

Burn Your Prairie Safely *and Have Fun, Too!*



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The North American Prairie was subject to regular wildfires and the flowers and grasses that comprise this fabulous ecosystem evolved under its influence. When managing prairies and prairie restorations, the controlled burn is the “magic bullet” that allows us to control many unwanted invasive plants. A good prairie fire is one of the special rites of spring on the prairie. The tips below are offered to ensure that your prairie burn is both inspirational and safe! Herewith are some specific rules and procedures to follow to assure a safe burn:

Design with Firebreaks in Mind

Design your prairie so that it takes advantage of natural existing firebreaks. Use nonflammable borders such as roads, driveways, ponds, streams, and mowed lawns or trails as the edge of the prairie. These will be your built-in firebreaks, and will save you lots of time compared to mowing firebreaks every time you want to burn.

Create Sufficient Firebreaks

In areas where firebreaks do have to be mowed around the prairie to remove flammable material, make sure the firebreak is sufficiently wide to prevent the fire from jumping across in adjacent fields or prairies. A general rule of thumb is to make your firebreak 15 to 20 feet wide. For an extra measure of safety, the firebreak can be disked or tilled to expose the mineral soil. However, open soil encourages weeds during the growing season, and requires that the area be re-tilled at least a couple of times during the summer to knock down weedy growth. This method does not work in steep slopes, as it will lead to soil erosion.

Divide and Conquer

Divide large prairies into smaller individual “burn management units” by creating firebreak trails between each unit. Small prairie fires are typically easier to manage than large ones because there is less area to control and fewer linear feet of firebreak to defend. It is generally recommended that prairies be burned every two to three years and not every year in order to maintain plant and animal diversity. Burning every year tends to favor the warm season prairie grasses and certain flowers, and may lead to a reduction of insects and other invertebrates such as butterflies. Creating a number of different management zones makes burning more manageable while also maximizing biodiversity.

Use Cool Season Grasses in Firebreaks

Plant low maintenance cool season grasses in your firebreaks, such as Prairie Nursery’s “No Mow” Lawn Mix. Cool season grasses begin growth in early spring, providing less flammable green growth that impedes the spread of fire. The dead thatch in these grasses is still flammable, so it is by no means an impervious firebreak. Wetting down grass firebreaks with water prior to and during burning helps prevent the spread of fire into them.

Mow Firebreaks in the Fall

Mow your firebreaks in the fall. The dead plant material will decompose over the winter and become essentially non-flammable by spring. Dead dry plant material that is mowed in spring just before burning will still carry a fire quite nicely, and must be raked off the firebreak prior to burning. Fall mowed material does not usually need to be raked off, except in cases where it is thick and dry and could carry a fire. Mow the firebreaks as closely to the soil as possible to reduce the amount of dead stubble, which can still be flammable in spring.

Five Primary Factors that Affect the Rate of Fire Spread:

- 1) Fuel Load
- 2) Air Temperature
- 3) Relative Humidity
- 4) Wind Speed
- 5) Soil Moisture

Together, these parameters will determine the rate at which your prairie will burn, and how easy it will be for you to control it.

1) FUEL LOAD

If your prairie has not been burned for two or more years it may have a fairly heavy fuel load composed of standing dead, dry grass. Standing dry plant material burns rapidly because oxygen is readily available to carry the fire. This “fuel-air mixing” can be significantly altered by simply mowing the prairie down with a heavy duty tractor-mounted mower just prior to burning. The dead plant material will now be lying on the ground where oxygen is less plentiful. The resultant fire will spread slowly, have lower flames, and quite frankly, is quite boring compared to a full fledged prairie conflagration!

2) AIR TEMPERATURE

The warmer the air temperature, the hotter the fire. Burning later in the day or in the evening typically results in cooler, slower mowing fires. Burning a prairie with a heavy fuel load in the middle of a warm spring afternoon can often result in an exciting event that greatly exceeds the expectations of the pyrotechnic manager.

3) RELATIVE HUMIDITY

Relative humidity is a measure of the amount of moisture in the air. The more moisture in the air, the slower a fire will spread. Burning in the evening when the relative humidity is higher can sometimes be the most important factor in determining the rate at which a fire spreads. Evening dew will greatly reduce the flammability of dead plant material, sometimes even rendering it non-flammable. A prairie that would erupt into flames when burned at 2 PM in the afternoon may be rendered impervious to fire when ignited at 10 PM at night, despite one’s best attempts to do so, even with the addition of copious quantities of liquid accelerants (aka “Boy Scout Water”).

4) WIND SPEED

Wind speed is another critical factor in determining the rate and intensity that a prairie fire moves across the landscape. Burning a prairie when winds exceed five miles per hour is generally not recommended, especially if flammable structures are nearby and/or your insurance policy is not current. This is especially true when the air temperature is high and the relative humidity is low. Attempting a prairie burn under these conditions almost assures a visit from the local fire department, as well as a possible feature article in the local newspaper.

5) SOIL MOISTURE

The amount of moisture in the soil can determine the rate of advance of a prairie fire, especially when burning against the wind using a “backfire.” The fire remains close to the ground during a backfire, and much of its energy is consumed to evaporate the moisture out in the soil. This reduces the vigor with which the fire burns and slows its rate of advance.

“Headfires,” which travel in the same direction as the wind are less affected by soil moisture. They move faster, and most of the heat energy is directed upward into the flammable vegetation rather than downward toward the soil. Headfires, although impressive with their large flames, are less effective at controlling cool season weeds than backfires.

A prairie with a heavy grass fuel load can easily be burned even when there is a foot of snow on the ground. The fire will move through the grass canopy above the snow, leaving unburned stubble below the snow level. This type of burn is not effective in controlling cool season weeds, since they are dormant and unaffected at the time of the burn. However, it is indicative of how much energy is stored in dead prairie grass that it can carry a fire across a snow-laden landscape.

Bunch grasses such as Little Bluestem and Prairie Dropseed may experience damage if burned under dry soil conditions. The fire can burn down into the crowns of the plant and kill the new leaf buds. It is not advisable to burn prairies with these grasses under dry soil conditions.

Burning Permits and Timing of Controlled Burns

Many municipalities have strict regulations regarding the specific hours of the day when the citizenry may burn prairies, fields, etc. Many mandate that spring burning of fields be done in the evening only, when the temperature is lower, the relative humidity is higher, and wind speed is reduced from their typically faster daytime levels. Always check your local regulations regarding controlled burning, and if a burning permit is required.

Burning permits are issued largely so that people understand the rules and conditions under which they are allowed to burn. Lord have mercy on the luckless land owner who requires the services of the local fire brigade and then finds himself without a burning permit. The local constabulary is seldom magnanimous and forgiving of such oversights.

Burn Against the Wind

Burn against the wind when initiating a controlled burn. Never start a prairie fire so that the fire is moving in the same direction as the wind! This will almost guarantee an uncontrolled conflagration, and the potential for calamity that accompany such an indiscretion. Burning into the wind, called "backfiring," ensures that the line of flame moves slowly as the wind pushes back against the line of advance. This procedure allows you to slowly and safely secure your leeward, or rear firebreak. This is the point at which a prairie fire is most likely to jump the firebreak and escape with the help of the wind. Continue to "burn in" the entire back firebreak until it has consumed the fuel within the first twenty to fifty feet.

This burned area is called a "blackline" and is your line of defense against advances from the windward side. At this point the fire line can be continued along one or both of the two edges of the prairie that lie perpendicular to the original fire line. After all three of these sides of the prairie have been burned in, the remaining portion of the area can be ignited on the windward side to create a grand finale using the wind to create a raging "headfire." The flames will advance rapidly until they meet the previously burned blackline, at which point they will extinguish themselves for lack of fuel.

The damage done to vegetation by a controlled burn is a function of Intensity and Duration. The hotter the fire, and the longer it burns in one spot, the more damage done. When controlling undesirable cool season grasses and weeds, a backfire is actually more effective than a headfire (a rapidly moving fire that burns with the wind, rather than against it). A backfire stays closer to the ground, and actually achieves higher temperatures (Intensity) at the ground level where the new plant growth is located. Because a backfire moves slowly against the wind, the Duration of the

heat is longer than with a more rapidly moving headfire. The heat from a headfire is also mostly dissipated upward, away from the ground level where it can do more damage to the target weedy vegetation.

Burn Downhill

Burn downhill, unless you relish a fast moving fire with fingers of flame that leap gleefully uphill. When a fire burns uphill it pre-heats the fuel ahead of it, making it burn faster and hotter. It can even create its own wind, further increasing the rate of spread. This method is recommended for professional pyromaniacs only, who have a thorough understanding of fire dynamics and carry loads of specialized fire insurance. By burning downhill, the heat of the fire moves upward and away from the fuel below it. A downhill fire actually spreads more slowly than a fire on level land, making it very controllable and of very little interest to true prairie pyros.

Burn in Mid-Spring

Burn in mid-spring when cool season grasses and weeds are actively growing. One of the reasons that a spring prairie fire is so effective at controlling weeds is that it kills newly germinated weed seedlings and knocks back invasive cool season perennial weeds (such as quackgrass, bluegrass, smooth brome, clovers, etc). Timing is essential to maximizing the beneficial effect of the burn. The optimal time to burn the typical mesic (medium soil) prairie is in mid-spring, just as the buds of the sugar maple tree (*Acer saccharum*) are beginning to open. This will usually be when you are mowing the lawn for the first time in spring (if you still have one!).

Cool season weeds in your prairie should be greened up and growing. This is exactly where you want them, so you can burn them back to the ground level. This sets them back, and they will have to struggle to recover in the face of competition from the primarily warm season prairie plants, most of which remained dormant and unaffected by the burn. The most common error people make is burn their prairie too early in spring. Wait until you see the greens of their stems, and then open fire! Your prairie flowers and grasses will thank you, and reward you with a profusion of blooms and amber waves of beauty.

Young prairie plantings are sometimes infested with cool season grasses and may be too green to burn at the appropriate time in mid-spring. It is generally recommended that prairie seedlings be burned for the first time beginning in the spring of the third growing season. However, the prairie grasses that provide the primary fuel may not reach sufficient development to carry a fire until the fourth growing season. The combination of plentiful green cool season weeds plus a dearth of dry prairie grass can lead to a prairie that simply won't burn despite one's best efforts.

What to do? If you have excellent firebreaks and good fire control equipment, you can consider breaking a rule or two. If you find that your prairie will not burn in the evening because of excessive green plant growth, and if your local regulation allow, you can consider burning in the afternoon when the temperature and humidity are more conducive to carrying a fire. One rule that you absolutely do not want to break is to burn under windy conditions. High winds, especially shifting winds, can create uncontrollable fires that can quickly escape. You probably don't want to have to explain to your neighbor why his pine trees turned into Roman candles when your prairie burn got out of control on a windy day.

Slow-Moving Gets the Job Done

Use slow moving backfires to do maximum damage to undesirable woody seedlings and cool season weeds and grasses. The impact of fire on vegetation is a function of duration and intensity. Although the roaring flames of a headfire may appear to be most effective at setting back undesirable plants, the lowly backfire is actually far more effective. Studies have shown that the temperature at the soil level is higher in a backfire than a headfire, because the fire creeps slowly along at ground. The energy from a headfire escapes upward and has little time to affect the vegetation at the ground level, where plants typically sustain the most damage from a burn. Secondly, backfires move slowly, thus increasing the time that sustained heat is applied to plant material. The headfire may be hot and sexy, but the plodding backfire gets the job done.

Dress Appropriately

Always wear appropriate clothing and have proper fire control equipment on hand. Never wear flammable clothing or easy melted synthetics such as nylon. Molten fabric sticks nicely to the skin and is very efficient at transferring heat energy directly to you. Denim jeans and long sleeved cotton workshirts are relatively fire resistant and afford moderate protection from heat. The truly safety conscious can order "Nomex" fireproof suits from suppliers such as Forestry Suppliers, Ben Meadows, and other purveyors of specialized outdoor equipment. NoMex suits are recommended when burning large prairies with heavy grass fuel loads and high heat intensities are anticipated.

Using the Essential Tools - Water and Drip Torch

Water is an essential element for fire control. If you are conducting a small prairie burn in your yard, set up the garden hose with a high nozzle so that it is at the ready. Wet down your firebreaks before lighting the first match, paying careful attention to your leeward, or back firebreak where the fire could most easily escape. Beware that during warm, dry and windy weather, the firebreaks will dry out quickly, and may need to be re-moistened as the fire progresses. The fire itself will also dry out any vegetation in the adjacent firebreak, and can burn into any remaining dead thatch or other combustible material in the break.

For larger areas, backpack type sprayers are essential for controlling the fireline and to immediately extinguish any spot fires that may jump the line. These typically hold four gallons of water and weigh around 35 to 40 pounds when fully loaded. Always test your equipment to make sure it is working properly before starting the fire!

No professional prairie pyro is without the ultimate ignition tool, the driptorch. This is a hand-held metal canister that is filled with a mixture of diesel fuel and gasoline (usually 80% diesel and 20% gas). The top of the canister has a metal tube with a "firepad" on the end that is pointed downward to deliver the fuel the ground to start the fire. The rate of flow of the fuel mixture is controlled with a pair of valves that regulate the fuel output and the air intake into the canister. This device is used to lay down a line of fire along the firebreak at the desired rate of speed, based upon the conditions and the judgment of the "fireboss." The driptorch is a far superior method of igniting your prairie compared to dragging dead grass around with a rake and lighting it, and then spreading it along the firebreak.

Notify Others

If you anticipate conducting a large burn that will attract attention, definitely call both your local fire department and sheriff's department to inform them of your location and the time when you expect to begin the festivities. Even if you have a valid burning permit, they will greatly appreciate this notice. When the neighbors start calling them to report a fire on your property, they will know that they don't have to saddle up and rush to put out your controlled burn. Been there, done that ... and it's not a pretty picture. Especially when you, the fireboss, are a member of the local volunteer fire department! (Yes, this really happened to me.)

Inform your nearby neighbors of your intent to burn your prairie. Make sure that they know to close their windows and not hang out their wash when you will be burning. A little forewarning goes a long way to maintaining good neighborly relations. Always respect the energy and power of your prairie fire, and remember ... Be careful out there!

Further Information

This article provides general tips on how to prepare and manage controlled prairie burns. It is not intended as a comprehensive course in fire management. For those who wish to become proficient in controlled burns, we suggest taking an accredited course in fire management. For more information, please refer to the National Coalition of Prescribed Fire Councils at **www.prescribedfire.org**.

For information in Wisconsin about controlled burning training, please check out the following sources: www.prescribedfire.org and www.aldoleopold.org.

We also recommend the book *How to Manage Small Prairie Fires* by Wayne Pauly.