

## Forestry Operations: Water Quality & BMPs

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Adapted from a presentation developed by Tom Gerow.



## What Are The Rules?

N.C. "Forest Practice Guidelines Related to Water Quality" (FPGs)

N.C. General Statutes (G.S.)

Petroleum Spill Notification

State 'Riparian Buffer Rules'

Rules ("guidance") in Wetlands



## *The Rules: FPGs*

### The FPGs are 9 performance standards:

- Goal-oriented, results-based, not prescriptive
- Each FPG section describes a desired outcome, not necessarily how to achieve it
- FPG compliance may be achieved by using *Best Management Practices* (“**BMPs**”), or some other suitable methods
- As long as the outcome/standard of the FPG is being achieved, any methods can be used



## *The Rules: FPGs*

### The 9 FPG standards: (02 NCAC 60C .0100 - .0209)

- .0201 Streamside Management Zone - SMZ
- .0202 Prohibition of Debris Entering Streams and Waterbodies
- .0203 Access Roads and Skid Trail Stream Crossings
- .0204 Access Road Entrances
- .0205 Prohibition of Waste Entering Streams, Waterbodies and Groundwater
- .0206 Pesticide Application
- .0207 Fertilizer Application
- .0208 Stream Temperature
- .0209 Rehabilitation of Project Site



## The Rules: FPGs

### FPG Site Inspections & Quarterly Reports (“4808”)

- NCFS required to inspect active logging sites as we become aware of them in normal of course of work, or by request, or complaint.
- We fill out forms, and communicate with person who is in ‘operational control’ of that job, copies of forms provided.
- If follow-up work is needed to get in-compliance with FPGs, a deadline is provided (*flexibility may be available, but communicate!*)
- Each quarter, Raleigh staff produces FPG Quarterly Report that shows all inspections for that quarter including:
  - Buyers in non-compliance & Operators in non-compliance & Referrals

Most of the large paper / lumber / timber companies ask for a copy of this report.

They will check to see if any of their contracted loggers or buyers are on the “non-compliance” list...

They get audited periodically and have to demonstrate that their company is following environmental sustainability goals



## Best Management Practices - BMPs

### Are BMPs required by law in NC??

Technically, No\* .....

....but activities must comply with the FPG rules

....(and all the other environmental rules)

- \* Federal wetland BMPs required: 15 roads, 6 site prep
- \* BMPs required on cost-share sites: FDP, CRP, etc
- \* BMP Certification: SFI, FSC, Tree Farm, etc

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FPG's = “you have to”      BMPs = “should do”

**BMPs are the tools in the toolbox**



## Best Management Practices - BMPs

### Skid Trails

- Concentrate on as few trails as possible.
- Limit primary skid trails to 10% of working area.

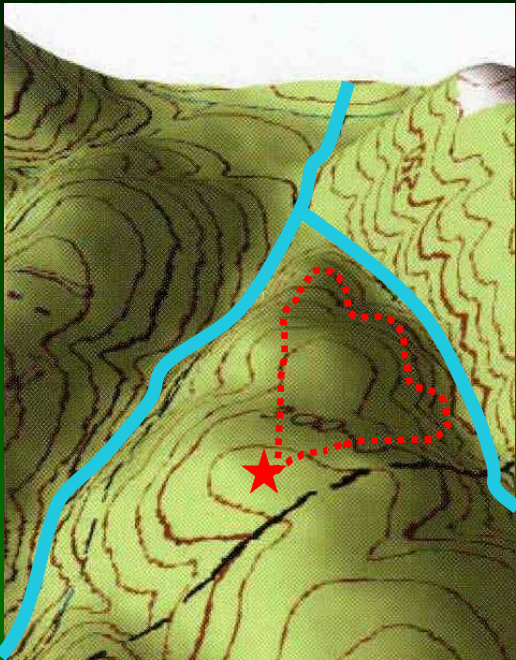
*Ex: 50 acre tract, 10%=5 ac: If primary skid trail is 15ft wide, limit length to 14,520ft (2¾ mile).*

- Avoid widespread, random skidding with repeated passes.
- Minimize in ephemerals.
- Minimize soil gouges, trenches.
- **Pack down leftover logging debris atop skid trails.**



### Log Decks

- Minimize size, area.
- Keep out of SMZs, ephemerals.
- Flat level ground, stable soils, with good drainage.
- **Pack down leftover logging debris atop deck.**



### Laying out Skid Trails

Avoid “ephemeral streams”

This means hollows, gullies, ravines.

Example Here:  
★ = log deck

Dotted line is skid trail.

Here, skid trail crosses 2 ephemeral streams and runs along the blue-line stream, close to SMZ.

**HIGHER RISK SCENARIO**



### Laying out Skid Trails

**Avoid “ephemeral streams”**

This means hollows, gullies, ravines.

Example Here:  
★ = log deck

Dotted line is skid trail.

Here, skid trail runs down atop the ridges and stays out of ephemeral stream gullies. Reduces contact with the blue-line SMZ.

**LOWER RISK SCENARIO**

## Best Management Practices - BMPs

*Effective BMP Usage.*

*Low Risk Management.*

Main trail matted-down.  
Low risk of soil damage or sedimentation

Granville Co





## **Best Management Practices - BMPs**

### **Streamside Management Zone - SMZ**

*Remember: A SMZ is required along certain streams & waters as described in FPG .0201:*

#### Where is SMZ needed?

- Intermittent Streams,... Perennial Streams,... and Perennial Waterbodies.
- **NOT** ephemerals, **NOT** ditches, **NOT** beaver ponds  
*(but, sediment still must be kept out of these features)*

#### Main goals of a SMZ:

- Slow & filter surface runoff
- Capture sediment before reaching stream
- Provide shade
- Maintain streambank stability
- Buffering from other natural impacts (nutrients, bacteria)



## **Best Management Practices - BMPs**

### **Streamside Management Zone - SMZ**

#### **General BMPs for Forestry Operations in SMZ**

- Keep skid trails, roads, decks at least 10 feet away from the edges of the stream or waterbody
- Maintain 50% ("half") of pre-harvest shade
- No more than 20% evenly distributed bare soil
- Do not use SMZ as a de-limbing gate
- Minimize soil gouging from skidded logs / trees
- Service & refuel equipment out of SMZ.
- Avoid high intensity prescribed burns in the SMZ.
- Minimize heavy equipment usage within SMZ (site prep).





## **Best Management Practices - BMPs** **Streamside Management Zone - SMZ**

### **SMZ: Special Cases**

#### **Braided Streams**

- Try to stay out of these areas.
- Harvest when dry.
- Often these are also wetland areas, so be aware.

#### **Hydrologically-Connected Ditches**

- Ditches that outlet to a stream system.
- No SMZ width recommendations.
- Protect ditchbank integrity and minimize heavy equipment use.

#### **Ephemeral Streams / Drainages**

- No SMZ width recommendations.
- Minimize heavy equipment use, decks, skid trails, roads.
- Wrap SMZ around stream head to include transition area.





## *Best Management Practices - BMPs*

SMZ flagged.  
Trees cut & removed away from stream.  
Some soil disturbance, but not extreme.  
Slash / tops piled along edge of slope.



## *Best Management Practices - BMPs* **Stream Crossings**

**Avoid installing new crossings if possible.**

Minimize the number & overall size of crossings

Rehab right away once crossing is not needed

### On skid trail crossings:

- Pack down slash atop of the approachways while being used...not just later for rehab
- Use bridgemats

### On logging road crossings:

- Keep soil from washing into the stream
- Consider a bridge or ford, instead of a culvert





**Best Management Practices - BMPs**  
**Stream Crossings: Bridgemats**  
Wilkes Co.



- Bridgemats butted tight together
- Road approachways stabilized with stone

**Stream Crossings: Bridgemats**  
What can be done to reduce risk to water quality at this site?





## Best Management Practices - BMPs

Skid Trail Stream Crossings: Stabilize the Approachways



Bridgmat Skid Trail Crossing.  
Bare soil, rutting on approachways. Needs slash applied.  
Even on flat ground, BMPs & Risk Management are important.



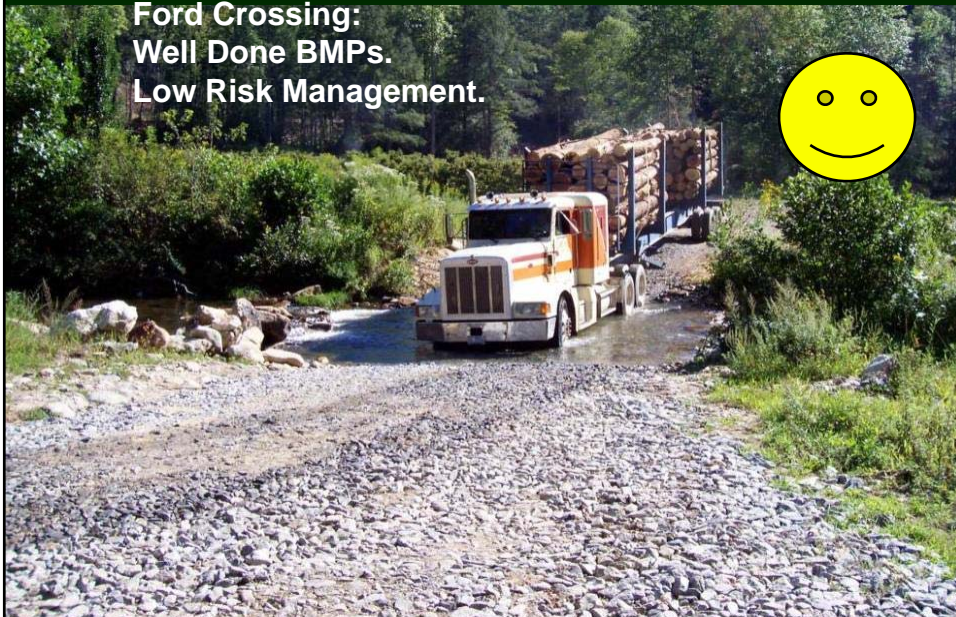
**Log pole crossing  
in a dry ditch,  
Northampton Co.**



**Ford crossing,  
ample ballast  
on each  
approachway  
and side banks  
grassed-over,  
Franklin Co.**

## ***Best Management Practices - BMPs***

**Ford Crossing:  
Well Done BMPs.  
Low Risk Management.**





Ford Crossing.  
Poorly Implemented BMPs.

High Risk Management.

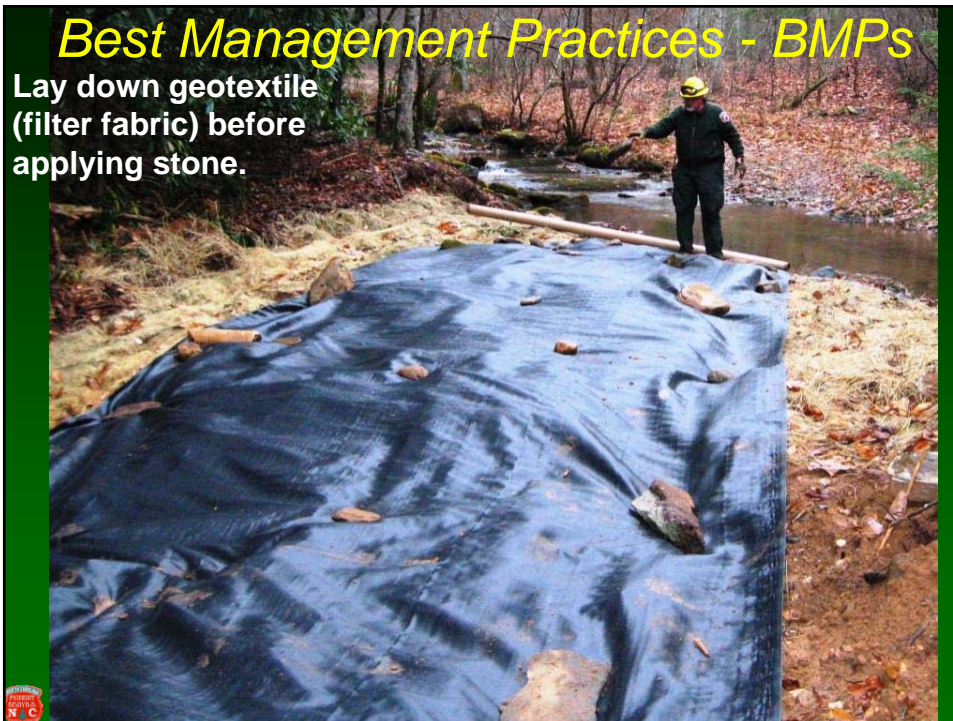


*What could have been done to prevent mud from pumping up?*

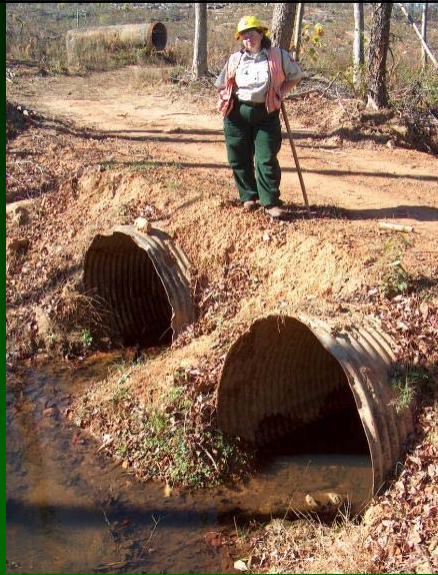


## *Best Management Practices - BMPs*

Lay down geotextile  
(filter fabric) before  
applying stone.



Tree tops in stream for skid trail crossing.  
Blocking water?  
Hard to rehab & remove.  
**High Risk Situation.**



Large culverts. Big enough?  
Bare soil exposed, washing away.  
**High Risk Situation.**

## **Best Management Practices - BMPs**

### **Erosion & Sediment Control: 3 steps to success**

#### **1: Prevent accelerated erosion & concentrated runoff:**

- Ground cover, soil structure, SMZ

#### **2: Control runoff before it gets out of hand:**

- Slow it down...& Spread it out...
- Establish a 'break in the grade' = divide slopes into short sections

#### **3: Capture sediment & runoff:**

- Keep it out of the stream, ditch, wetland

#### **BMP Tools to Control Runoff**

- Broad-based dip
- Turnout
- Cross Drainage
- Waterbars
- Inside Ditchlines
- Road Insloping, Outsloping, Crowning



#### **BMP Tools to Capture**

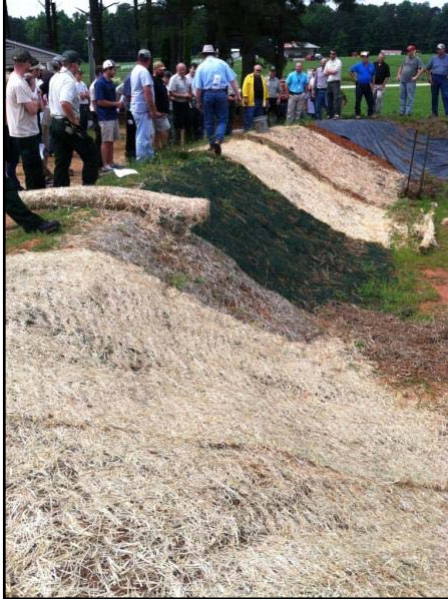
##### **Sediment**

- Filter Areas
- Silt Fence
- Brush Barrier
- Sediment Trap/Pit
- Hay / Straw Bale
- Check Dam



## BMPs: Erosion Control Tools (new options)

Erosion Control Matting  
*slopes & stream banks*



Coir / Fiber Logs, or "Wattles"  
*fiber check-dam, instead of rip-rap*



## Best Management Practices - BMPs Forest Roads

- **Don't build a new road unless needed.**
  - *Can the old logging road be "freshened up" and used ??*
- **Take extra care at stream crossings.**
- **Follow the contour. Don't dig any more soil than needed.**
- **Only install as much road as needed.**
  - *Minimize length, width, and soil excavation.*
- **Install diversions. Control the runoff. Maintain the road.**
  - *.....slow it down & spread it out.....*
- **Daylight strip to let the sun shine down.**
- **In lowlands (wetlands), keep road height at a low profile.**
  - *Avoid creating a berm or dike. Install plenty of cross-drain culverts or bypass dips.*



## **Best Management Practices - BMPs**

**Forest Roads: Which Is Using BMPs to Manage Risk?**



## **Best Management Practices - BMPs** **Site rehabilitation (rehab) & stabilization**

**REQUIRED under section .0203 & .0209 of FPG's!**

- **Critically important, especially at:**
  - Stream crossings
  - Along or within SMZ's & buffers
  - Along steep slopes that lead towards the water
  
- **Most common rehab work:**
  - Remove debris from streams
  - Install water diversions on plowlines, trails, roads
  - Reshape roads, firelines to prevent funneling of runoff
  - Re-cover bare soil nearby streams (*esp. approachways*)





## *Best Management Practices - BMPs*

Skid trails with effective rehab groundcover



Stream crossing was removed.  
Is this good enough?



*So.... How Are We Doing?*



## **BMP Performance Report Card**

**NC Forest Service conducts periodic detailed logging job site surveys. These are in addition to our standard FPG inspections.**

**BMP site surveys are intended to see what BMPs are being used, and if the BMPs are working as intended.**

**Most recent data is from 212 active logging jobs we evaluated between 2006 & 2008.**

**Some results that we found....**



## BMP Performance Report Card

- Statewide, BMPs were implemented 85% of the time where they were applicable.
- Regionally, the numbers vary widely:
  - Mountains 66%, Piedmont 88%, Coastal Plain 91%
- When BMPs were used, there was no risk to water quality nearly 100% of the time.
  - This tells us that when BMPs are used, they work!
- When BMPs were not used, there was a risk to water quality 54% of the time.
- High BMP % use = High FPG % compliance.



## BMP Performance Report Card

### STREAM CROSSINGS ARE A PROBLEM

Worst statewide average BMP usage rate was at stream crossings, with 72% implementation:

- Mountains 52%, Piedmont 77%, Coast 78%
- The most frequent FPG rules violations we see year after year also occur at stream crossings (.0203)
- This is why we talk so much about BMPs & bridgemats & rehab & avoiding stream crossings

### ----- Stream Crossing Methods -----

We looked at the types of crossings and risk to water quality when BMPs were not used:

- Risk to water quality from Bridgemats: 9%
- Risk from Culverts 49%, Poles 23%, Fords 27%





## BMP Performance Report Card

### Take home points *(things you already know?)*

- Logging in the mountains, on steep slopes is very, very challenging.... Much more BMP work is needed.
- Stream crossings are a problem, avoid them at all costs
- Bridgemats are the best BMP option, lowest risk to WQ
- BMPs that give you the most reward:
  - **Stream Crossings, Rehab, Debris in Streams, Skid Trails, SMZ, Roads**
- SMZ's less than 10 feet don't work.
  - **Between 35 feet & 50 feet should be sufficient most of the time**
  - **Take extra precautions when logging in the SMZ**
- Rehab, Rehab, Rehab.... as soon as possible.
- Technical assistance, harvest planning, and ProLogger **ARE WORKING....**



## MOU between NCFS & DEMLR

### Improve Communication

- NCFS is lead agency in determining FPG Compliance
- DEMLR is lead agency in determining if the activity is forestry
- Work together on questionable tracts
- Improve follow-up paperwork flow and share findings

### Interagency Training

- Plan regional meetings with personnel to ensure everyone is on the same page
- Visit sites to gain understanding of what each agency is seeing and thinking on sites



## NCFS Contacts

### Typical hierarchy

- County Office – County Ranger or Assistant CR
- District Office – District Forester, Assistant DF, Water Quality Forester
- Regional Office – Assistant Regional Forester
- Central Office – Water Quality and Wetland Staff Forester

### Common exceptions

- Districts with Water Quality Foresters: That forester commonly becomes a main contact for tracts with problems or potential problems
- Disagreement with an office's decision

