**Harvesting Woodlots in New Zealand: What do small-scale landowners and loggers think?**

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Woodlots (aka small-scale or farm forests) represent a significant proportion of annual harvest volumes in New Zealand, adding 10-15 million m$^3$ from now into the next decade. Woodlots also present a variety of challenges for landowners planning to harvest, as well as loggers accustomed to working in larger commercial forests. For example, landowners must consider health and safety, economic feasibility, protection of environmental and cultural values, disruptions to normal farming operations, and site clean-up after logging. Conversely, woodlot loggers must often deal with small harvest volumes, frequent shifting of logging machines, difficult harvesting conditions (e.g. steep and erodible terrain, edge trees, and fences), lack of infrastructure, lulls in harvest activity during winter, and unique safety hazards on farms. In light of these challenges, this study addressed the following research question: “What are the requirements for a successful woodlot harvest?”

Seventeen woodlot landowners were surveyed to better understand the values that their woodlots provide, as well as their satisfaction with a recent harvest. Subsequently, the three logging contractors associated with the most highly satisfied landowners were interviewed and an observational study of their harvesting operations was conducted to highlight the harvest systems, machines and/or operating principles they use to address woodlot harvesting challenges.

Commercial value was the top woodlot objective, followed closely by aesthetics and water quality protection. This indicates that while all woodlots have economic value to their owners, most will have two or three additional woodlot values of equal importance. Fifty-nine percent of landowners were satisfied with log value recovery, while 64% were satisfied with the overall economic outcome. Landowner concerns about value recovery included confusion about tonnage delivered, merchantable logs left on the hillslope, stem breakage, and the quantity of logging residue left at the landing. Dissatisfaction with the overall economic outcome was related to unforeseen deductions (e.g., port scaling fees), lack of transparency regarding harvest recovery, costs, and returns, long log cartage distances, and high logging machine transport costs.

Interviews with the logging contractors and observational studies of their harvesting operations revealed innovative strategies for controlling harvesting costs, which is key for the narrow profit margins associated with many woodlots. The use of multipurpose machines to fell, delimb, shovel, and process stems in the forest reduced the total number of machines required, thus reducing equipment transport costs. The use of makeshift landings, or small, in-forest processing and log storage areas, reduced the cost and environmental disturbance associated with earthworks to form a more traditional commercial forest landing. During dry weather, forwarding cut-to-length logs from the woodlot to a roadside landing via farm tracks or paddocks eliminated the need for upgrading or constructing new roads for on-highway truck access to the property. In addition, loggers noted that...
shovel logging can reduce the amount of tracking required and is particularly useful for downhill extraction distances up to 300 m.

Each of the loggers also recognized the increasing importance of steep-terrain harvest systems applicable to woodlots. Examples included tethered-machines to enable ground-based extraction on steeper terrain, as well as cable yarding options with low transport costs and reduced set-up times (e.g. yarder/loaders). Finally, loggers highlighted that a good harvest result, from the perspective of the farm forest owner, requires compassion for farm-related values and protecting these values during harvest time. Examples included protecting fences, working around stock movements, and site clean-up to ensure a tidy job. The results of this study can be used by farm forest owners preparing to plant or harvest woodlots or by other logging contractors that specialise in harvesting woodlots. This work resulted in two popular research articles being published in New Zealand Tree Grower:
