Appendix 8: Logging Systems Descriptions

The proper selection of a logging system involves consideration of many different conditions:

- Slope and terrain
- Type of water resources/wet areas present
- Skidding or yarding distance
- Weather
- Soils
- Tree size and volume per acre
- Size of tract
- Cost of road construction
- Cost of logging
- Productivity goals

Below is a basic description (listed alphabetically) of the most common logging systems found in the southeastern United States. Potential water quality issues are provided in bulleted text for each system.

Animal

Large working animals (horses, mules, etc.) pull individual logs along the ground, or carts that carry logs partially suspended off the ground.

- ✓ When done correctly on a limited basis it can minimize the severity and intensity of soil disturbance.
- ✗ It may require more roads, due to limited skidding distances for animals. This increased amount of roads can lead to increased potential for soil runoff.
- ✗ Care must be taken to minimize "gouging" of the soil by animals' hooves and/or the skidded logs.

Cable Yarding

This system uses a combination of a winch, cables, and a carriage to collect logs by suspending them off the ground with a thick wire cable rope. A carriage is the device that moves in and out from the yarder to the timber and contains the cable ends used to attach onto the logs.

- ✓ Ground disturbance is minimized and the need for skid trails is reduced or eliminated altogether.
- ✓ The need for forest roads is reduced, and those forest roads that are needed may be located further from waterbodies than what may be possible with other systems.
- ✗ Due to the inherent high costs of operations, this logging system is usually only economical for extremely valuable high-quality timber.

Forwarders

These machines are rubber tired tractors equipped with a self-contained log loader and a log bunk that can transport logs completely off the ground. Forwarders can reduce the number of forest roads needed since logs can be carried for longer distances from the woods to the deck.

- ✓ Forest road construction is minimized, which helps reduce the potential for sedimentation.
- ✗ However, if operations are conducted under wet conditions, soil compaction and site productivity degradation can occur. The use of wider tires and/or add-on track cleats can help minimize this potential problem.

Helicopter

Helicopters can completely lift cut timber from the woods and fly it to the deck.

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- ✓ The need for forest roads is reduced, and those forest roads that are needed may be located further from waterbodies than what may be possible with other systems.
- ✗ Due to the inherent high costs of operations, this logging system is usually only economical for extremely valuable high-quality timber.

Skidder

A skidder is a tractor that uses a cable, grapple, or both, to secure and drag the partially suspended logs / trees to a deck. Skidders may be mounted on tracks or tires.

- ✓ Skidders are the most common logging system in North Carolina and their use is appropriate for most of the site conditions found in the State.
- ✓ Skidders that are mounted on tracks, extra-wide tires, or dual tires can further minimize intensive soil disturbance in some cases and allow operations to continue during adverse conditions.
- ✗ When not used properly, skidders can severely impact water quality and lead to conditions that may degrade long-term site productivity.

Shovel Logging (Loading)

This is a term used to describe a log / tree loader that is mounted on self-propelled tracks. These machines can construct a homemade 'mat trail' made up of logs that other equipment then travels upon, instead of the ground. This mat trail is then removed as skidding is completed. Shovel systems are usually limited to total harvests due to the need to use tree/log material for the mat trail.

- ✓ Shovel systems are able to work effectively in wetter areas than a skidder system because they move timber with the reach and swing of the shovel-arm rather than the traffic movement of a wheeled or tracked machine.
- ✓ Shovel systems allow logging on extremely wet-natured sites while minimizing site disturbance.
- ✗ Due to the ability of this equipment to operate in saturated soil conditions, care must be exercised to ensure sufficient SMZs are established, marked, and maintained.

Swing Systems

Swing systems use a combination of all these systems to best utilize each component. For example, a track-mounted felling machine harvests the timber; a shovel-loader moves the trees across a wet area using a 'mat trail' to reach high ground. From there, a rubber-tired skidder moves the logs across dry ground to the deck.

- ✓ Water quality and site productivity is usually well protected, since each machine is being used for its intended purpose.

Track-Mounted Equipment

These are machines mounted on rubber or metal tracks instead of rubber tires. Track-mounted machines are available for tree cutting, skidding, processing, loading or roadwork.

- ✓ When compared to rubber-tired equipment, track machines protect soil better due to the increased "footprint" area of the tracks. This decreases the ground pressure of the unit. Tracked machines minimize soil compaction, especially on wet soil conditions.
- ✗ Due to the ability of this equipment to operate in saturated soil conditions, care must be exercised to ensure sufficient SMZs are established, marked, and maintained.

Whole-Tree Chipping

Whole-tree chipping uses large machines that break apart trees into small chip-sized material. These chips are then placed into a chipvan that is transported by tractor-trailer. The chipped material is used either for making paper or as fuel. This system is typically used on sites that have an abundance of low-quality timber.

- ✓ Chips can serve as a very effective soil cushion on decks and skid trails to minimize and sometimes prevent soil disturbance from occurring.
- ✗ Chipping often leaves very little leftover woody material on the site that could otherwise be used for stabilizing skid trails, stream crossing approachways, or decks.
- ✗ Forest access roads often need to be wider, flatter, and have broader turns than traditional logging roads, so stability is provided for the high center-of-gravity chipvan trailers. Additional BMP work may be needed.