KAURI POLE STAND THINNING

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INTRODUCTION

Logging of pole kauri using a Lama helicopter as the extraction vehicle has taken place at Russell Forest in 1980, 1981 and 1982. Production from each operation has been 153m^3, 390m^3, and 465m^3 respectively.

Pole or 'second crop' kauri at Russell Forest describes trees from 80 to 150 years old and from 30 to 100 cm DBH. The trees occur as clumps and stands, generally on the top of steep ridges. Although the kauri type is distinct from the surrounding forest types there is great variety in stocking, size and quality within stands and an early problem was to design a silvicultural system which was operable within this situation of stand variability.

The silvicultural system devised is a single tree selection practice which essentially removes the larger trees in any group and thins uniform overstocked areas, with the expectation that the ongoing growth of younger (and smaller) trees will provide periodic opportunities for further logging passes as these younger trees grow through to an optimum size.

Kauri has three distinct forms:-

A youthful phase where trees are narrow crowned and lightly branched.
A 'ricker' phase where branches are bigger and crowns become spreading and uneven.
The classic mature phase where trees have thick trunks and massive spreading crowns.

In the Russell stands few trees have reached the mature phase and these, because of their rarity are not considered for logging. All trees at the 'ricker' stage of growth are logged unless their removal would create unstocked gaps within the stands. Younger trees are thinned where they are overstocked to stimulate the growth of the residual trees.

HARVESTING

A. Pre-Logging - Kauri stands are mapped from colour transparency aerial photography. All stands are 100% cruised for merchantable

volume. All trees 30 cm DBH + are measured for diameter and merchantable height and numbered with aluminium tags. Trees selected for logging are marked with a painted 'X' on their uphill side. On the average, 40% of the merchantable wood in a stand is removed.

B. Log Preparation - Log preparation is the subject of a separate paper so I'll cover broad aspects only. The aim of log preparation is to produce a finished log that weighs as close as possible to the helicopter's lifting capacity (one tonne).

The key constraint in the log preparation phase is that the loggers have no mechanical backup - no equipment is available beyond what they can carry into the bush. They can be up to 2 km from the road end in very steep country. Stands are tight, selection logging is the system and directional felling is the necessary technique. A 'hangup' will require a Tifor winch being brought in to drag the tree onto the ground. All fuel and equipment must be carried to the point where it is needed.

Consequently travelling within the bush breaks down as the largest single activity in the log preparation phase.

Organisation is as follows.

(i) Falling - 2 fallers each with an offsider. Senior faller is also the bush boss.

(ii) Scaling - 1 Scaler + one assistant.

(ii) Ripping - is done by a combination of the above.

C. Extraction - Before the helicopter arrives on the forest most of the work has been done. All trees are felled, limbed and bucked. All logs are scaled numbered and have their weights marked on them. All strops available have been set.

The hire rate on the Lama is around $600/hour and it is essential that all steps are taken to keep the machine operating efficiently

1. Safety - Is the subject of a seperate discussion. The main consideration is to organise work so that men are never under a laden helicopter.

2. Personnel - Ten men were in support of the helicpoter in the 1982 operation. Their roles broke down as follows.

(i) Controller - Has overall responsibility for decisions taken during lifting. Although the bush end of the operation is the most interesting place to be during lifting, the log dump is where most of the problems tend to focus and this is where the controller should be.

(ii) Strop Setting (Two men) - Strops used were made up from 14 mm Polypropolene. We used two grades of this rope; 'Proplon' and 'Superfilm' both with a breaking strain of 2790 kg. 'Proplon' is double the price of Superfilm and looks to be more durable. At this stage I'd suggest that anyone comtemplating continuous logging should use 'Proplon' with 'Superfilm' being adequate for 'one shot' operations. We haven't tested any other kinds of rope.

Strops are made up on the forest via a single splice on 8-9 metres of rope to make a loop like a rubber band. A few long (trailer) strops, 15 metres in length and eyed at each end, were made up to double lift widely separated lightweight logs.

We lifted the number of strops from 25 to 80 for this year's logging and this removed the possiblity of the strop setting team being under the working helicopter.

Strops are half hitched to the butt end of logs. Rope strops don't bite in the way wire does so head stropped logs should be roped behind a swelling or the strops will pull off.

Next time we operate, the strop setting team will have its own radio so it can direct the pilot where to drop bundles of strops.

(iii) Lifting Team - Comprises three men and the agility and teamwork they develop can speed the job up considerably. Their jobs are as follows.

Radio Man

Provides the bush part of the three way radio link between bush, skids and pilot. He should have a good knowledge of the bush and the whereabouts of logs. He advises the scaler of log numbers to be lifted, directs the pilot onto the extraction site, advises the pilot when to lift (or drop) a log, advises

the skids and pilot when and where to send strops and provides the safety link for the bush crew.

Breakers Out (Two men)

These men set the pattern for lifting sequence. Pattern is usually a sweep part way up one side of the ridge cross over and sweep part way up the other side, cross over and repeat. If the ridge has a fairly level top the whole ridge can be swept in a single circle. Logs are usually lying up and down the hill and obviously the butt log of any tree in this situation is lifted off first.

Their task is to catch the helicopter tagline as it's lowered into the forest and set the strop to the quick release hook at the end of the tagline. Usually one man catches the hook and passes it to his partner who is holding the strop ready. As soon as the hook is set both men move quickly away (usually uphill) from the log which will be starting to go up.

Lifting

Log going up and to the right.

Breaker Out heading uphill and to the left.

(iv) Skids (2-3 men) - At the skids a log loader and a skiddy await the arrival of the logs. The loader picks up the log and takes it to whatever heap is appropriate. The skiddy removes the strop and checks the log number. He puts the strop in a bundle ready for despatch to the bush. Another log will arrive in 2-3 minutes. Consequently if there is any extra skid work such as limbing an extra skiddy will be needed.

Records (1 man)

The log dump is the sale point at Russell Forest. All logs must be scaled in the bush to determine their weight so it is a simple additional step to record wood volumes for sale purposes. Each log has a number and during the extraction phase it is the scaler's job to check off each log as it's put on the dump thereby compiling a final tally which can be presented to the purchaser.

3. Helicopter Problems - A Lama helicopter with a 1 tonne lift capacity has been used for the three operations at Russell. It is an expensive (about $600/hour) piece of machinery to keep in the air and various endeavours can be made to make the machine more efficient.

(i) Locating the Bush Crew - Because the forest structure survives after logging and because the extraction crew is constantly changing location it's often difficult for the pilot to find them. Steps that can be taken to improve this situation are as follows.

Radio Man

As soon as the helicopter comes into his view he can control the pilot's line of approach by simple radio instructions like 'left' or 'right'. There's no harm in doing plenty of talking. The pilot can tell you to shut up if your talk is distracting him.

Bright Clothes

The extraction team should wear distinctive brightly coloured clothes. We use roadman type dazzle red vinyl vests.

Tourists

Helicopter logging attracts visitors. Keep them out of the bush, as their presence can muddle the pilot.

Movement

Is what stands out when the pilot

is taking an oblique view across the forest. So shake saplings if the pilot is close but can't locate you.

Clear Bush

Undergrowth, especially pongas, can completely obscure personnel from the pilot's view. Where obscuring growth occurs on a lifting site it should be cut down during the log preparation phase.

(ii) Tagline and Hook - The biggest hold-up in extraction is caused by problems with the tagline. The electric cable to the hook often gets fouled in treetops and branches. When it breaks stops are necessary to make repairs.

This year a step in the right direction was taken when Marine Helicopters fitted an alkathene sheath over the bottom 1.5 metres of the tagline. Further evolution should see the bottom 15 metres sheathed as there should be no exposed wire on the tagline section that encounters the forest.

Any helicopter company contemplating selection logging should carry a spare quick release hook and plenty of spare parts such as tape, wiring, spare sheathing and tools needed for making running repairs. A spare lower tagline section (15 metres) and hook could solve a lot of problems.

(iii) Skid Sites - Must offer clear access in and out for the pilot and be sufficiently large for the loader to stack logs clear of the drop zone. If you're using rope strops do not metal the drop zone or your strops will be cut by rocks. Don't attempt to land logs and load trucks at the same time unless you've got two loaders. The laden helicopter flies better into the wind so skids should be located with some thought for prevailing wind direction. Obviously, the laden machine flies better downhill so you may be better to work to a distant downhill log dump than to a close but uphill one.

EVALUATION

A. Helicopter Size - Any discussion I've had on use of a larger helicopter in New Zealand has suggested that a Bell 204 with a lift of up to 2300 kg is the most likely machine to be imported. Nobody is prepared to state the Bell's NZ hire rate except to say that it would not be less than $1200/hour.

Because of the scattered nature and small individual size of the Russell trees it is unlikely that the Bell 204 would be as efficient and flexible as the Lama. There would be a role for the bigger machine if a sufficient volume of mature kauri became available for logging. This is an unlikely circumstance on State areas. So a bigger machine would need to prove itself somewhere else before we'd contemplate switching from the Lama for selection logging of pole kauri.

B. Profitability - It should be noted that every time you fly out a one tonne kauri sawlog you fly out 150 kilos of unsaleable bark and another 300-350 kg of slabs and sawdust. Helicopter hire cost $35 per m^3 or around $30 tonne. So if you are in the business of timber production rather than log sales you could spend large sums in the bush on product improvement and still come out ahead of the game.

1982 Costs to produce 465 m^3 sawlogs are:

Helicopter Hire/	$16350	$35 m^3
Machinery (loader/ chainsaws gangbus transporter)	$1800	$ 4 m^3
Labour (including/ 28% overheads)	$10000	$22 m^3
TOTAL		$61 m^3

Not tallied are strop costs, supervision, skid clearing and road work.

Royalties total approximately $49,000 on the above so helicopter logging can be profitable, even on log sales.