

# Considerations for Prescribed Burning: IGNITION TECHNIQUES

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# Ignition Technique Patterns



When initiating a prescribed fire, it is important to determine the type of ignition pattern, or combination of patterns prior to the burn. Making this determination depends on several factors: burning objectives, fuel characteristics, pre- and post-burn weather, smoke management, manpower and equipment availability, and adjacent fuels. (See PM2088A, Developing a Prescribed Fire Burn Plan)

Descriptions for five basic ignition patterns follow below, and include: backing fire, flank fire, headfire, strip headfire, and spot firing techniques. The most manageable of these methods of ignition is the backing fire ignition. Techniques such as strip headfires and spot firing can be very effective for meeting objectives, but are also more complicated and pose an increased risk to personnel carrying out ignitions. As such, these techniques should only be done by experienced practitioners. For all ignition techniques, personnel carrying out ignitions should move in a direction perpendicular to the wind or directly into the wind, so that flames move away from that person.



## 1 Backing Fire

- Advantages: Slower rate of spread, shorter flame length, lower intensity, more complete fuel consumption than headfire.
- Disadvantages: Longer burn time because the fire moves slower, poor smoke dispersal, more smoke on personnel monitoring fire line
- Uses: Creation of most black fireline conditions; expansion of firebreaks; higher wind situations.
- Remarks: Lingering fire may damage the root collar of trees, causing irregularities in resprouting potential.
- Please Note:
  - Gravel roads make good firebreaks but smoke management is essential when burning near roads.
  - Disked firebreaks should be 4 times the height of the fuel for grasslands.
  - Back fire shown in picture was initially started in 25 to 50 foot stages to allow for fire behavior to be observed. If burning conditions change, it is much easier to put out 25 to 50 feet of fire than larger areas.



## Ignition Source Movement Perpendicular to the Wind



## Wind Direction & Fire Movement

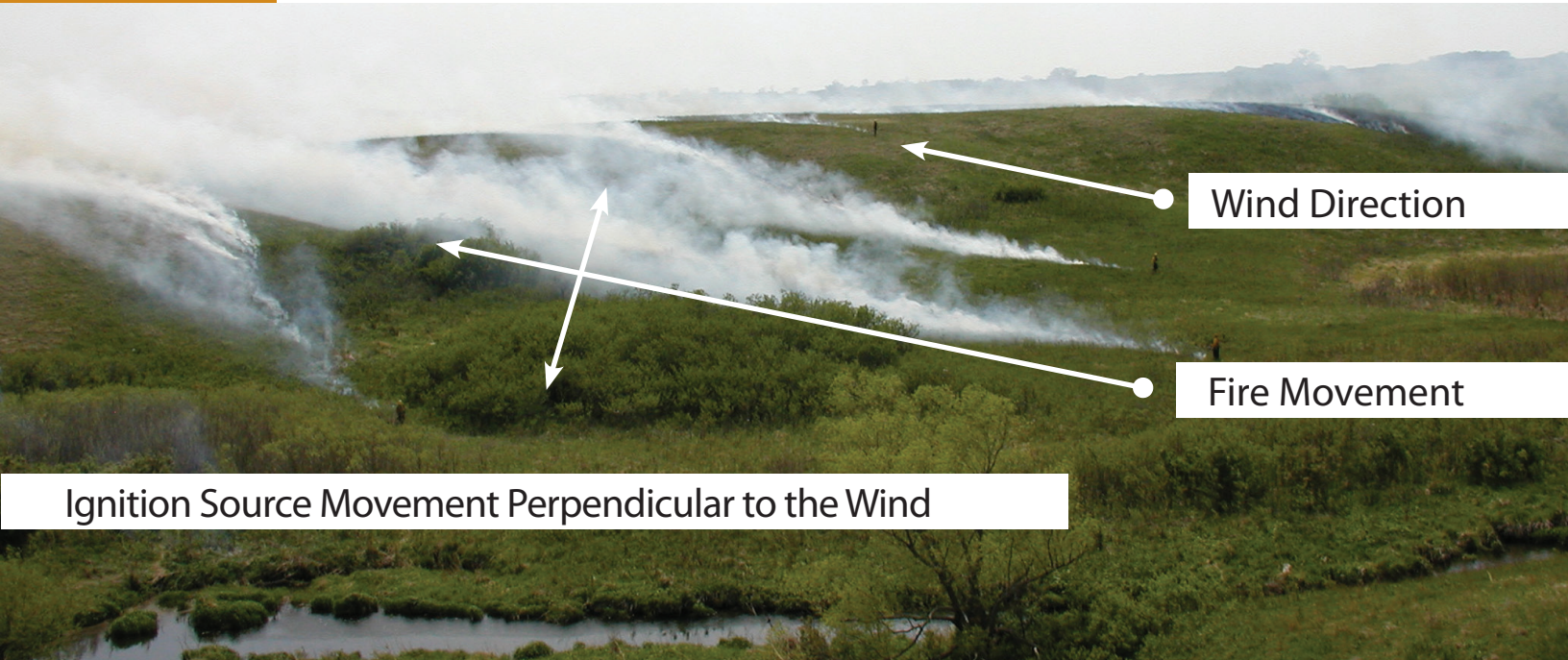
### Head Fire Ignition

Advantages: Fast rate of spread, broader flame front, longer flames, greater heat intensity, more effective smoke dispersal, higher fuel moisture possible, uniform burn but less complete combustion than back fires.

Disadvantages: Higher probability of long distance spot fire ignition, larger firebreaks (black earth) needed, limited use in forests with heavy fuel loads (creates too much heat).

Uses: Large areas, brush fields, clearcuts, forests with light fuels.

Remarks: Familiarity with burning is critical. Take caution when dealing with high rate of spread; head fires can often travel faster than humans can run (large firebreaks needed on all sides).



## Wind Direction

## Fire Movement

## Ignition Source Movement Perpendicular to the Wind

### Flank Ignition

Advantages: Intermediate flame height and intensity, controlled ignition by varying the distance between ignition points, large area can be covered with multiple ignition sources.

Disadvantages: Personnel safety issues if wind shifts, as fire can be alternately backing and heading creating potential to have fire upwind of others and head-fire situations with lack of communication and planning.

Uses: Clearcuts, brush fields, woods with light fuel loads, or grass dominated areas.

Remarks: Generally each row should be 10 to 20 feet apart in woodlands and 50 to 200 feet apart in prairies. Best to use with a steady wind speed and direction where igniters walk into the wind all at the same speed. If wind direction shifts slightly this perfect alignment helps ensure safety; remember to always have firebreaks on all sides.





# Ignition Technique Patterns



Wind Direction & Fire Movement

Ignition Source Movement  
Perpendicular to the Wind

## Strip 4 headfire Ignition

**Advantages:** Flame height and fire intensity can be moderated somewhat by varying the distance between ignition points. A large area can be covered with multiple ignition sources. Closer strips will reduce flame height and intensity.

**Disadvantages:** Personnel safety issues if wind shifts (potential to have fire upwind of others and create headfire situations with lack of communication and planning). Only experienced crews should be used in heavy fuel areas.

**Uses:** Clearcuts, brush fields, woods with light fuel loads, or grass dominated areas.

**Remarks:** Generally each row should be 10 to 20 feet apart in woodlands and 50 to 200 feet apart in prairies. Be sure to stagger igniters, depending on wind direction to ensure safety of downwind igniters. Downwind igniter or up slope igniter must proceed first and be well ahead of other igniters to ensure safety. Best to use with a steady wind speed and direction; always have firebreaks on all sides.



Fire Movement

Wind Direction

## Spot 5 Fire Ignition

**Advantages:** Rapid movement in all directions, large area can be covered with multiple ignition sources, fire intensity moderated, smoke dispersal enhanced, heat and smoke are pulled to the center of the burn unit facilitating smoke rise.

**Disadvantages:** Susceptible to changes in wind direction, larger fire breaks needed to account for wind shifts.

**Uses:** Large areas, brush fields, clearcuts, light slash, undercanopies.

**Remarks:** Intensity varies depending on spacing. Be sure to stagger igniters depending on wind direction to ensure safety of downwind igniters. Experienced igniters should conduct these burns with trained lookouts to assist in communications. always have firebreaks on all sides.

Prepared by: Jesse Randall, ISU Extension forester, and Ryan Harr, Assistant Scientist II, Natural Resources Ecology and Management. Related publications can be found on the ISU Extension Forestry web page at [www.forestry.iastate.edu](http://www.forestry.iastate.edu) or at the ISU Extension Store at [www.extension.iastate.edu/store](http://www.extension.iastate.edu/store). Search for publications PMR 2088A, Developing a Prescribed Fire Burn Plan, PMR 2088B, Tools and Safety Gear, PMR 2088C, Why, When, and When Not to Burn, PMR 2088D, Smoke Management for Prescribed Burning, and PMR 2088E, Ignition Techniques. Materials listed are suggested safety items; many good substitutes are available. Original material adapted from Randall and Haley Frater. No product endorsement is implied by inclusion in this publication.

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