North Carolina Forestry

Best Management Practices

Quick-Reference Field Guide

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Planning Ahead Can Pay !

Effective & low-cost practices to protect water quality can also be time-savers.

Practice	Your Bottomline Cost	Upfront Water Quality Payoff
Avoid stream crossings	$	
Preharvest planning	$	
Effective streamside management zones (SMZs)	$$	
Good erosion control	$$$	
Re-Use bridgemats on crossings	$$$$	
Returning to a site to fix a problem	$$$$$$	

Remember:

Groundcover is your best bet to control erosion:

Keep groundcover in place --

Establish groundcover --

Do it right from the start –

What this Field Guide Is and Is Not

This Field Guide:

- …is written for loggers, technicians, foresters and others as a quick-reference guide illustrating good practices for soil conservation and the protection of water quality during forestry operations.

- …illustrates examples of proper Best Management Practice (BMP) implementation, improper BMP usage, and examples of sites where BMPs could have minimized impacts to water quality.

- …replaces two out-of-print publications: Pocket Guide to the Forest Practices Guidelines Related to Water Quality and the Best Management Practices Checklist for Forest Harvest Operations.

This Field Guide:

- …is not the North Carolina forestry BMP manual.

- … is not a full, complete or comprehensive description of all possible BMP options that may be worth implementing on your job site. The selection and intensity of BMP usage is site specific. Alternative practices are suitable if they achieve the same or better results related to water quality protection during forestry operations.

- … is not a complete citation of all rules, regulations, laws or regulatory guidance related to water quality and forestry operations.

Section 1: Introduction

How to Use this Field Guide

This field guide provides some quick-reference tips and suggestions that show how to protect water quality during your forestry operation.

The tips in this field guide may help you comply with the **Forest Practices Guidelines Related to Water Quality,** or FPGs, and other water quality regulations. The FPGs and a selection of other commonly referenced regulations are highlighted in the back of this guide.

This guide focuses on timber harvesting and related activities. As you need detailed or specific BMP recommendations, refer to the North Carolina Forestry Best Management Practices Manual to Protect Water Quality, available at your local N.C. Division of Forest Resources office or online at www.dfr.state.nc.us.

Photo and Drawing Symbols

The photos and drawings have symbols to demonstrate examples of typically “good” or “bad” situations. Other symbols are used to remind you about regulations or other mandatory practices that may apply to your site.

The symbols used are shown on the next page.

Symbol	What It Means
	A “bad” situation that needs improvement to protect or maintain water quality. **You want to avoid this type of condition.**
	Examples of “good” BMP work that should function properly if maintained. **You want to achieve the results shown by these photos.**
FPG	Recognize that a mandatory, statewide FPG rule may apply. Read and understand the North Carolina Forest Practices Guidelines Related to Water Quality (FPGs) to make sure your site remains in compliance with these statewide regulations. For your reference, the full citation of the FPGs is included in Section 10 (red) of this field guide.
RULE	Caution: There are other rules, laws or regulatory guidance that may apply to your site. A summary of the most commonly referenced rules is in Section 10 (red) of this field guide.

Remember:

Each photo has caption text that explains what you should be looking for in each photo that makes it a “good” or “bad” example.

Section 2: Planning

Planning your forestry operation can prevent water quality problems from happening.

Planning saves you time, money, and 'wear and tear' on equipment by alerting equipment operators to take extra precautions or stay away from sensitive areas.

BMP planning helps to:

- Locate streams.
- Establish and mark SMZs or buffers.
- Determine road access and layout.
- Assess the need for stream crossings.
- Layout skid trail and deck locations.
- Evaluate potential rehab needs.

Remember:

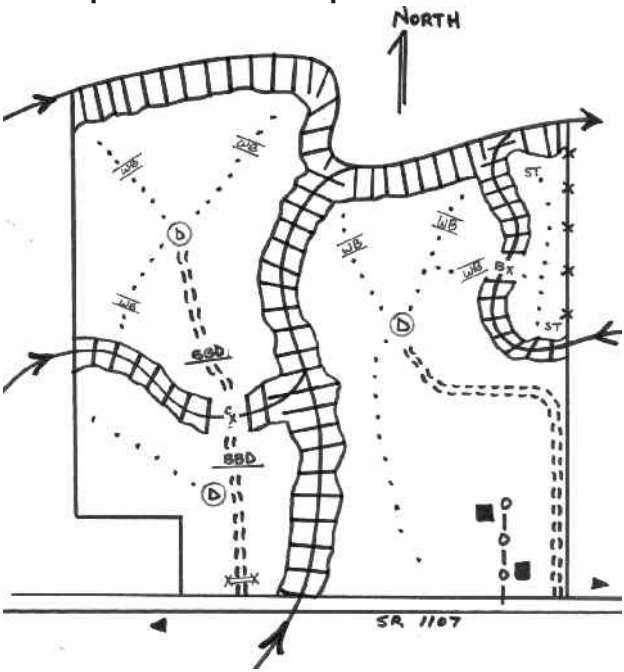
Plan before timber harvesting and other forestry work: site prep, road work, drainage maintenance, burning, herbicide application, and other activities.

Use these planning tools:

1. On-site visit with sketch maps.
2. Topographic maps (“topo” maps).
3. Soil survey maps.
4. Air photos or satellite images.

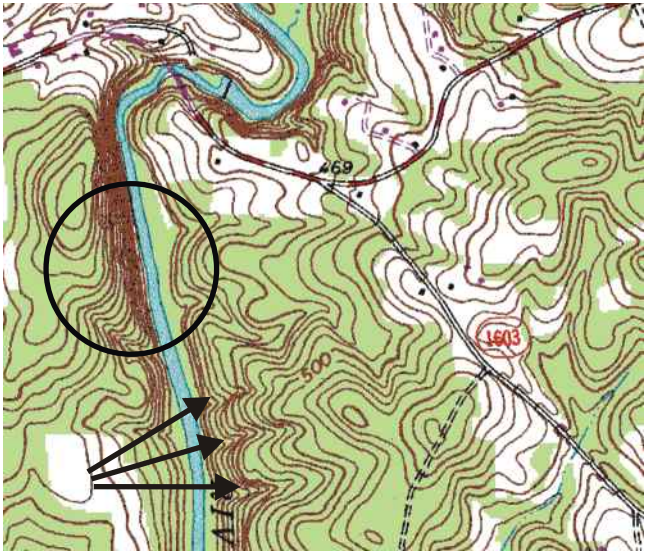
Examples of each of these four items follow:

Example 1: Sketch map



This sample sketch map shows important BMP features: streamside/buffer zone; culvert crossing (CX); bridgemat crossing (BX); deck (D); waterbars (WB); broad-based dip (BBD); sediment trap (ST); roads (==) and skid trails (…).

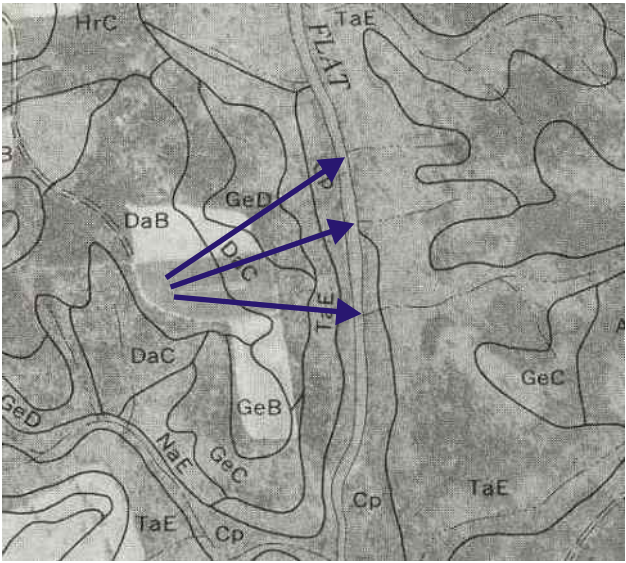
Example 2: Topographic ("topo") maps



The brown lines are called "contour lines." Contours show similar elevations:

-- As contour lines get closer together, this indicates steeper slopes (circled).
-- Contour lines shaped like a V indicate the probable location of a stream, gully or other drainage (arrows).
-- Either dashed or solid blue-colored lines estimate rivers and larger streams. Topo maps do not show all streams. Visit the site to verify stream location.

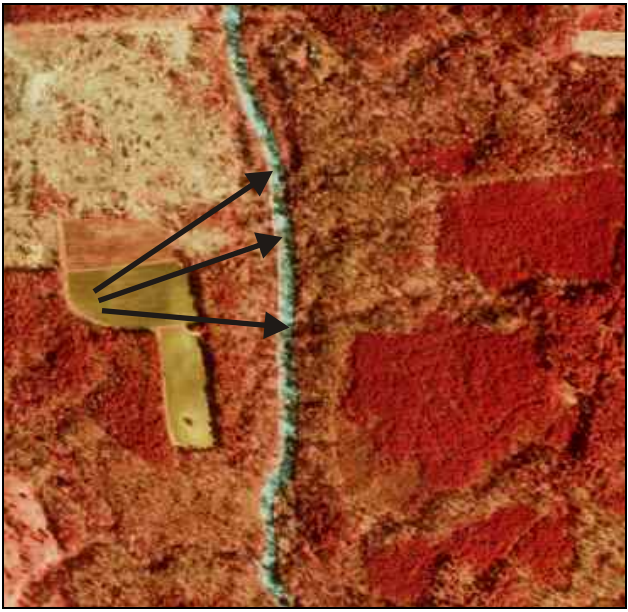
Example 3: Soil survey map



The solid black lines separate different soil types. The alphabetic codes refer to the type of soil estimated for that location.

-- Streams are estimated with dashed lines (arrows).
-- Soil maps often show more streams than on topo maps, but you should still visit the site to verify stream location.
-- The soil survey book contains tables of information listing the ability of each soil type to handle heavy equipment and support tree growth.

Example 4: Air photo or satellite image



This is an infrared color satellite image of the same site as shown by the soils map. Satellite images and air photos may come in black and white, true color or infrared color.

-- Small streams can be hard to see on photos. Compare this with the streams shown on the soils map (arrows).
-- Changes in shadows or timber types (pines versus hardwoods) can be a clue that a stream corridor exists.

Preharvest Planning Steps

A preharvest plan should be your starting point. This plan may also be useful for other forestry operations such as site prep, roadwork or other silvicultural treatments.

Step 1 - Know the rules

FPG ***Statewide mandatory "Forest Practices Guidelines Related to Water Quality" (FPGs).***

RULE ***NCDWQ riverbasin and watershed 'Riparian Buffer Rules', stream/ditch obstruction laws, and others that relate to water quality.***

- Wetland rules and requirements.
- Endangered species considerations.
- Other forestry-related rules: waste disposal; prescribed burning; fluid spill reporting and clean-up.

Step 2 - Layout and access

- Understand the lay of the land. Use maps to avoid problem areas and layout your job.
- Establish suitable access to the property.
- Identify, locate and mark harvest boundaries.

Step 3 - Site and timber conditions

- Keep roads, skid trails, decks and firelines on flat level ground and away from streams.
- Steeper slopes will likely need additional work to control runoff and keep sediment out of the streams.
- Recognize that soil conditions can limit the ability of heavy equipment to work. Plan accordingly.
- Locate decks, skid trails and roads to maximize access to timber while minimizing bare soil exposure.

Step 4 - Streams and waterbodies

- Locate streams and waterbodies that need protection. Seek professional assistance if you are unsure.
- Determine if stream crossings are needed.

Step 5 - SMZs and riparian buffers FPG RULE

- Establish needed SMZs or riparian buffers.
- Visibly mark the SMZ and/or riparian buffer so equipment operators can easily see them.

Step 6 - Stream crossings FPG RULE

- Avoid stream crossings if possible. Know the rules.
- Select a stream crossing type and location that will minimize impacts but provide efficient site access.
- Use erosion control structures at the crossings and along the approachways to the crossing.
- Install crossings at a 90-degree angle (perpendicular) and where the channel is narrow.

Step 7 - Roads and entrances FPG RULE

- Know the rules related to roads and entrances.
- Minimize road number, size, width and length needed for safe and efficient operations.
- If a new road must be built, situate the road atop firm, well-drained soils.
- Keep away from streams and out of ephemeral drainage areas if possible.

- Establish safe access onto public roads. This may require obtaining N.C. DOT driveway permits.
- Restrict mud, soil and debris from being dragged onto public roads. Wooden mats or stone can work well.
- Avoid entering the public road at a blind-spot location (hills and curves). Consider setting up warning signs along public roads to warn oncoming traffic.

Step 8 - Skid trails and decks

- Minimize the number and size of skid trails and decks. Situate skid trails and decks on level ground, where possible, to control runoff.
- Locate the skid trails and decks as far from waterbodies as practical.
- Use erosion control practices to control runoff.

Step 9 - Sketch map and harvest scheduling

- Sketch a map to show expected BMPs, erosion control needs, important features and creeks.
- Communicate: hold a briefing to share maps and site information with equipment operators.
- Determine which portion of a site will be harvested first and have a backup plan if site or soil conditions deteriorate.

Step 10 - Site rehab and closeout FPG

- Know the rules related to site stabilization.
- Closeout, rehab and stabilize stream crossings, roads, decks and skid trails. This may include mulching, culvert removals, re-grading of roads and installation of fences or gates.

- Perform site rehab as soon as practical after an area is no longer being worked. An optional groundcover seeding table is provided later in this section.

Step 11 - Monitor and Maintain BMPs

- Monitor and maintain BMPs so they function.
- Evaluate BMPs and site conditions after heavy rains to see if water quality is still protected. Take actions right away to protect water quality.
- This may include returning to a site to fix a problem, even after you have tentatively closed it out.

Seeding and Soil Amendment Options for Stabilization of Forestry Sites in North Carolina

Lime: 45-50 pounds/1000 sqft of ground agricultural lime.
Fertilizer: 10 pounds/1000sqft with equivalent 10-10-10.
Nitrogen Fertilizer Conversions: Pounds of fertilizer that provide 1pound of nitrogen per 1000 sqft.:

20 lbs of 5-5-5	**10 lbs of 10-10-10**
20 lbs of 5-10-5	**12.5 lbs of 8-8-8**
20 lbs of 5-10-10	**6.25 lbs of 16-0-0**

The seeding options shown on the next page were selected because they are:

- Low-cost
- Readily available at farm/garden supply
- Easy to handle and apply
- Visually pleasing
- Multi-functional
- Adaptable to a wide range of soil conditions

Spring Application Mix	
Creeping Red Fescue	0.5 lbs / 1000sqft
Red Clover	0.25 lbs / 1000sqft
Oats	1.5-2.0 lbs / 1000sqft
Summer Application for Temporary Cover	
German Foxtail or Browntop Millet	0.75 lbs / 1000sqft
Early Fall Application Mix	
Creeping Red Fescue	0.5 lbs / 1000sqft
Red Clover	0.25 lbs / 1000sqft
Wheat	1.5-2.0 lbs / 1000sqft
Late Fall Application Mix	
Creeping Red Fescue	0.5 lbs / 1000sqft
Annual Rye Grass	0.25 lbs / 1000sqft
Rye	1.5-2.0 lbs / 1000sqft
Winter Application for Temporary Cover	
Annual Rye Grass	0.5 lbs / 1000sqft

Remember:

- ***Groundcover is often your best low-cost solution!***
- ***A soil analysis test may save you money by avoiding the need to apply excessive lime and fertilizer.***
- ***You can also consult with local USDA-Natural Resources Conservation Service (NRCS) or Soil and Water Conservation District for additional seeding options to stabilize soil.***