

THE VIABILITY OF TWO STAGE HAULING IN CABLE OPERATIONS

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INTRODUCTION

Two stage hauling in cable operations is far from a new concept or method and in fact has been used in many parts of the world including New Zealand over the years.

Documentation of the New Zealand experience is limited but studies conducted by Sperry 1981 and Murphy 1983 on 009 Madill with 668 Clark Skidder in tree length old crop P. Radiata showed similar results of greater production and lower costs using a two staging system.

During the last five years I have been involved with three separate cable operations using the two staging method. These were located in Kaingaroa Forest on the pumice plateau. They have performed to varying degrees of success. The most recent operation using the Washington 88 Swing Yarder (W88) in young crop P. Radiata has been a very successful combination of the two staging method.

A more detailed appraisal of these operations will follow.

GENERAL PRINCIPLES OF TWO STAGING METHOD

- 1) The Hauler is positioned away from processing area ideally within 200 metres.
- 2) Secondary machine normally a Skidder or Bulldozer is used to haul tree length timber away from Hauler to processing area.

- 3) Logs are graded, processed, segregated, stacked and loaded on truck from the processing area.

REASONS WHY TWO STAGING MAYBE CONSIDERED

- 1) Cable operations in New Zealand are traditionally tree length even in larger tree sizes. This has always caused problems with deflection at or near the landing.

Two staging enables the hauler (especially the shorter tower models) to be positioned closer to the edge allowing greater deflection particularly in a gravity skyline system.

- 2) Landing activities have been identified as a major cause of delays in cable logging operations (Galbraith 1986, Prebble 1988). Two staging can help minimise these by having the processing areas away from the hauler.

- 3) Log value optimisation via log grading and more market driven production is requiring more time and better conditions for 'log making' and processing.

- 4) Safety considerations, especially that 'no person shall work near or under a loaded rope during inhaul' and the recent controversy over the clearing of the skid personnel to a safe place if logs are 'hooked' further back than 1 metre.

- 5) Flexibility - secondary machine helps sustain production during hauler downtime or can quickly boost production if allowed to log easier terrain normally close to hauler areas.
- 6) Flexibility - in planning by being able to work awkward corners and small areas without the need for expensive roading or landing construction.
- 7) In some cases (especially the W88) the Hauler is able to move along the edge every two to three rope shifts, thus creating a parallel type hauling pattern which results in greater volume available under each skyline road.
- 8) In some cases (especially in Kaingaroa) two staging can better utilise existing roads and skids.
- 9) Where roading and landing construction is expensive savings can be made.
- 10) In environmentally sensitive areas especially where soil disturbance is to be kept to a minimum.
- 11) Large debris stacks (bird nests) around landings do not occur if processing areas are positioned away from drop offs. This also prevents subsidence which can result with disastrous effects.
- 12) The aesthetic and visual appearance of areas after logging can be more pleasing due to the lack of debris piles and soil spill.

REASONS AGAINST TWO STAGING

- 1) Requires an extra machine plus two personnel - one to operate and one to unhook at hauler who is invariably under-utilized.
- 2) If haul track to processing area is uphill or that soil

conditions can prevent satisfactory use of mobile machines all year round then two staging becomes very difficult.

- 3) The secondary machine is invariably second hand and can be plagued by downtime.
- 4) Large long logs (tree length) can prove difficult to turn if hauler pad is positioned badly.

SUMMARY OF OPERATIONS

A) Echo Logger and 666 Clark Skidder (Contractor - J Dudson and Whales Bros)

This combination was used for many years to log larch in Waiotapu and in later years larch, corsican and D/Fir in many areas of Kaingaroa.

The Echo logger is a medium sized hauler (76 - 100Kw) with 15m tower. The logging system used was predominately gravity skyline using a christie carriage. The larch and corsican average tree size over the different areas ranged between 0.6 tonnes to 1.8 tonnes.

The method used in this operation was to push 'small pads' at ideal locations near the steep drop offs. The tree length logs were landed in front of the hauler with some overhang. In some cases the logs would have to be held by the hauler while the skidder hooked on. If the hauler had been sited further back and logs processed and loaded out on a conventional skid, there would have been no deflection at the edge and near the landing with the shotgun system.

When logging the D/Fir which was of greater tree size again (2 - 2.6 tonnes) it was even more critical to site pads as close as possible to the edge of the slope. This tree size was at the haulers maximum capability and problems were encountered landing the longer and larger logs.

To boost production at this operation skidder areas adjacent to the steep drop offs were logged at the same time. The combined production was approximately 36,000 tonnes and costs relatively high but this was the only alternative for the Forest Service at that time.

From an environmental and aesthetic aspect the operation would score top marks.

B) 009 Madill, 530 International Loader and 668 Skidder (2nd hand) Contractor P.O. Sullivan.

At the changeover from Forest Service to Timberlands, Pat O'Sullivan accepted a full contract operation.

At this time the operation was to supply a range of market opportunities and not just Waipa mill as before. This entailed cutting a whole new range of log grades which effectively meant approximately 50/50 longs and shorts as against the previous 70/30. This was to put a far greater pressure on the loader and the skiddies.

During the same period the Labour Department Inspector was also seriously complaining about skid congestion and safety factors. So the decision was made to try two staging which was not new to Pat. Also future areas, one in particular, would really suit the two stage system especially from an environmental aspect.

In this operation changing to two-staging, extra men were not employed as it was already a nine man crew. A reshuffle of duties was all that was required.

The skidder was not costed into the operation as it was expected production would rise and the target was to stay the same. Using the two staging also meant that the 530 loader would experience less repairs and maintenance with

not having to pull large tree length logs away from under the ropes.

In January/February 1988 a study on the cost and production differences between conventional and two staging was performed on this operation by LIRA (Rob Prebble).

The basic conclusions of this study was that two staging had increased production by 3.4m³ PMH, but only 20% of this was attributed to the two staging. Using the LIRA costing format the two staging system costs are higher, but this included adding the skidder and one extra man.

During this study on both systems, productivity was well above the average production to date of either system. Also production during the conventional operation was unusually high compared to previous studies.

The full report on this study is about to be released which covers all facets of both operations in detail.

On reviewing this operation to date, with Pat and myself, it is considered that the two staging has not been as successful as hoped as production has been lower than anticipated, but the system has allowed some very difficult and environmentally sensitive areas to be logged with reasonable production and to the satisfaction of the local Catchment Authority. The safety aspect, log making and the workload on the loader cannot be under-emphasised.

One of the major problems which has occurred has been the turning of the logs down the hauling track with the skidder, especially if the direction of the hauler main lines are at right angles or acute angles to the skidder haul track. It is necessary to carefully plan these aspects.

The second hand skidder has caused many problems and perhaps a near-new machine is more applicable.

C) Washington 88 Swing Yarder
and D7 Cat Tractor - FR15
Fiat Allis Loader

On corporatisation of the Forest Service the W88 came under my control. At this stage this machine was one of the most talked about and studied in the country. High expectations of the machine had not yet been realised.

The W88 was leased with "right of purchase" by Jim Helmbright. At this stage the W88 had worked only in large P. Radiata old crop with which the machine had struggled in tree length hauling but had shown very good potential in one log length trial.

Soon after corporatisation the W88 was switched into smaller P. Radiata (called transition crop at Kaingaroa 1.6m³ tree sizes). At this stage I considered it an ideal opportunity to try a rotating grapple with live heelboom on an excavator base. Logs would be processed in the bush using the Pacific NW roadside logging concept.

For various reasons this trial was stopped but an extensive project report by LIRA (R. Prebble) is available which outlines the potential of the concept.

One major benefit of this trial was the use of pre-stropping which has had a lasting effect on the productivity of this operation.

After this trial we were back to the conventional large landing, rubber tyred loader pulling away from the ropes, processing, sorting and loading on truck.

The smaller transition crop apart from more log grades, also has more sweep which leads to more short logs. With the hauling away, sorting and loading the loader was unable to manage the workload. A large pile under the ropes soon eventuated. After about three weeks of this changes had to be made. Production during this period had only averaged 180 tonnes per day. An internal work

study of the skid cycle was undertaken at this stage which showed a longs to shorts ratio of 32/68. There were at least eight sorts with only 2 long sorts which represented only 8% of the loaders activities.

It was also decided to study options using a loader/Bellogger and two staging with a skidder.

Both these options made considerable differences and production increased immediately due to the hauler chute area being clear.

The Bellogger was extremely versatile and almost made the loader redundant. The success of Belloggers under haulers is covered in a separate paper at this seminar.

The two staging with the skidder was also successful in that it keeps the hauler chute clear. The loader was still under considerable pressure but with early loadouts and even truck dispatching the skid cycle became under control.

Production under both these options increased to above 230 tonnes per day.

Further evaluation by both Jim Helmbright and myself considering these options and other parts of the system took place.

It was considered that the two staging option would have better advantages for the Kaingaroa scene than the Bellogger option. The three major factors to favour the two stage system were:

- 1) the ability to move the hauler quickly along a track around the edge with each two to three ropeshifts thus ensuring a parallel type hauling pattern with maximum volume under the lines. This also worked well with the pre-stropping with either side of the line being worked.
- 2) the existing road and skid pattern suited two staging otherwise more skids and roads

would have to be formed.

- 3) Annual production capability would be greater two staging and the overall unit rate at least 6% lower with 23% increase in production.

After these considerations, it was decided to use the two stage option. A tractor was to be used instead of a skidder as Jim's preference.

To date this operation has continued in this form with very good production in both P. Radiata and D/Fir. Daily production has averaged 250 tonnes per day. The operation has performed well above MARVL expectations with the cutting of more sawlogs in every grade and less pulp. In a random sample of accuracy of length measuring of logs this crew was the most accurate.

This operation to date has worked both sides of a major catchment area with considerable environmental sensitivity. The local catchment authority watch every step and to date are well satisfied.

CONCLUSION

In reviewing this information the two staging method has proved a useful option.

The economies from a cost point of view are not always strictly viable but when considered with many other factors they are competitive with conventional methods.

One particular operation has been very successful with the two staging method from all considerations.

As harvesting of the new crop begins with the smaller tree sizes, the need for greater value optimisation and the requirement of constant change due to markets, the two staging method is a very real and viable alternative.

