# Chapter 9
# Fire Management

**Did You Know?**

*Fire is a natural part of North Carolina's forests.*

*Fire management includes both prescribed burning and wildfire suppression.*

This chapter contains BMPs that can be used to protect water quality when using fire for forest management. There are BMPs for planning burns, using firelines, and controlling wildfire.

## Water Quality Link

Using fire as a forest management tool may reduce soil disturbance that might otherwise happen from using heavy equipment to accomplish the same task.

However, if a fire burns too hot, (as happens on some wildfires) the upper layer of organic matter can be completely burned off, which exposes bare soil.

**Helpful Hints:**

*Organic matter in the top layer of the soil's ground surface acts as a cushion to allow rainwater to soak into the soil below.*

*This top layer of organic matter is known as duff.*

There are two main goals when protecting water quality related to fire usage:

1. **Retain a duff layer on the soil to allow precipitation to absorb into the ground, while still meeting the goals of the prescribed burn.**
   When water soaks into the ground, there is less chance that it will run-off and cause erosion into a waterbody.

2. **Minimize the risk of erosion into a waterbody from firelines.**
   Proper layout, construction, and stabilization will help control runoff.

**For Forest Owners:**

*A prescribed burn uses fire to achieve forest management goals:*
*- Silviculture*
*- Reforestation*
*- Reducing wildfire hazard*
*- Wildlife enhancement*
*- Ecological restoration*

Additional factors play a role in determining the erosion risk from using prescribed burns:

- **Groundcover**: Duff layer provides improved water infiltration.
- **Slope**: Steeper sites need more protection from runoff.
- **Firelines**: Minimize the area of bare soil and control runoff.
- **Rainfall**: Hard rains after a fire can easily wash away soil.
- **Intensity**: Intense fires may burn off duff or damage the soil.
- **Soil**: Some soils are more likely to erode than others.
- **Revegetation**: Promptly revegetate critical areas.

## Rules Related to Forest Management Burning in North Carolina

FPG

**Forest Practices Guidelines Related to Water Quality (FPGs)**
Requires you to take action to prevent accelerated erosion.

**DWR riverbasin and watershed 'Riparian Buffer Rules'**
Restricts the use of prescribed burns within the buffer.
Consult each rule for your specific riverbasin or watershed.

**Helpful Hints:**

*Contact your local office of the N.C. Forest Service if more information is needed on any of these rules.*

**Regulation of Open Fires** [Cited in N.C.G.S. Ch113, 60.21 - 60.31]
Sets criteria for when and where burning permits are required.

**North Carolina Prescribed Burning Act** [Cited in N.C.G.S. Ch113, 60.40 - 60.45]
If you choose to follow the guidance defined by this Act, you must obtain a burn plan that is prepared by a certified burner, file it with the N.C. Forest Service, and burn according to the parameters in the plan.

**For Forest Owners:**

*Variable burn conditions may include:*
*- Slope / terrain*
*- Fuel types / loads*
*- Weather*
*- Soil Conditions*
*- Forest health*

## Planning a Prescribed Burn

As part of a burn plan, it is suggested to include a description of where and what BMPs may be needed on the tract.

These BMP descriptions should also account for the variable conditions that may affect the fire behavior on your tract. *(see sidebar For Forest Owners)*

## BMPs for Planning and Burning

- Burn according to site and weather conditions to achieve the desired results while protecting water quality.

**Watch Out!**

*Retaining duff is especially important on areas with high erosion hazard or highly erodible soils.*

- Retain a duff layer on the soil to allow water to absorb into the ground, while still meeting the goals of the prescribed burn.

- Keep high intensity burns out of the SMZ unless suitable measures are used to insure protection of water quality.

- When conditions allow, use natural or in-place barriers such as roads, canals, utility rights-of-way, streams, lakes, or wetlands to minimize the need for fireline construction.

- The type, width and location of firebreaks or firelines should be noted on the burn plan and/or map.

## Firelines for Prescribed Burning

Firelines or firebreaks are needed to contain a prescribed burn. In many cases it is necessary to turn over several inches of earth with disks or plows to expose bare mineral soil for the fireline.

On sites where bare soil must be exposed to create an effective and safe fireline, you should pay attention to the potential erosion risk of exposed soil.

***A Note on Firelines for Wildfire Control:***

Firelines are also necessary to safely and efficiently control wildfires:

- The BMPs below are for firelines that are intended for a prescribed burn.

- While some of these recommendations may also apply to a wildfire situation, there are specific BMPs for wildfires later in this chapter.

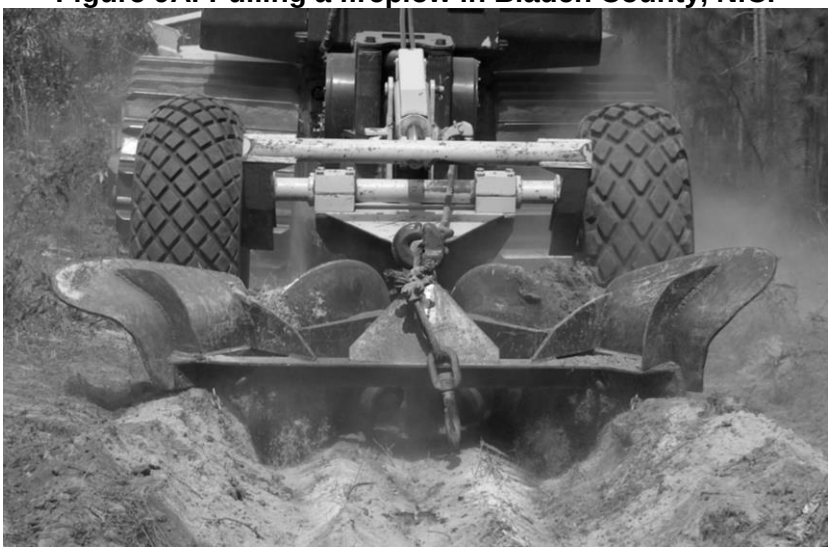
**Also Refer To:**

*Chapter 5 for BMPs suggested for roads and skid trails that may also be useful for firelines.*

While firelines are usually for temporary use, they should be planned and constructed with the same care and attention paid to water quality protection as with temporary roads and skid trails.

Firelines should be rehabilitated, retired, or otherwise stabilized in areas that pose a risk to water quality.

**Figure 9A: Pulling a fireplow in Bladen County, N.C.**



**Caption:**
*Minimize soil disturbance when installing fireplow-lines, especially when located near streams or along slopes.*

*This fireplow-line is exposing an adequate amount of mineral soil to starve the fire but is not overly deep or wide.*

## BMPs for Fireline Construction

- Construct firelines only as deep and/or wide as necessary to contain the prescribed fire.
- Minimize using soil disturbing tractor-plow firelines if conditions allow.
- Construct firelines in a way that minimizes erosion and prevents runoff from directly entering waterbodies by installing and maintaining water bars, sediment traps, turnouts, or using other appropriate methods.
- When site conditions or burning techniques are suitable, construct firelines along the contour and avoid straight uphill/downhill placement.
- Fireline slope should be kept to 25 percent or less if possible.
- Try to keep constructed firelines out of SMZs, marshes or other environmentally sensitive areas. If a constructed fireline is needed in these areas, avoid using heavy equipment.

**Helpful Hints:**

*Possible alternatives to constructed firelines include hand-cleared lines, natural firebreaks, or wet-lines.*

*Wet-lines are strips of land that are kept saturated with water during the fire.*

**Did You Know?**

*Slope percent is measured by vertical rise divided by horizontal run.*

*A 25 percent slope has 25 feet of height rise for every 100 feet of distance run.*

## BMPs for Fireline Maintenance

- Maintain erosion control structures to control runoff on firelines. Provide adequate cross-drainage where needed to avoid damming surface runoff.
- Minimize accelerated erosion into waterbodies and stabilize those areas that pose a risk to water quality.
- Clear streams and ditches of debris that was pushed in by fire equipment.
- Revegetate and/or stabilize firelines that pose a risk of accelerated erosion to waterbodies.

**Also Refer To…**

*Chapter 11 for detailed BMPs on revegetation.*

## Wildfire Control

**Did You Know?**

*The main objective of wildfire control is to protect life, property, and natural resources, in that order.*

During a wildfire, firefighters work aggressively to contain, control and extinguish the fire.

Site rehabilitation and stabilization after a wildfire includes BMPs, but is usually the last step taken.

In most cases, these BMPs are not implemented until after a fire is both contained and controlled, and it is safe to operate in the burn area.

### BMPs for Wildfire Control

**Also Refer To…**

*Other previously noted fire management BMPs should be considered for their potential application when working a wildfire.*

- Expose no more ground surface than is necessary to control the fire.
- Protect surface waters such as streams, rivers and other waterbodies from polluted runoff.
- Minimize soil disturbance along streambanks and within SMZs or riparian buffers. Avoid crossing streams with heavy equipment unless necessary.

**Did You Know?**

*BMPs for wildfire suppression are usually implemented after-the-fact and depend upon the severity of the fire and the type of suppression techniques used to control the wildfire.*

- Keep fire-retardant chemicals out of SMZs, riparian buffers or waterbodies as conditions allow.
- Clean and maintain firefighting equipment away from SMZs, riparian buffers or waterbodies.
- If water retention areas are constructed, they should be returned to their pre-existing hydrology as close as possible after they are no longer needed.

**Helpful Hints:**

*Firefighter training can address the importance of protecting water quality with BMPs and doing site rehabilitation afterwards.*

- Stabilize and/or retire firelines and access trails or roads that were created to control the wildfire. Consider installing suitable water (runoff) diversions, as described in Chapter 5.
- Establish groundcover, re-vegetate or stabilize areas that are a high risk of accelerated erosion.