



SHORT-PULP EXTRACTION WITH A SMALL HAULER (A FURTHER TRIAL)

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INTRODUCTION

During 1978 an initial short pulp extraction trial using a Timbermaster Skyline was conducted at N.Z.F.P. (see LIRA Report Vol. 3 No. 8 1978). Further studies were recommended to look at a range of different conditions and equipment. This Technical Release reports on trials conducted during February and March 1979, using a Wilhaul Skyline Yarder and Christy Log Carriage. Eleven year old Radiata regeneration on steep country was extracted both uphill and downhill in short pulp and long length form.

DESCRIPTION OF THE AREA

Age of stand	11 year old Radiata (Regeneration)
Stocking	860 s/ha (over 14 cm)
Average tree size	0.11 m ³
Prescription	Reduce stocking to 300 s/ha using 4 m wide outrows with 16 m between out rows
Length of slope	200 m
Degree of slope	34°

The southerly aspect slope was quite steep, but the trees were reasonably uniform in size, although the stocking was low. The undergrowth was thick with ferns and native regrowth, including bush lawyer. A road was available at the top and foot of the slope.

CUTTING

Contractor M. Spykerbos supplied the labour for this operation. Six lines (149 tonnes) of short pulp were cut and one line (26 tonnes) of long length wood. Heavy undergrowth restricted the extent of the trial

LONG LENGTH

One man cut and trimmed the 26 tonnes in 1.5 days (17.3 tonnes per day). This faller experienced a great deal of difficulty trimming

because of the undergrowth.

SHORT PULP

Cutters operating over a total of 27 full man-days produced 149 tonnes of short pulp, a daily production of 5.5 tonnes. The men originally intended to thin 3 lines each, but after the first week reduced this to 2, because of the heavy undergrowth and steep slopes.

The undergrowth had to be cleared from the lines before wood could be stacked and this consumed a great deal of time. Considerable physical effort was required getting the log billets through the slash and onto the line on such a steep slope.

The slope made stacking of the logs difficult and to assist, all the stumps on the outrow line were left high and the bundles stacked against these.

The bundles were stacked on the ground with a trench dug underneath, so that a rod with a strop attached could be pulled around them. When bundles were placed on runners, it was found that the slightest bump caused the stack to fall apart.

The opinion of all the cutters after the trial was the same - they were not interested in working in this type of stand at any price.

EXTRACTION

The Wilhaul skyline, owned by contractor S. Hamilton, completed extracting all the wood in 5 days. Four lines of short pulp were extracted downhill, plus the one line of long length. The hauler then moved to the uphill position and pulled the remaining two lines of short pulp only. A machine operator and breaker-out were used during the extraction.

A Hough 50 loader, belonging to contractor A. Nicholson, was used to clear wood away from the front of the hauler - either directly onto a truck or onto a stockpile alongside the road.

DOWNHILL EXTRACTION

The actual machine extraction time was 8.75 hours yielding 97 tonnes, a production rate per hour of 11.1 tonnes. Total time including shifts and downtime, except for the first set up, was 15.25 hours for 97 tonnes, or 6.4 tonnes/hour.

The Wilhaul was considered much better in downhill hauling than the Timbermaster skyline tried previously (see LIRA Report Vol. 3 No. 8 1978). Control of the bundles was better due to a stronger haulback rope braking force. Over the period of the trial only one bundle was lost and had to be re-stacked.

Pre-stropping was carried out on all lines.

UPHILL EXTRACTION

On the first line uphill, a small Christy carriage on a gravity

return system was used. It was anticipated that a self locking carriage would offer good control of the bundles during extraction. After experimenting and some adjustment, the Christy carriage was made to work, but at no stage did it prove faster than the conventional method. This was because:

1. Repositioning the carriage stop on the skyline was required for each bundle and in many cases doing this upset the stacks of pulpwood. The breaker-out then had to re-stack these.
2. Unfortunately the ball on the main rope was not the correct size and it kept slipping along the rope. This was eventually corrected by using a larger retaining pin.

When using the Christy carriage, 26.2 tonnes were extracted in 5.6 hours or 4.7 tonnes per hour.

The second uphill line was pulled with a conventional skyline system, using tailrope tension for lift. The strawline was attached to the carriage and used to hold it in position when the bundles were being attached to the mainrope.

With this method 26.2 tonnes were pulled in 2.75 hours or 9.53 tonnes per hour.

LONG LENGTH DOWNHILL HAULING

One line was extracted in long lengths (as is usual for 14 year old wood) for a comparison with the short pulp extraction. A full day (7.25 hours) was spent on this line and produced 26 tonnes or 3.58 tonnes per hour.

Breaking-out was slow because of the amount of slash and also the breaker-out was trying to use 3 strops all the time. Although this produced an average of 2.6 pieces per haul, cycle time was slow.

LOAD-OUT AND CLEARING WOOD FROM THE HAULER

The Hough 50 front-end loader was ideal and at all times kept the hauler clear of wood, however the log truck was waiting a great deal of the time during loading due to the low hauler production. The loader had the capacity to stockpile or load and clear the hauler without difficulty. For the long lengths, the loader pulled the logs to an adjacent landing, with the strops attached to the loading forks, where they were cut into 6 m lengths.

OBSERVATIONS AND RECOMMENDATIONS

CUTTING

It was obvious that on these slopes of 34°, it is potentially hazardous to cut and carry short pulp. Also, on this trial, the undergrowth was such that it demoralised the cutters. It is recommended that in N.Z.F.P. operations:

1. Cutting short pulp on steep slopes (i.e. over 25°) should not be considered.
2. Heavy undergrowth proved that as well as slowing down production

it also affected the moral and attitude of the cutters. Low stocked areas with heavy undergrowth should not be considered for short pulp.

EXTRACTION

The Wilhaul performed better than the Timbermaster on the short pulp extraction trials. This was due to a higher level of tailrope control that was able to be maintained. Bark damage on residual trees was low as most of the short pulp was on the outrow and very well controlled during extraction.

1. The Christy carriage did not prove suitable for short pulp extraction due to the disadvantage of having to shift the skyline stop for extraction of each bundle.
2. Downhill hauling proved as good as uphill hauling, a major drawback on uphill being the last few metres of each line where lift was limited.
3. Stack weights of up to 0.97 tonnes were acceptable. The occasional one of over one tonne was too heavy. The average ideal size for full control should be 0.8 tonnes.
4. The Wilhaul proved capable of hauling 10 tonnes of short pulp per hour. More wood on each line should result in higher output. Including machine shifting time, 50 - 60 tonnes per day is possible.
5. The possibility of hauling both short pulp and long length pulp where topography or crop are most suited to each, and in the same operation, should be considered.

LOAD OUT

1. The use of the loader with the hauler proved ideal. A small loader similar to an agricultural tractor with forks, should be able to handle the clearing and stockpiling of short pulp.
 2. The loader is capable of clearing the hauler and loading direct at the same time.
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On the data studied at \$200 per hour helicopter hire rate , to extract to skids a similar volume produced by a four man crew, the cost would be:

800 metres haul	\$27.47/tonne
1100 metres haul	\$33.21/tonne
2400 metres haul	\$46.50/tonne

It is noted that these costs are a guide to this operation and a machine with greater lift capacity would undoubtedly give a reduced cost per tonne.

CONCLUSION

Under Normal logging conditions a helicopter would be too expensive for production thinning. It could however have application in areas where ground conditions are particularly difficult or the area is sensitive to environmental damage, but a larger payload capacity would be necessary.

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DISCUSSION

(1) TRAVEL TIMES

It was pointed out by Lakeland Aviation that the travel speed both empty and loaded will remain fairly constant for all sizes of machines within the 1 - 3 km range. Although the helicopter was capable of 140 knots it was actually operating at around 70 - 80 knots because to go any faster would increase the lost time due to overshooting. Difficulty in locating landings and breakout areas from tree top height was experienced.

(2) PAYLOADS

The helicopter payload is 365 kg (0.36 tonnes). The average load attained in the study was 0.25 tonnes so the machine was under-utilised which experience would eliminate.

(3) CYCLE TIMES

Location of the skids affected 'load drop' time. On the 800 m and 2400 m hauls, line of approach was straight up a road and thus easy, on the 1100 m haul it was over the trees and across a road thus more time was required to position the load for dropping. Overweight loads had to be dropped and reorganised which increased some cycle times. Experience with premeasurement in the bush, better estimation of weight of logs, and a higher standard of trimming would all reduce this element and would also assist in maximising the available payload.

OVERALL VIEW

This was a short study under ideal working conditions. It demonstrated the speed and versatility of helicopters and proved their ability to lift out thinnings and transport them long distances, with little damage to crop trees. (A similar operation performed just after the spring flush could increase damage to the tops.)

The major gain with this form of logging is its reduction in roads, skids, and internal contour tracking and the effect of these in terms of environment and conservation.

COST COMPARISON WITH NORMAL METHODS

A four man skidder gang to fell, extract, cut to length, and stack would yield:

7981 tonnes	800 metres haul	\$12.26/tonne
6934 tonnes	1100 metres haul	\$14.14/tonne
3615 tonnes	2400 metres haul	\$27.13/tonne