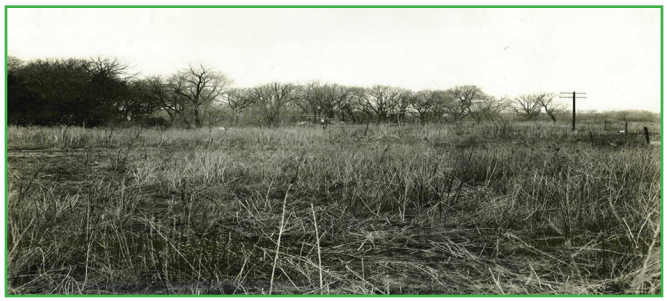
In consultation with a park ranger, conduct species counts in areas of Homestead National Monument of America or at another facility.

Students should tally the results in their nature journals. Then, they should make notes about and sketches of the species that they see. They should also note the occurrence of species they do not recognize.

Afterwards, ask students to give ideas of what they think "biodiversity" is. Explain and/or review this concept. Then, ask students to describe the biodiversity they found in their various species counts. How many species did they identify? How many species did they find but not recognize? Which unit had the greatest biodiversity? Why might that be?

Review what students know or have learned about prairie fires; or have a park ranger speak on how burning contributes to prairie restoration. Ask students: what are some ways that we know burning influences different kinds of plants? How do we know that burning contributes to prairie restoration?

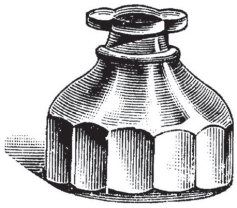
Before Restoration in 1937



After Restoration in 2007

Post-Visit Activity #1 (suggested)

Enrichment Activities



Research the advantages and disadvantages of having a prescribed burn in the fall vs in the spring.

Write a 500 word paper on which you would choose if you were the Natural Resource Manager at Homestead National Monument of America.

FIRE'S IMPACT ON BIODIVERSITY

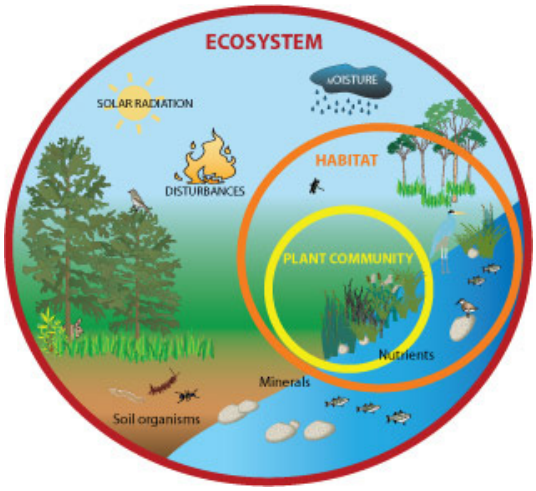
Preserving Biodiversity

Have students review what students know or have learned about biodiversity either from in-class discussions or from their visit to Homestead National Monument of America. A PowerPoint that reviews the plant life found at Homestead National Monument of America can be found under the For Teachers section at: www.nps.gov/home.

Have students read (individually or as a class) the excerpt on prairie fire from Aldo Leopold's *A Sand County Almanac* (pages 28-32). The link is: http://lb.vg/M3L67

In writing, or as an entry in their nature journal, if that activity was done, have students respond to the reading by addressing these questions:

- What is biodiversity?
- Why do we value biodiversity on the prairie?
- What are some of the strategies and techniques we can use to preserve biodiversity?



CHARACTER EDUCATION

Citizenship

Students who practice good citizenship are motivated by more than self-interest and greed. They are genuinely concerned for the needs of others. They recognize their duty to contribute to making life better at home, at school, in the neighborhood, and for the whole planet.

5 Minute Focus

Many natural ecosystems need fire to stay healthy. Timed prairie burns are conducted on a regular basis by trained fire specialists. The fire kills intrusive weeds and many larger woody plants and allows light in for the native plants. Because of their root system, the prairie plants are not harmed and the fire actually encourages growth. The fire releases nutrients into the soil and creates a surface that warms quickly so the growth of plants gets a head start. Burns simulate what wild fires did for the tallgrass prairies. It was also used by American Indians who recognized its benefits.

Discuss beneficial fires and harmful fires. Stress that burns are well planned and organized by experts. What other components of nature have good and bad aspects?

ADDITIONAL RESOURCES

Reading

Arrington, Frances. *Prairie Whispers*. Philomel, 2003
192 pages. A historical novel in which prairie fire plays a role in the finale. Recommended for young adult readers

Dick, Everett Newfon. *The Sod-House Frontier, 1854-1890: a Social History of the Northern Plains from the Creation of Kansas & Nebraska to the Admission of the Dakotas*. D. Appleton-Century Co., 1937. 216-220.

Leopold, Aldo. *A Sand County Almanac: With Essays on Conservation from Round River*. New York: Random House, 1970. 28-32.
http://lb.vg/M3L67
Discussion of the Bur Oak's insulation against prairie fires.

Pyne, Stephen J. "How Plants Use Fire" (And Are Used By It):
http://www.pbs.org/wgbh/nova/fire/plants.html

Reichman, O.J. *Konza Prairie*. Lawrence, KS: University Press of Kansas, 1987. 104-114, 158-162.
Readable, simplified explanation of the water and nitrogen cycles on the prairie and how fire works with them. Nice before and after pictures of prairie fire results.

Resources

Glossary of Fire Terms:
http://www.pbs.org/wgbh/nova/fire/glossary.html

Homestead National Monument Fire Case Study (Flash Presentation):
http://www.nps.gov/fire/utility/media/uti_caseStudy_HOME.cfm

Homestead National Monument's Prescribed Fire Slideshow (2009) available for download here: http://www.nps.gov/home/photosmultimedia/multimedia.htm

National Park Service Fire and Aviation Management website links:

Prescribed Burns: http://www.nps.gov/fire/fire/fir_prescribedfire.cfm

Fire Knowledge Quiz: http://www.nps.gov/fire/educational/edu_stu_firequiz_10to14.cfm

Fire Feelings Lesson: http://www.nps.gov/fire/educational/edu_tea_les_firefeelings.cfm.

Fire Vocabulary

Backfire—A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the fire's convection column.

Blow-up—A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a firestorm.

Brush fire—A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Candle or candling—A single tree, or a very small clump of trees, that is burning from the bottom up.

Campfire—As used to classify the cause of a wildland fire, a fire that was started for cooking or warming that spreads sufficiently from its source to require action by a fire control agency.

Creeping fire—Fire burning with a low flame and spreading slowly.

Debris burning—A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Escaped fire—A fire that has exceeded or is expected to exceed initial attack capabilities or prescription.

Fingers of a fire—The long narrow extensions of a fire projecting from the main body.

Firestorm—Violent convection caused by a large, continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like fire whirls.

Fire whirl—Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to more than 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

Flaming front—The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Flanks of a fire—The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Fire Vocabulary

Flare-up—Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Head of a fire—The side of the fire having the fastest rate of spread.

Hotspot—A particularly active part of a fire.

Large fire—1) For statistical purposes, a fire burning more than a specific area of land, e.g., 300 acres. 2) A fire burning with a size and intensity such that its behavior is determined by interactions between its own convection column and weather conditions above the surface.

Prescribed fire—Any fire ignited by management actions, under certain predetermined conditions, to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and Environmental Protection Agency requirements must be met prior to ignition.

Project fire—A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.

Running—A rapidly spreading surface fire with a well-defined head.

Slop-over—A fire edge that crosses over a control line or natural barrier intended to contain the fire.

Smoldering fire—A fire burning without flame and barely spreading.

Spot fire—A fire ignited outside the perimeter of the main fire by flying sparks or embers.

Structure fire—Fire originating in and burning any part or all of any building, shelter, or other structure.

Test fire—A small fire ignited within the planned burn unit to determine the characteristics of the prescribed fire, such as fire behavior, detection performance, and control measures.

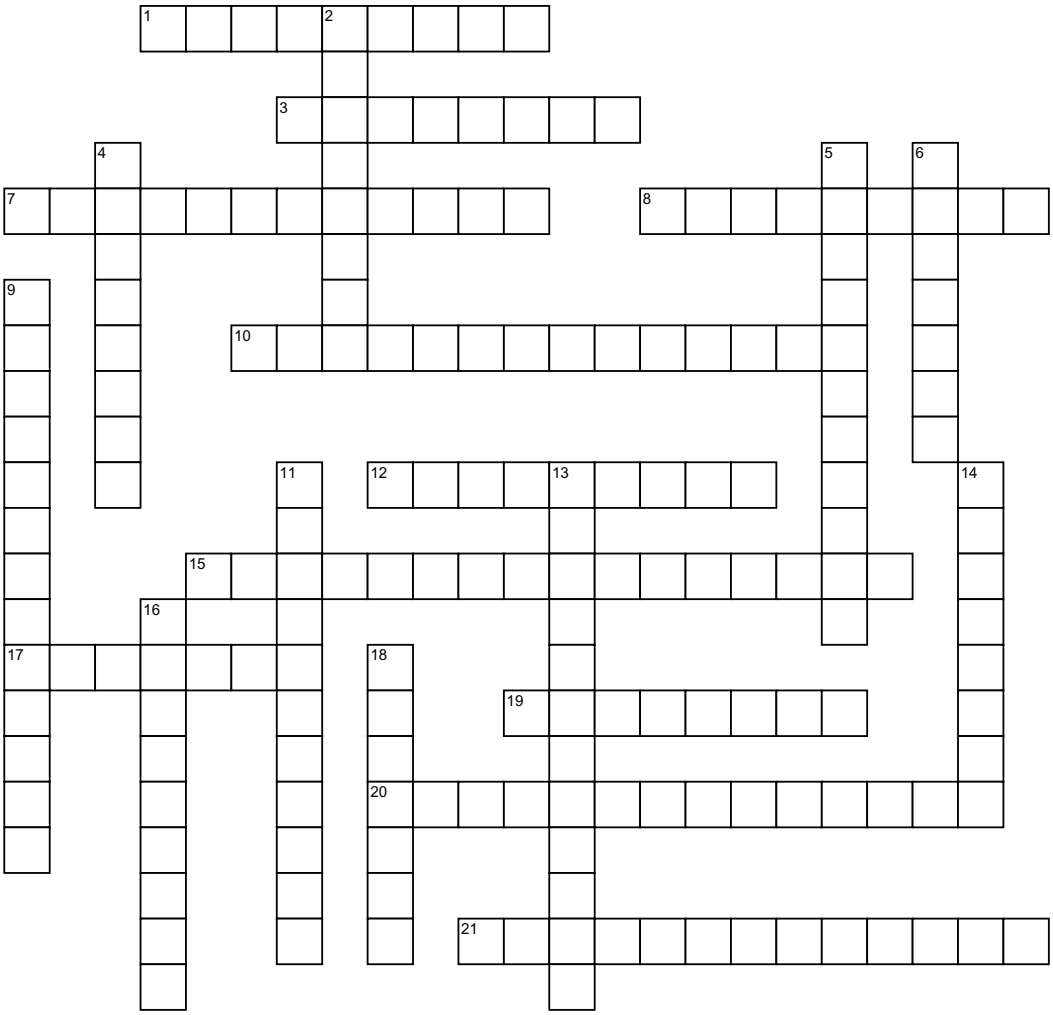
Torching—The ignition and flare-up of a tree, or small group of trees, usually from bottom to top.

Uncontrolled fire—Any fire which threatens to destroy life, property, or natural resources.

Underburn—A fire that consumes surface fuels but not trees or shrubs.

Wildland fire—Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Fire Vocabulary



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ACROSS

1 Violent convection caused by a large, continuous area of intense fire.
3 The ignition and flare-up of a tree or small group of trees, usually from bottom to top.
7 The zone of a moving fire where the combustion is primarily flaming.
8 A fire that consumes surface fuels but not trees or shrubs.
10 Any fire ignited by management actions under certain predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement.
12 Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame.
15 Any fire which threatens to destroy life, property, or natural resources.
17 Any sudden acceleration of fire spread or intensification of a fire.
19 As used to classify the cause of a wildland fire, a fire that was started for cooking or warming that spreads sufficiently from its source to require action by a fire control agency.
20 A fire burning without flame and barely spreading.
21 Fire originating in and burning any part or all of any building, shelter, or other structure.

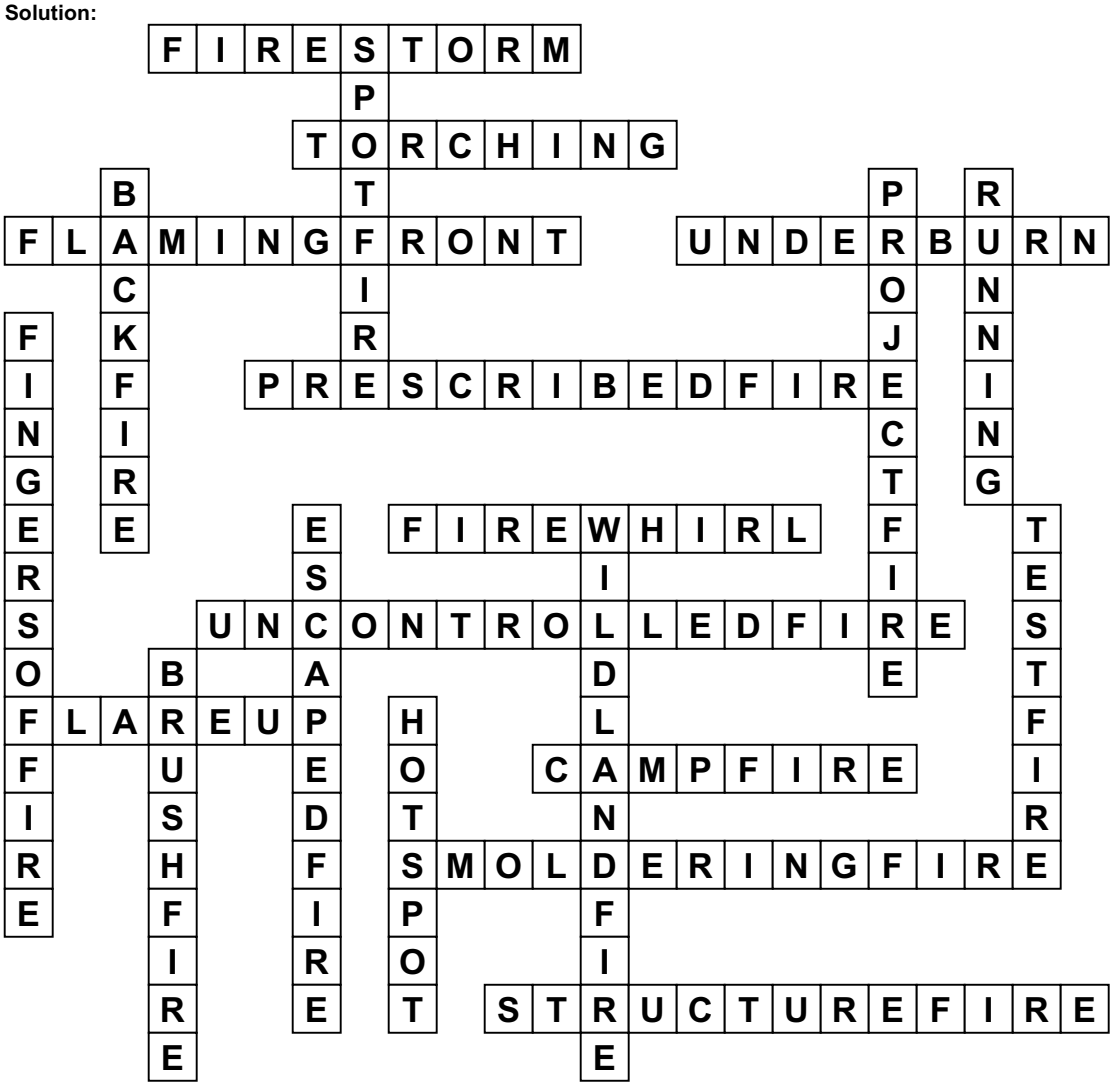
DOWN

2 A fire ignited outside the perimeter of the main fire by flying sparks or embers.
4 A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force or the fire's convection column.
5 A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.
6 A rapidly spreading surface fire with a well-defined head.
9 The long narrow extensions of a fire projecting from the main body.
11 A fire that has exceeded or is expected to exceed initial attack capabilities or prescription.
13 Any nonstructure fire, other than a prescribed fire, that occurs in the wildland.
14 A small fire ignited within the planned burn unit to determine the characteristics of the prescribed fire, such as fire behavior, detection performance, and control measures.
16 A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.
18 A particularly active part of a fire.

WORD BANK: Backfire, brushfire, campfire, escapedfire, fingersoffire, firestorm, firewhirl, flamingfront, flareup, hotspot, prescribedfire, projectfire, running, smolderingfire, spotfire, structurefire, testfire, torching, uncontrolledfire, underburn, wildlandfire.

Fire Vocabulary

Solution:



Homestead National Monument

Identifying Prairie Plants

Big bluestem

- Grows from 3-10 feet tall
- Also called "turkey foot"
- Deep, thick roots help form sod

Little bluestem

- Grows to about 3 feet tall
- Also called "beard grass"
- State grass of Kansas and Nebraska

Indian grass

- Grows 3 to 7 feet tall
- Like bluestem, a perennial grass
- State grass of Oklahoma and South Carolina

Switchgrass

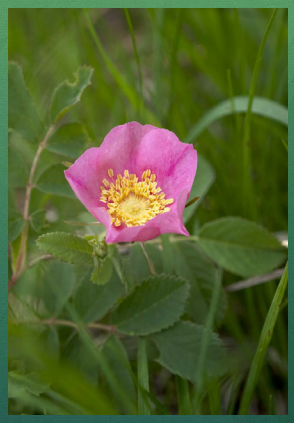
- Grows from 2-6 feet tall
- Being studied for use as a fuel source
- Helps provide cover for birds and animals

Milkweed

- Has smooth, flat leaves, purple/pink flowers, and a "milky" sap
- Provides food for the larvae of monarch butterflies

Prairie rose

- Pink petals with yellow stamens
- Blooms from about May through Sept.
- State flower of Iowa and North Dakota



Lespedeza

- Has purple flowers in the summer months
- Part of the pea and bean family
- Food for deer

Purple Coneflower

- Pink/purple petals with a red/orange "cone" center
- Part of the sunflower family

Compass plant

- Yellow flowers that look like sunflowers
- Name comes from pioneer belief that its leaves would point north-south direction

Sumac

- A woody plant: shrub or small tree
- Has crimson red berries
- Leaves turn red in the fall

Information and photos courtesy of *Homestead National Monument of America*