

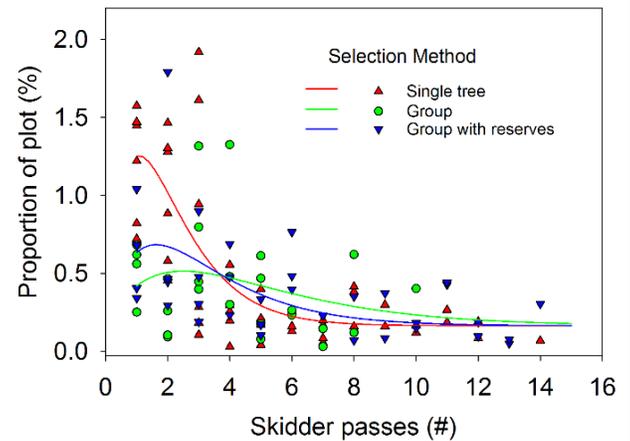
Skidder-Trail Soil Compaction Under Selection Silviculture in Longleaf Pine Forest

All timber harvest causes some level of soil disturbance, and sustainable partial harvest in longleaf pine forests to maintain a multi-aged structure may either concentrate the impacts of equipment in a small area or disperse them more broadly. We compared soil impacts in stands where harvested trees were selected individually (single-tree selection) with stands where trees were selected in half-acre groups (group selection). About 15% of available timber was removed in both systems. We attached global positioning system (GPS) trackers to skidders that dragged logs from where the trees were felled in the woods to landings where they were loaded on trucks. The GPS allowed us to determine how many times a skidder passed over each section of ground. We measured soil compaction (i.e., compression) and growth of planted longleaf pine seedlings in sections of skidder trail where we knew how many times skidders had passed.



Skidder trails covered between 2% and 6% of stands on this low-intensity harvest. We found that while the area affected was similar in all the harvest treatments, in group selection a larger proportion of the area was affected by high numbers of skidder passes. In areas where skidders passed over a section of ground more than 10-15 times (a very small proportion of the area harvested), the soil layer at 4 to 12 inches depth became so compressed that pine tree roots could, in theory, have difficulty penetrating it. However, planted longleaf pines grew faster on trails that had more skidder traffic, which might have been due to lower grass cover and to better water-holding ability of the coarse-textured, sandy surface soils after they had become compressed.

Results of this study suggest that overall soil impacts are slightly greater under the group selection than under the single-tree selection method, because of the larger area affected by higher numbers of passes. Overall, at this low harvest intensity soil impacts are minimal and may, in some respects, even help tree growth, although the



possibility of more severe impacts remains on other soil types and conditions. That is, it is not just the harvest system but also the interaction with soil properties, harvest equipment, operator skill, soil wetness, and ground cover that determines soil impacts. The possibility for soil compaction should be one of the factors considered by foresters and landowners when developing silvicultural and harvest access systems for longleaf pine.

CITATION

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KEY POINTS

Group selection concentrates harvest impacts in a smaller area than single-tree selection

High numbers of skidder passes (>10-15) can create subsoil compaction

Seedling growth may improve after compaction of sandy coarse-textured soils

Later productivity declines are possible in heavily used skid trails due to subsurface soil compaction