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TRIALS OF THE TL-3000 CABLE YARDER IN NEW BRUNSWICK

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INTRODUCTION

As a result of the growing demand for fiber, harvesting of wood on steep slopes is expected to increase in eastern Canada. The TLD Gauthier model TL-3000 cable yarder is well suited to this market, particularly for harvesting medium-size stems. In September 1995, this equipment was demonstrated on Fraser Inc.'s Restigouche District operations in New Brunswick. FERIC evaluated the cable yarder's productivity and soil disturbance after harvesting.

The TL-3000 cable yarder comprises a remote-controlled, self-propelled carriage equipped with a winch that travels over a single cable stretched between two anchor points (Figure 1). Many technical improvements have been incorporated since the reports published by Gingras and Lavigne (1989) and Courteau and Heidersdorf (1991), with the travel speed of the loaded carriage now reaching 300 m/min (descending). In the current study, the bottom anchor was a 20-tonne Atlas excavator and the upper anchor was a Caterpillar D7E bulldozer. The direct hourly operating cost of this equipment, with a crew of three workers, was calculated to be $160/PMH using FERIC's standard costing method.

Figure 1. The TLD Gauthier TL-3000 cable yarder raising a load using its winch.

STUDY CONDITIONS

The harvested stand (the McDougall site) was composed mainly of spruce, fir and white birch, with a density of 1150 stems/ha. The gross merchantable volume reached 210 m³/ha, but patches of fir saplings were scattered throughout the stand. The slope varied from 45 to 60% (with an average of 50%), and harvesting was done between 170 and 240 m from the lower anchor point, just beyond a regeneration area at the base of the slope.

Trees were felled just before cable yarding and the faller assisted in choking the stems. While the second operator controlled the winch and the carriage remotely, the faller prepared the next load. The third worker, who also had a remote control, unhooked the stems at a landing.

RESULTS AND DISCUSSION

The system's productivity was measured during detailed time studies. Table 1 summarizes FERIC's observations of the TL-3000 during 71 work cycles. Overall, yarding was done at a rate of 31.1 trees/PMH, amounting to about 7.5 m³/PMH. The direct cost, including felling, was thus estimated to be $21.25/m³.

As the carriage already travels at its maximum speed, the outhaul and inhaul times would be difficult to reduce. However, 60% of the operating time was devoted to choking, unhooking and raising loads. During the observation period, the average lateral choker haul-out distance was 15 m before reaching the first stem to choke. To maximize the time devoted to extraction, the choker haul-out distance should be reduced by only choking trees felled near the main cable.

Using three detachable choker assemblies (one on the cut-over, one at the landing, and one that returns with the empty carriage) could decrease choking and unhooking times. With a 50% reduction in choking and unhooking times, the increased productivity would reduce the cost by about $4.80/m³.

Table 1. Summary of observations on the TL-3000

	Average
Number of stems per turn	3.2
Volume/stem (m^3)	0.242
Volume/turn (m^3)	0.77
Average extraction distance (m)	210
Productivity - stems/PMH	31.1
- m^3/PMH	7.5
Operating costs ($/$m^3$)	21.25
Cycle times (min)	
- Outhaul	1.18
- Choker haul-out	0.77
- Choking	1.07
- Raising the load	0.70
- Inhaul	1.08
- Unhooking	1.12
- Operational delays	0.17
- Total time/turn	6.09

EVALUATION OF SOIL DISTURBANCE

Two cutovers were surveyed to evaluate the soil disturbance caused by harvesting: the McDougall site (described above) and the Whalen site, whose slope varied from 40 to 65% (average distance of 250 m). At the Whalen site, the lower anchor was located on a road on the far side of a stream at the base of the slope. The steep slope and the position of the anchor points provided high lift for the extracted stems. The surveys used a network of 4-m^2 sample plots distributed systematically throughout the cutover. In each plot, the percentage of the area associated with each disturbance category was estimated visually. Since debris can interfere with identification of the underlying disturbance, the results presented in Table 2 apply only to the soil's visible surface.

The proportion of moderate disturbance was low and the proportion of severe disturbance was minimal in comparison with the levels typical of ground-based extraction systems. Moderate disturbance covered 4.4% of the McDougall site, showing the effect of slight dragging of the crowns of trees that the cable yarder could not fully lift, whereas the Whalen site, with higher lifting of the loads, showed only trace amounts of such disturbance. More frequent movements of the lower anchor would both permit faster hookup of the more distant stems and reduce the proportions of disturbed ground underneath the yarding trails.

Table 2. Soil disturbance on the cutovers harvested with extraction by cable yarding

	McDougall site	Whalen site
Coverage by debris (% of area)	19.4	27.6
Level of disturbance (% of visible area)		
- Light or nonexistent disturbance: soil intact, stumps, crushed vegetation, disturbed humus layer, no exposure of mineral soil	95.0	98.9
- Moderate disturbance: deposits of mineral soil, mixed mineral and organic matter, and shallow mineral soil exposure (< 10 cm)	4.4	0.6
- Severe disturbance: mud, signs of erosion, deep (> 10 cm) mineral soil exposure	0.6	0.5
	100.0	100.0

CONCLUSIONS

The TL-3000 allowed harvesting on steep slopes at an acceptable cost for this type of operation. The impact on the site was relatively minor, but the system must be installed in such a way as to maximize lifting of the loads. Using detachable choker assemblies would significantly improve the work method and would permit a cost decrease of up to 23%.

The use of such a system could permit mixed harvesting operations that combine extraction by skidder and cable yarder. For example, the area at the top of a slope, but accessible for harvesting with a skidder, could have its wood extracted downslope by cable yarding after initial transport by skidder. The increased volume of wood thus made available would help to offset the cable yarder's setup costs.

REFERENCES

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