



North Carolina  
Forest Service

# FORESTRY Leaflets

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FM-21

## Protecting Soil Resources

### **Why Conserve Forest Soil?**

Soils can take thousands of years to form but can be degraded over much shorter timeframes if certain precautions are not taken. Soil resources that are properly managed can maintain site productivity, help protect water quality, decrease costs associated with forest operations, reduce wear and tear on equipment, and maintain positive public perceptions of forest harvesting. The development of a plan that helps anticipate, prepare for and deal with operational challenges is a critical component of effective soil conservation.

### **Do Forest Operations Degrade Soil?**

*It depends.* In many cases, planned forest management activities that follow Best Management Practices (BMPs) have minimal negative soil impacts, if any, and tend to have the highest combined economic, social, and environmental value. In these cases, site productivity and water quality levels are maintained by retaining soils onsite and adjusting operations per site conditions.

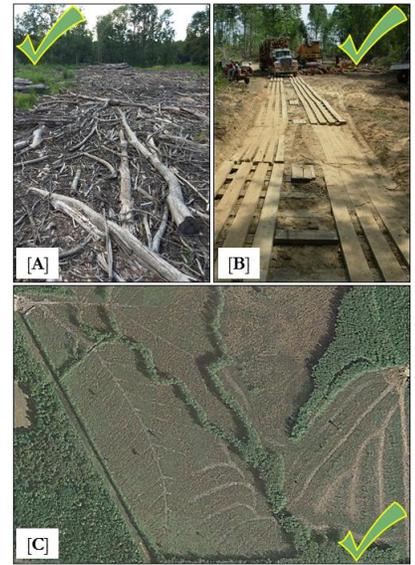
Conversely, poorly planned and executed forest operations can negatively impact soil primarily through rutting and/or accelerated soil erosion. The level of soil impact can be influenced by site characteristics (climate, topography, soil type), timing of operations (wet/dry weather) and equipment use (weight and number of passes). Each site has a unique threshold at which soils could be negatively affected. Research has shown that sites with finer soil texture, greater soil water content, and more frequent and heavy traffic tend to be more susceptible to soil disturbance. Excessively rutted, soupy, or churned soils and/or accelerated soil erosion restrict plant growth by altering soil aeration, as well as water and nutrient availability. In many cases, soils degraded through poor harvesting practices can be mitigated through site preparation and/or fertilization. However, having to conduct these additional operations decrease profits realized from the timber harvest and creates poor public perceptions of forestry.



Left photo shows an example of a harvest that protected soil resources by following Best Management Practices. Note ample woody debris in the general harvest area and shrub-like vegetation in the streamside management zones that minimized rutting, erosion, and sediment delivery to the stream. Right photo shows a different harvest site that needed additional site preparation to improve soil aeration. Right photo had similar levels of woody debris to the left photo, but was buried by excessive and extensive equipment passes during wet site conditions. While this timber harvest did not violate any state or federal laws, it created an undesirable public perception of the forestry profession.

## Forestry Best Management Practice Recommendations for Soil Conservation\*

- ✓ “A universal BMP is to minimize the amount of soil disturbance. This is especially true for intensive soil disturbances that are often referred to with terms such as rutting, compacting, souping, mixing and/or churning” (page 14).
- ✓ “Have a backup plan when inclement weather and/or wet site conditions do not allow operations to continue on a specific site” (page 36).
- ✓ “Where conditions warrant: Concentrate skidding on as few skid trails as needed. Limit primary skid trails to 10 percent of the total working area. Avoid widespread or random skidding patterns with repeated passes. Minimize placement and use of skid trails in ephemeral drainages. Create skid trails only as wide as necessary to safely operate your equipment. Minimize the extent of gouges or trenches upon the ground surface that are created by the skidding of trees or logs” (page 85).
- ✓ “Consider placing logging debris such as slash, laps or limbs on critical bare soil areas as the forestry operation is ongoing” (page 132).
- ✓ “Maintaining the BMPs once you have put them in place will assure they continue to function” (page 12).
- ✓ “Consider ceasing operations or choosing a better harvest method if a single pass of equipment produces ruts deeper than six inches across a significant area of the site beyond the primary skid trails and decks” (page 99).
- ✓ “Maintain the road surfaces as needed to minimize or repair ruts, holes, or depressions that hold water, which can weaken the roadbed or create concentrated runoff with sediment transport” (page 60).



Examples of forest operations protecting soil resources: [A] Skid trail covered with woody debris [B] Log truck road covered with wooden mats [C] Primary skid trails limited to less than 10 percent of the harvest area.

\*Excerpted from the 2006 N.C. Forestry Best Management Practices Manual

### Set Yourself Up for Success

Identify and summarize information about your tract of land through a process called preharvest planning. A preharvest plan can help you conserve soil and water resources and achieve the most economical logging operation consistent with silviculture. The 2006 N.C. Forestry Best Management Practices manual provides an 11-step planning process to assist you in planning for your harvest site (Pages 33-35).

The N.C. Forest Service also offers a free online planning tool called the “[Forest Preharvest Planning Tool](#)” (FPPT). The FPPT allows users to create maps and plan forest operations on any area of land in North Carolina (an example is pictured on right). Users can identify streams, waterbodies and the tract’s soils limitations. Users can also draw tract features such as skid trails, log decks, and streamside management zones on top of topographic and aerial maps. This tool incorporates several commonly-used planning aids into one program and allows the users to identify areas of concern. Check out the FPPT at:

<https://www.ncforestatlas.com>. Additionally, N.C. Forest Service county rangers and foresters can provide preharvest plans upon request. Contact your county ranger by visiting the N.C. Forest Service’s web page:

[http://www.ncforestservice.gov/contacts/contacts\\_main.htm](http://www.ncforestservice.gov/contacts/contacts_main.htm).

### Additional Resources

N.C. Forest Service Central Office: (919) 857-4857

<http://ncforestservice.gov>

Consulting Forester List, N.C. Forest Service

[http://ncforestservice.gov/Managing\\_your\\_forest/consulting\\_foresters.htm](http://ncforestservice.gov/Managing_your_forest/consulting_foresters.htm)

