Prescribed fire is an essential component of native vegetation establishment and management. Though challenges are associated with the process, prescribed burning can be executed safely and effectively in the roadside environment.

Prescribed fire is a management tool used for two main objectives:

- Discourage the growth of invasive and woody plants.
- Invigorate the growth of native plants.

A timely burn can slow the growth and spread of weeds and small trees, both of which are susceptible to the intense heat associated with fire. Most native prairie species, on the other hand, have a positive response to fire. Historically, this ecological relationship was critical to the existence of the tallgrass prairie, and today it continues to be an essential management practice in roadside prairie remnants and plantings.

**Preparing for a Burn Season**

Properly trained staff, the right equipment and advance planning are key to a successful and safe prescribed burn.

**Training and Personnel Requirements**

Though there are no state-wide minimum requirements for individuals participating in roadside burns, training opportunities are administered by the Iowa DNR that provide basic information for performing safe prescribed burns.

The minimum recommended training session is S130/190, which covers the basics of fire behavior and wildfire fighting techniques. This 40-hour course, combined with an annual eight-hour refresher, is adequate preparation to participate in a prescribed roadside burn. A combination of experience and additional training may be necessary to plan and lead a successful and safe burn.

Staff requirements for roadside burns vary with the conditions at each site; the size of the crew depends on the size and complexity of the burn. As a general rule, two to four qualified people can safely execute most roadside burns. Burning alone or understaffed is not advised, so it may be necessary to coordinate efforts with other agencies. Secondary road maintenance crews, county conservation boards, local fire departments, and other county IRVM programs are possible partners.
Personal Protective Equipment (PPE) standards vary among agencies, but some general guidelines should be considered.

**Minimum Suggested PPE**
- Leather work boots
- Gloves
- Safety glasses
- Clothing made of natural fibers

**Highly Recommended PPE**
- Helmets
- Face and neck shrouds
- Fire retardant clothing such as Nomex
- Goggles

![This fire crew is wearing Nomex and other highly recommended personal protective equipment.](image1)

**Equipment**
All ignition and fire-fighting equipment should be inventoried, inspected and tested prior to the burn season and immediately before each burn. The following are the basic tools used when burning roadsides.

**Ignition Tools**
Drip torches are the most efficient tool for igniting prescribed burns.
- Two drip torches containing a 2:1:1 diesel/kerosene/gasoline mix or, if kerosene can’t be found, a 2:1 diesel/gasoline mix
- Pre-mixed fuel in safety cans
- Lighters

**Hand Tools**
Hand tools are used to remove combustible materials and smother fire. They are often used to create fire lines and mop up after the burn.
- Rubber flappers
- Fire rakes
- Fire brooms
- Shovels
- Gas-powered blowers

**Water Supply**
Numerous styles of water tanks and pumping systems are effective for use in roadside burns. Some systems are designed specifically for fire suppression; others can also be used for management practices such as herbicide application. Additional features such as fire resistant hosing, electric hose reels and adjustable pattern spray guns improve the effectiveness of the rig.

Tractors and ATVs can also be equipped with tanks and water pumping systems. These rigs can quickly access locations that may be inaccessible to larger equipment. They have smaller tank.
Capacities, but can move personnel and equipment more efficiently along the fire line.

- 3/4 to 1-ton truck equipped with a 300-400 gal. tank and pump
- Tractor and/or ATV equipped with 50-100 gal. tank and pump
- Backpack pump sprayers
- Additional storage tank or trash pump to refill equipment

**Communication Devices**
Communication with the burn crew during a prescribed fire is critical. It is also important to maintain a communication link with agency headquarters and local authorities prior to, during and after a burn.

- Two-way radios
- Cellular phones

**Weather Data Collection Devices**
Weather data must be collected to ensure conditions are within the parameters of the burn plan. Hand-held weather units are inexpensive, accurate and the most effective means of monitoring on-site weather conditions. Hourly printouts are available from NOAA for specific areas.

**Signage and Traffic Control Devices**
The use of warning signs and other traffic control devices is highly recommended. The extent of the warning measures depends on the traffic flow and difficulty of the burn.

- Warning signs “Prescribed Burn Ahead” or similar
- Vehicles with flashing lights
- Flaggers

*Much of the equipment needed for prescribed burning can be purchased from vendors such as those listed below. See LRTF Funding Guidelines for information about prescribed burn equipment and PPE grants and ordering procedures.

- Forestry Suppliers, Inc.
- Ben Meadows Company
- Gempler’s

Hand-held weather unit.
Public Notification
Prior to a burn season, notify the public that trained personnel will be conducting prescribed burns in the ROW with specific management objectives in mind. A simple press release (Appendix 6a) to the local media will do. Adjacent landowners can be notified in person or by letter as part of the planning process (Appendix 6b). Any questions/concerns should be addressed at this time.

Developing a Plan For the Season
Goals and objectives for the upcoming burn season should be established in advance. This includes developing a list of potential burn sites and prioritizing that list. A simple spread sheet (Appendix 6c) is a good way to compile and organize this data.

There is often only a small window of time during which conditions are appropriate for prescribed burning. For this reason, it is critical to establish clear objectives, so sites of highest priority can be burned first. A reasonable goal for burning native prairie remnants or plantings is approximately once every 3-5 years, and should be prioritized on the list accordingly. Some sites may require more frequent burns to address weed or brush infestations. Those should be moved higher on the list.

As a general rule, any burn is better than no burn. While it is common to burn whenever conditions are favorable, the seasonal timing of a burn will have an impact on the plant community’s response:

<table>
<thead>
<tr>
<th>Routine maintenance (thatch removal)</th>
<th>Any time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed control*</td>
<td>Late spring</td>
</tr>
<tr>
<td>Brush control*</td>
<td>Spring</td>
</tr>
<tr>
<td>Warm-season grass stimulation</td>
<td>Mid- to late spring</td>
</tr>
<tr>
<td>Cool-season grasses</td>
<td>Enhanced by early spring and fall burns</td>
</tr>
<tr>
<td></td>
<td>Suppressed by late spring burns</td>
</tr>
<tr>
<td>Forbs</td>
<td>Enhanced by early spring and fall burns</td>
</tr>
</tbody>
</table>

* Research specific weed and brush species before using fire for management. Some may have a positive response to fire.

Burning after spring green-up produces extra smoke, requiring additional safety precautions and planning. Lower fuel moisture levels during early spring and fall produce less smoke. Burning around signs, and other hazards, removes the fuel load before the primary fire line arrives.
Developing a Burn Plan
A complete burn plan, developed in advance, is the first step toward executing a successful burn. The following information should be included:

- Area to be burned
- Potential hazards
- Desired weather parameters
- Equipment and personnel requirements
- Firebreaks and anchor points
- Special concerns

A sample burn plan and sample weather data are shown in Appendices 6d and 6e.

**Area to be Burned**
Identify the areas within a potential burn site that will benefit most from prescribed fire. A complete burn of an area is not always desired; the practice of patch burning is beneficial to many insects, birds and small mammals. Patch burning will result in a mosaic of burned and unburned areas.

**Potential Hazards**
Potential hazards are anything that should not burn during the prescribed fire. This includes adjacent vegetation, utility poles and boxes, fences, signs, plastic culverts and tile intakes. Identify these items in advance and mitigate the danger by reducing the fuel load around the hazard and/or thoroughly watering the area prior to ignition.

<table>
<thead>
<tr>
<th>Adjacent vegetation</th>
<th>Burn/no burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop residue (worked)</td>
<td>Burn with low/moderate winds</td>
</tr>
<tr>
<td>Crop residue (not worked)</td>
<td>Burn with high humidity and light winds</td>
</tr>
<tr>
<td>Standing crop</td>
<td>NO burn</td>
</tr>
<tr>
<td>CRP/Pasture/Timber</td>
<td>Burn with prepared firebreaks and light winds</td>
</tr>
</tbody>
</table>

Adjacent vegetation patterns affect how and when a burn should be performed.

If the fuel load is high enough, prescribed fire can be used to set back or kill woody vegetation. In this photo, woody stem density has reduced the combustible fuel load, making it difficult to sustain a fire intense enough to significantly damage the brush.

Fuel loads around hazards can be reduced prior to the burn season by weed-whipping surrounding vegetation.

During the burn, a backpack pump sprayer can be used to create a wet line around wood utility poles.
Weather Parameters
Weather is the most important outside factor affecting fire behavior, so it is essential to determine the weather parameters within which each burn can be safely executed. The following are reasonable guidelines for conducting most roadside burns.

- Temperature 40 - 70 F
- Relative humidity 30 - 70%
- Wind speed 5 - 15 mph
- Wind direction Away from the road and safety-sensitive areas

Equipment and Personnel Requirements
Identify one person as the burn boss and determine the number of people required to safely carry out the burn based on the size and complexity of the area in the prescription. Consider that additional support staff may be required in highly traveled areas to assist with traffic control and address questions from the public.

Prepare a site specific list of ignition, fire-fighting and safety equipment needed for the burn.

Firebreaks and Anchor Points
Firebreaks and anchor points are critical to starting and stopping a prescribed fire and their respective locations should be identified as part of the burn plan. Roads, field drives, agricultural fields, mow lines and wet lines may all be used as firebreaks.

The anchor point of a prescribed fire is the position at which the burn is first ignited. This location is typically the most downwind position and must be completely secured before continuing with the burn.

Special Concerns
Many other outside factors such as traffic patterns, visibility issues, residential areas, livestock operations and high-voltage power lines may require consideration. Identify as many of these special concerns as possible in advance to mitigate the dangers associated with them.
CONDUCTING A PRESCRIBED BURN

Pre-Burn Activities
Review the burn plan. Does the burn fit the prescription?

*Pre-Burn Checklist*
- Check weather forecast
- Observe adjacent land use activities and make notifications
- Collect on-site weather data
- Check equipment
- Install signage and traffic control measures
- Develop a plan of attack and brief personnel
- Assign duties
- Notify headquarters and local authorities

The Burn

*Ignition*
Wind direction and location of firebreaks will determine the point of ignition. Establish the anchor point at the most downwind position and secure that location before continuing down the fire line. Burning into the wind with a backing fire will maintain a slower, controlled burn.

Continue ignition along the fire line pausing as needed to allow for suppression near potential hazards such as utility poles, fence posts and tile intakes.
If the fire is progressing slowly due to conditions such as low fuel loads, undesirable wind patterns or high humidity, use a flanking fire to increase fire intensity.

Slow backing fires result in the least amount of smoke and the most complete combustion, but igniting a head fire may, at times, be desirable to speed up a burn. After adequate black lines have been established along all downwind positions, a head fire can be ignited with caution.

**After the Burn**

*Post-Burn Checklist*

- No flames - no smoke
- All smoldering materials extinguished
- Firebreaks secured
- Personnel debriefed
- Weather data collected
- Headquarters and local authorities notified

**Record Keeping**

Complete records are necessary to support a prescribed burning program. Recording and compiling data for each burn will help establish future management objectives.

*Smoldering logs and other debris are mopped up with water or hand tools after the burn is complete.*
**Comments**

### Preparing for a Burn Season

I recommend the use of official county letterhead / memo format when notifying adjacent landowners. It looks professional and more like normal county business, rather than just a note from a county employee. I like using the wide open time frame (“this spring”) in my memos and mailing them about a month prior to the burn. If notification has to be on short notice, use different wording and hand deliver, hanging the memo on a door handle if necessary. This shows you’re making an effort to let landowners know what’s going on. *Wes Gibbs, Jones County, 2011*

While it’s important to inform the public and media about prescribed burns, you don’t want to attract unnecessary distractions to site. It’s critical that all personnel have their full attention on the burn. The presence of additional people, such as the media or the general public, can distract the burn crew, and increase traffic congestion. *Josh Brandt, Cerro Gordo County, 2010*

Plan for the worst with water and equipment so you’re not under-prepared. Roadside burns can be challenging, but when done correctly, they’re not a big deal. It’s an accepted management practice that’s cheaper than spraying and cutting. *Wes Gibbs, Jones County, 2010*

We try to vary burn seasons and intervals between burns so we aren’t adversely affecting any one set of desirable species. *Jim Uthe/James Devig, Dallas County, 2010*

We currently use 2:1 diesel/gasoline because kerosene it hard to get. 2:1 is temperature sensitive, sometimes hard to ignite when cool and very volatile when hot (shooting jets of flame). When we use kerosene, we use 2:1:1 diesel/kerosene/gasoline because just diesel and kerosene can be hard to ignite. It can also get volatile when temps are above 80º (probably shouldn’t be burning anyway). *Daryl Smith, Tallgrass Prairie Center, 2011*

### Conducting a Prescribed Burn

Stick with your burn plan. Even if you’ve spent a lot of time getting equipment and personnel to a burn site, if on that day conditions in the field do not meet your burn plan, DO NOT BURN. *Linn Reece, Hardin County, 2011*

Before checking my potential burn site list on the day of the burn I check two if not three of the following websites:
- [www.weather.gov](http://www.weather.gov) (NOAA)
- [www.weather.com](http://www.weather.com)
- [http://www.netexpress.net/~okeefe/](http://www.netexpress.net/~okeefe/)

These all give hourly info about upcoming weather to help us decide if, where and when to burn. This alerts us to possible weather changes signaled by a change in wind direction and speed and other factors. *Linn Reece, Hardin County, 2011*
A small test burn at the anchor point will indicate fire and smoke behavior and the feasibility of continuing with the prescribed burn. **Jon Steege, Fayette County, 2011**

Put the slowest man on the drip torch. **Linn Reece, Hardin County, 2010**

We use strip head fires to speed up the burn without using a full-blown head fire. It works well with a smaller crew. **Jon Steege, Fayette County, 2011**

We use a Scotty Foam Fire Pump and Backpack (self-contained) and also a Scotty Garden Hose Foam kit. The optional grass line outlet on our fire unit provides the water pressure. Good for stubborn smoldering ties and stumps. **Linn Reece, Hardin County, 2011**

Multi-use tanks and pumping systems should be thoroughly cleaned inside and out before being used for a new purpose. **Jon Steege, Fayette County, 2011**