

Prairie Fire Survey

Note: The following research idea has not been fully developed into an activity but has been tried in some workshops and classrooms. If you try it, let us know how it went by sending a note to epp@mhub.facstaff.wisc.edu.

Background

This activity is designed to help students understand the role and change fire plays in a prairie.

Several forces shaped the prairie through the centuries; geological (the Rocky Mts. created a rain shadow), and climatic forces (extreme temperatures, strong winds, low rainfall as a result of the rain shadow), and FIRE. Fires occurred naturally from lightening or were deliberately set by humans.

Native Americans started fires to drive game for hunting, to make traveling easier, and to create grazing land. After a fire, the new, tender growth attracted the wild grazing animals. Native Americans understood the effect of fire on the prairie for creating good grazing and hunting land. Today, prairie restorationists and managers are researching different methods and ways to burn prairies and restored prairies.

Without fire the prairie would not have spread so far or prospered so well. This is especially true in Wisconsin where there is adequate rainfall (31.5 inches per year) for trees to grow.

How does fire benefit the prairie?

Fire destroys the invading trees and shrubs. The prairie plants are not destroyed, their growing points and food storage parts are below ground. The plant's growing tips are protected because the soil is a good insulator and the intense heat does not penetrate beyond the surface. In contrast, the buds of woody species are exposed to the hot flames and usually will not survive.

Fire prevents prairies from choking on their own growth. Without fire the dead leaves and stems accumulate through the years. This DUFF layer acts like a mulch and smothers new growth.

The duff also holds nutrients, especially potash and phosphorus. Fire releases these nutrients for the plants to use again. That makes fire a good recycler! The exception is nitrogen. The nitrogen stored in the plant material is lost in the fire. During the burning process the nitrogen is released as a gas into the atmosphere. The plants will absorb nitrogen through other means. Some nitrogen returns in the rain. Nitrogen also comes back through the legumes (bean plants)

as a result of a symbiotic relationship with bacteria in the soil. This FIXED nitrogen is available to the other plants in the prairie.

A fire-blackened prairie stimulates new growth. The black, sooty soil absorbs the heat of the sun which quickly warms the soil. This gives prairie plants a good start for the growing season.

In restorations, fire also helps to reduce the weedy, non-native invaders of the prairie. Most invaders, such as quack grass and lawn grass, green up early in the spring. These grasses are called COOL SEASON grasses. Most prairie grasses are WARM SEASON grasses. A fire hinders the growth of the cool season plants allowing the prairie a competitive edge.

Using the Activity

Materials needed:

- Soil probe thermometers
- Air thermometers (optional)
- Measuring tape or rulers
- Weather information
- Student observation sheets

Activity 1:

Weather and Soil Data Form:

Begin one week before the scheduled burn. Have the students record the weather conditions (sunny, rainy, cloudy, etc.), air temperature, relative humidity, rainfall,

wind direction and speed, and the soil temperature at the surface of the soil and 3" deep in the soil. They should try to collect the data each day.

After the burn continue to record the soil temperature once a week in the burned and non-burned areas. This information can be used when comparing plant growth in each area.

Purpose of this activity:

Students are collecting preliminary data to understand the conditions necessary for a prescribed burn. Humidity should be between 30% and 50%, temperature - 50 F to 80 F., and wind between 5 and 15 m.p.h. The wind direction varies between sites. Wind direction is important in determining where the smoke will blow. The weather conditions before the actual fire also plays a role in the success of a fire. High moisture content in the air and duff lowers the success of

the burn. Extremely dry conditions risks the chance of wildfires. The data collected ahead of time will be useful in analyzing the success of the fire and can be saved to compare future burns.

The soil temperature readings are useful to understand the difference the fire makes in the soil temperatures after the fire and its effect on plant growth.

How to use the soil probe:

There is a small notch on the probe 2 1/2 inches from the end. This is where the temperature of the soil is sensed. To measure the temperature of the surface soil, push the probe in the soil, vertically, until the notch is at ground level. To measure the temperature deeper, push the probe into the soil as far as it will go.

Activity 2:

Observation Pages - Before, During, and After the Burn:

Students will observe the prairie to compare changes to plant growth, soil characteristics, animal life, and their perceptions of the fire. Each week there after, students are asked to observe weekly changes. Leave an area unburned for comparisons. The post-burn activity can be used in the fall as a follow through at the end of the growing season.

Encourage students to look closely and to use their observations in their answers. In the classroom, have the students discuss their findings as a group.