

# Firing Techniques for Prescribed Fire Managers

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As we put the first fire on the ground, a lot of things are, or should be, going through our heads. Most often we are thinking about weather conditions, if we have the right equipment, or even just watching out for stump holes as we make our way through the woods. What we tend to leave overlooked is the way we use the fire to accomplish our goals. Too often we get stuck in a rut and rely on a back fire followed by a combination of more backing fires with some head fires as needed.

Prescribed fire managers have many more options at our disposal for the ways we use fire. The option chosen must be used to better accomplish the management objectives of the land on which we are conducting the burn. For instance, on a site preparation burn we would most often want to eliminate as much vegetation as possible in order to be left with an area that can be easily planted, and the newly planted seedlings will have less trouble becoming established in. Or, if we are burning to accomplish a goal of increasing wildlife habitat, we may be using slower moving, less intense fires to encourage a select few species to regenerate.

The firing techniques used by prescribed fire managers are driven by wind. Based on behavior and spread, fires either move with the wind (head fire), against the wind (backing fire), or at right angles to the wind (flanking fire). By knowing the wind direction and the goal of the fire, we can manipulate how the fire behaves. In general, there are five different firing techniques: backing fire, head fire, strip head fire, flanking fire, and spot fires.

## Backing Fire

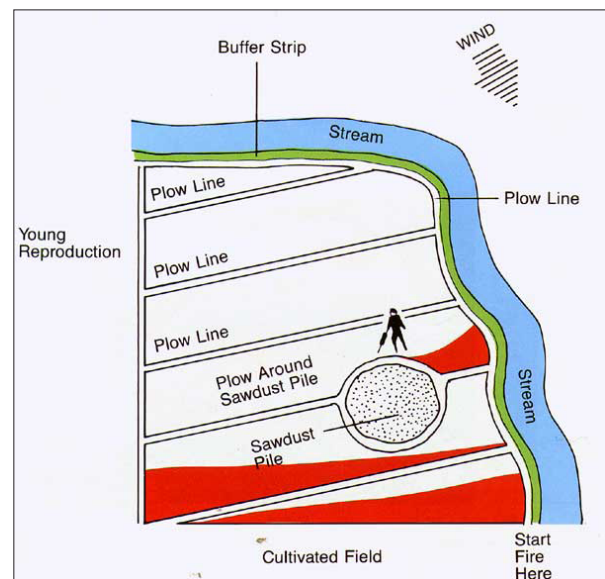
This type of fire will exhibit the slowest rate of speed and lowest intensity. Backing fires are typically used to start a prescribed burn, enlarging the size of firebreaks by adding a “black line” along the down-wind side of the fire. This simply provides an extra layer of protection from the fire escaping by adding to the existing firebreak.

Another area where this type of firing technique is useful is in young pine stands where tree injury or mortality are an issue. Using a backing fire and letting it creep through the stand against the wind will provide a good clean burn and result in the least possible damage to the pines or other desired species.

Additional control lines are required within the burn block as shown in the illustration below. Without these control lines, each line after the initial would essentially be a strip head fire (described below) as it burns into the previous backing fire. Because this type of burn will take quite a bit longer than any of the other methods, long range monitoring of weather conditions is a must.

## Considerations:

- Slow movement – Low intensity
- Useful in young pine stands or in stands with heavy fuel loads
- Low, steady in-stand wind speeds desirable
- Least damaging to desired species
- Fuel continuity required
- Avoid using in areas with deep duff layer unless the duff is moist due to potential damage to feeder roots



## Head Fire/Strip Head Fire

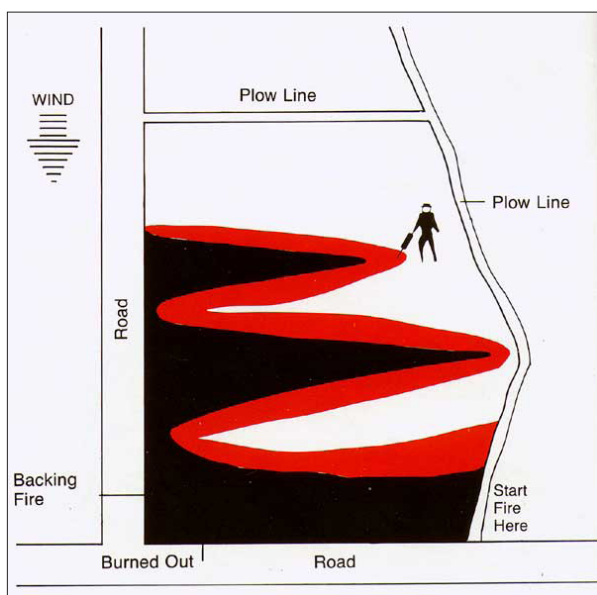
Head fires produce the highest intensity because they are driven completely by the wind and are able to move at a relatively high rate. Although uncommon, there are times when a pure head fire will accomplish the goal. However, head fires are often used as strip head fires.

Strip head fire involves igniting parallel lines of head fire at various distances. The head fire from the most recently ignited line will burn towards the previously ignited line, which will be backing towards it. Where those lines converge, the intensity rapidly increases. By varying the distance between the strips, you will be able to manipulate the behavior and intensity of the fire overall. At wider spacings between lines, the head fire will be able to increase to greater intensity before it converges with the backing fire of the previous line. Closer spacing will help maintain a lower intensity. In a timber stand with heavier fuel loading, it may be appropriate to use strips placed closer together so that individual head fires do not have time to build to potential intensity before converging with the previous strip.

It should be noted that with the use of strip head fires, closer attention to wind direction and speed must be paid in order to ensure safety of personnel and equipment, especially if multiple persons are setting lines in close succession.

### Considerations:

- Rapid fire spread
- Higher intensity
- Can handle greater wind shifts
- Fuel continuity not required due to higher intensity
- Useful with higher relative humidity and fine fuel moistures



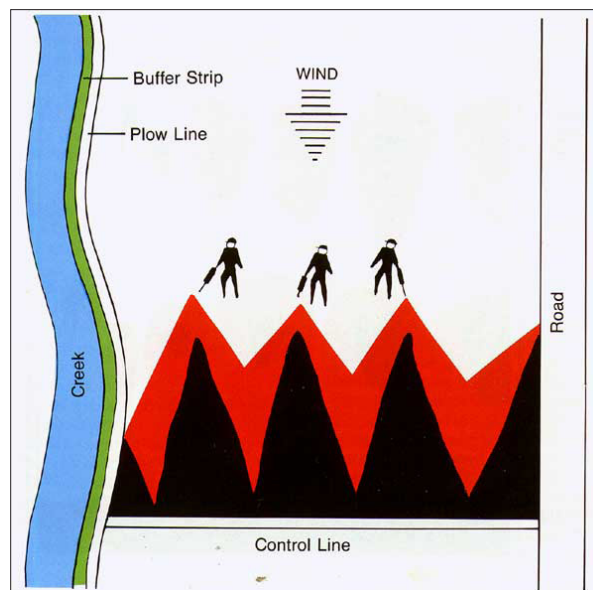
## Flanking Fire

This technique involves setting lines of fire as you move directly into the wind. Fire intensity is generally moderate and as with strip head fires you can manipulate the intensity by adjusting the distance between ignition points. Moving the points closer together will net a less intense fire, whereas moving them further apart will increase the intensity.

With this technique, it is critical that you have a steady wind speed and direction where the igniters move at the same speed.

### Considerations:

- Wind direction must be steady
- Useful in open understory
- Rapid ignition of entire block



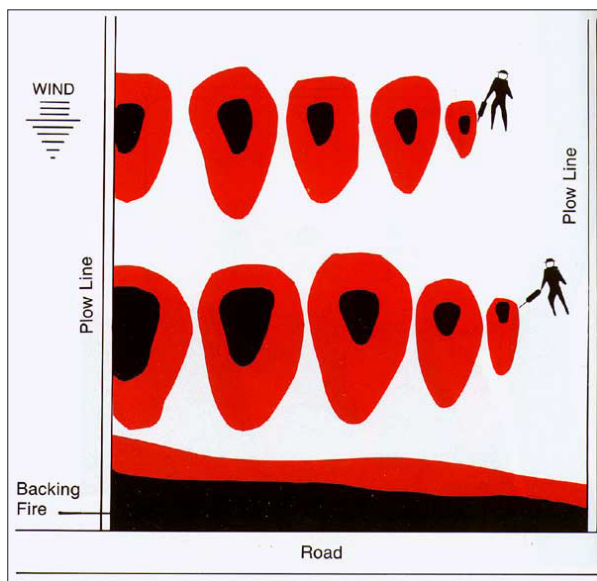
## Spot Fires

Spot fires allow the burn manager the most control of the result of the fire through intensively managed timing of ignition spots within lines, spacing between ignition points, and spacing between ignition lines. The intensity of spot fires falls somewhere between that of a line of backing fire and that of lines of strip head fires. With spot fires, there is movement in all directions, however it should be understood that most fuels will be consumed by the head or flanking portions of the fire, since they are moving most rapidly. As a result, low in-stand wind speeds make this type of fire most effective and allow continual modification of ignition methods to adapt to changing fuel loads, fuel types, and terrain.

If everything is within your burn prescription, you can increase both between and within-line distances. This step will reduce ignition time, and decrease the number of igniters required. The number of convergence areas with higher intensities will also be decreased.

### Considerations:

- Can handle variable wind speeds/directions
- Rapid ignition of burn block
- Easily manipulated on the fly
- Can be adapted to suit changing conditions including fuel loading, fuel type, and topography



### Mop-Up

Prescribed burning is the most useful and least expensive tool available to land managers. However, with this tool comes a great deal of responsibility. Ensuring that the burn is conducted in such a way to adhere to the burn prescription or burn plan, smoke management guidelines, and objectives of the land owner is critical.

By implementing the firing techniques outlined above, obtaining your management objectives should be a walk in the woods.

*Illustrations courtesy of US Forest Service publication "A Guide for Prescribed Fire in Southern Forests."*