North Carolina Forest Service

FORESTRY Leaflets

Focus Series on Bottomland Swamp Forests

December 2018 *#BF-4*

Harvesting Timber Using the Shovel-Mat Logging Method

The Issue

Harvesting timber in bottomlands, swamps and other low-lying areas usually requires specialized logging equipment and methods. The most frequently-used method is known as 'shovel logging', also called 'mat logging'. This method of logging integrates the use of multiple machines mounted upon crawler tracks in tandem with machines that are mounted on extra-wide or dual-rubber tires. This logging method is suited for wet-natured sites where clearcut harvesting will be implemented.

The Method

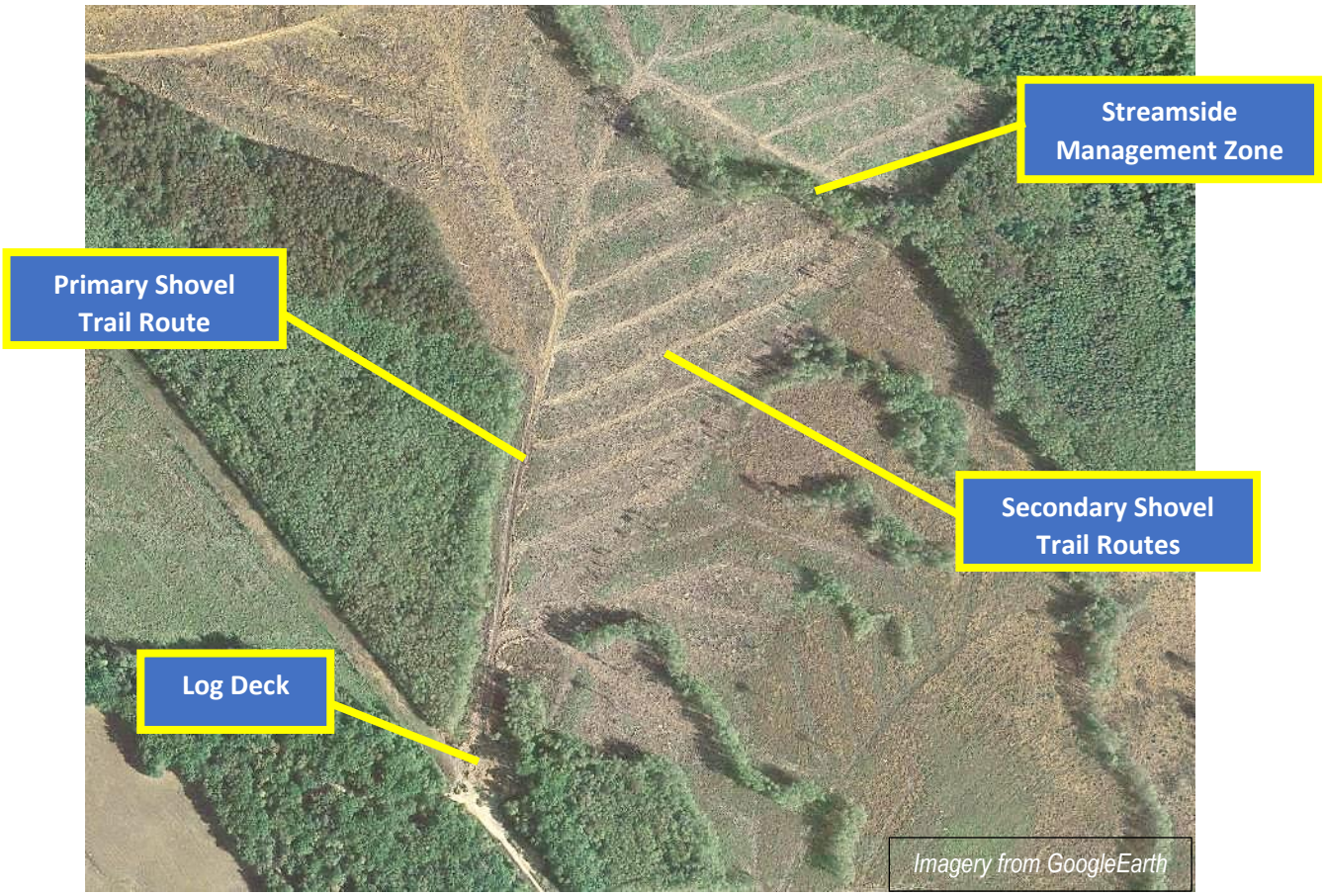
First, a track-mounted harvesting machine cuts a pathway through the standing timber. Next, a similar track-mounted, tree-handling/log-loader machine will pick up the trees that have been cut and place them atop of the ground in a finger-joined pattern to create a skid trail atop of the ground surface. Then, rubber-tired skidder tractors drive back and forth atop of this skid trail to shuttle the newly harvested timber from the forest, up to the log deck for merchandizing and staging. Once an area of the tract has been harvested, the trees and logs that were used to build the skid trail are pulled up.

Left: A track-mounted tree harvesting machine (called a tracked feller-buncher).
Right: A track-mounted log-loader (called a shovel logger, or shovel machine), on the end of a shovel skid trail.

NOTE: Over the years, some loggers and foresters have used the term "shovel road" or "mat road" when talking about shovel-logging. These trails should not be considered as an actual "road". They are specialized temporary skid trails that are exclusively intended for use by off-road logging equipment. They are not intended to be designed, constructed or maintained as a road.

Skidders should only run on the shovel trail (left), and not directly on the bare ground of the swamp (right).

Shovel Logging -- View from Above



Satellite image of an area in southeastern North Carolina that was harvested using the shovel-logging method. An advantage of shovel logging is the reduction in the number of log decks or logging roads, thanks to longer skidding distances that are possible. By eliminating the need for more decks or roads, there is less soil disturbed, exposed or deposited in the wetland. On this tract, it would have been best if the shovel trails had stopped further back from the SMZ.

Shovel Logging Recommendations

Shovel-mat logging methods should be used in swamps, bottomlands, or large areas prone to flooding. Careful planning and implementation of forestry Best Management Practices (BMPs) are important to protect the quality of water and conserve the soil resources.

Water Quality Considerations

In addition to complying with the FPGs and other applicable rules, as well as using forestry BMPs, you should consider these recommendations when deploying shovel-mat logging:

- ✓ Minimize the number, width, length, and overall footprint of the shovel-mat skid trails. Keep the skid trail to 1-skidder-width wide. If it's necessary for skidders to pass, install a short wide section of trail.

- ✓ Layout the shovel-mat skid trails in a way that prevents the restriction of expected flood flows that may occur across the harvest area. Install temporary cross-drains as needed.

- ✓ Keep the shovel-mat skid trail at least 60 feet from the Streamside Management Zone (SMZ).

- ✓ Do not install shovel-mat skid trails across ponds, lakes, marshes, or streams.
    - If the trail must cross a stream, use temporary bridgemats or log-stringers.
    - If the trail must go across a coastal marsh, first seek guidance from the N.C. Forest Service or N.C. Division of Coastal Management.

- ✓ Do not deposit soil atop the shovel-mat skid trail.

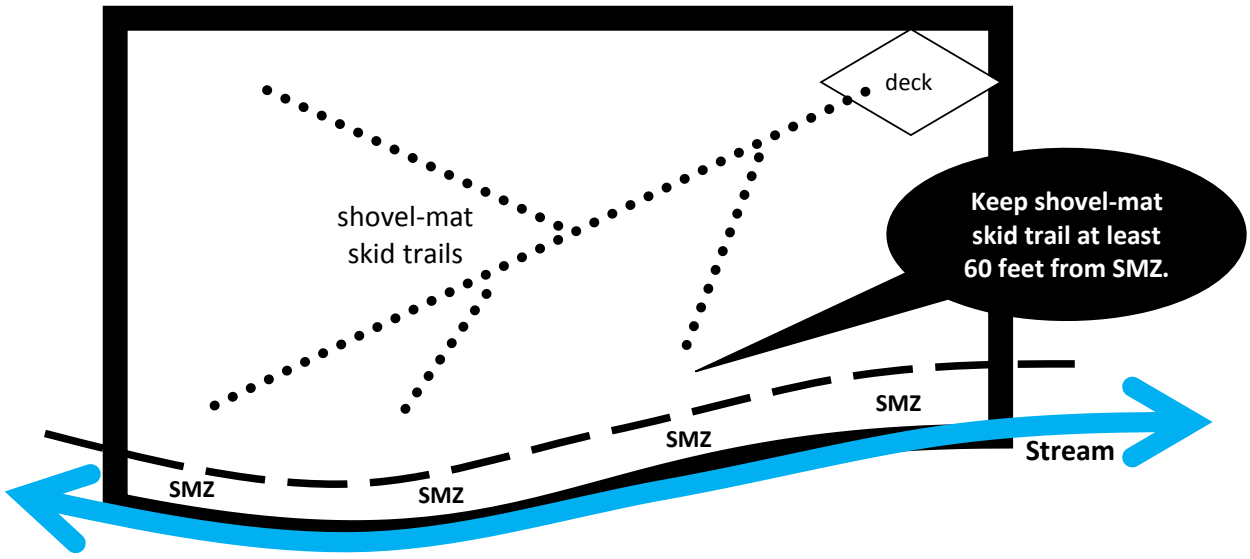
- ✓ Do not excavate stumps or soil when installing or removing the shovel-mat skid trail.

- ✓ Build-up the shovel-mat skid trail so that equipment and tractors travel above the average ground surface. Do not operate rubber-tired machines off the shovel-mat skid trails.

- ✓ Add more trees or logs if the shovel-mat skid trail begins to sag, sink or break apart.
    - The objective is to avoid 'pumping' action of the saturated soil from each pass of the skidder, which may increase sedimentation and/or turbidity.

- ✓ Promptly remove the shovel-mat skid trail when no longer needed.
    - The removed logs/trees should be merchandized; or if not usable, then scatter the removed woody material across the site, away from the SMZ.
    - If you need to stop work before finishing the harvest, and you wish to retain the shovel-mat skid trail intact to complete the harvest later, you should create gaps in the skid trails if there are identifiable flow-ways, so flood flows can pass unimpeded.

- ✓ Cease logging during flood events when the water level is higher than usual.



Forest Management and Reforestation Considerations

When planning and undertaking a timber harvest in a bottomland swamp, consider taking these measures to promote reforestation and management of the next generation forest:

- ✓ Avoid harvesting trees from the SMZ.
  - Full retention of trees in the SMZ can provide a long-term seed source, moderate the potential of stream temperature increases, provide a wildlife habitat corridor, and act as a visual aesthetics screen along the waterway.

- ✓ Retain permanent seed-source trees: one tree per 5-acres, distributed across the harvest.
  - Favor the retention of cypress, tupelo, blackgum, oak, or Atlantic white cedar.

- ✓ To promote stump sprouting (known as 'coppice'), cut the stumps at or just above the average high-water mark.
  - This mark is often seen as a permanent water stain or moss-line around the base of the trunk.
  - If the stump is submerged underwater, the coppice sprouting may not be as successful.

- ✓ Retain dead standing trees ('snags') if it is safe; these are important for wildlife habitat.

Technical References

While this leaflet series is intended for woodland owners, below are a couple of technical references:

Ecological Forestry Practices for Bottomland Hardwood Forests of the Southeastern U.S. Forest Stewards Guild. Authors: A. Mahaffey and A. Evans. www.forestguild.org/publications/research/2016/FSG_Bottomland_Hardwoods.pdf

Forestry Best Management Practices Manual to Protect Water Quality. North Carolina Forest Service. www.ncforestservice.gov/water_quality/bmp_manual.htm