SESSION 2

Paper (a)

TURN MAKING FOR HELICOPTER LOGGING

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INTRODUCTION

The economic objective of helicopter logging is to maximise turn efficiency. This goal is attained by endeavouring to minimise turn cycle time and maximise helicopter payload. This necessitates careful, thorough planning of all aspects of log preparation and extraction.

Because weight considerations are so important the ground personnel must produce logs and make turns that are close to the helicopter's maximum permissable lift capacity.

While the problem of attempting to obtain maximum loads is common to all harvesting systems it is more critical with aerial logging because of the high hourly helicopter cost and its zero overload tolerance. Miscalculations in load planning have a serious affect on the economics of the system. However, it is somewhat difficult to achieve very high average load factors because of variations in wood density, log form irregularity and market requirements for logs of specific lengths.

CROSS-CUTTING AND LIMBING

It is essential that trees are felled accurately, both to avoid damage to residual trees and to facilitate easy log extraction. Directional felling is, therefore, important. The absence of logging machinery on the ground means that the safe lowering of 'hang-ups' can be a major problem.

To ease breaking-out and uplift of logs it is necessary to ensure that limbing is done thoroughly. Particular attention should be paid to limbs on the underside of logs. These may sometimes hold logs 'spiked' to the ground. The following equipment is required by a 2 man cross-cutting and limbing team.

1. 2 powersaws (including spare bars, chains, tool kit and fuel)

2. 2 mauls

3. Assorted wedges (plastic and alloy)

4. 2 axes

5. 'Tifor' hoist or similar (for pulling down 'hang-ups' and moving logs)

6. Radio (VHF)

7. First aid kit and stretcher

8. Fly.

LOG MEASUREMENT (SCALING)

The following log measurement procedure applies specifically to selection management operations in second crop kauri forest. However, the methodology would, with some minor modifications, be applicable to other management techniques and forest types.

Two men are required for log scaling. They should work in closely with cross-cutting and limbing personnel. Log scaling serves two purposes. - To determine log weight and to record log volumes for timber sale needs. Gross (overbark) volume is used to assess log weight. This is converted to weight by applying a weight/volume factor, (944 kg/m^3 for second crop kauri at Russell Forest).

Three tree types are recognised for log scaling purposes. These are:

1. Whole trees which when headed off will not exceed 1000 kg (the lift capacity of a Lama SA 315 B helicopter).

2. Trees with a gross weight in excess of 1000 kg but whose diameter (less than 70 cm DBH in the case of kauri) permits logs to be cut that are not less than 3.0 m in length and have a weight not exceeding 1000 kg. The emphasis when scaling trees of this type is to attempt to obtain maximum length in the butt and possibly second log. Log scalers should have tree volume data from the pre-harvest assessment which can be used to advise cross-cutters when two or more trees should be felled in such a way that allows small head logs to be lifted out in the same turn.

3. Trees of such size that it is impossible to produce 3.0 m length logs with a weight not exceeding 1000 kg. Logs from these trees will need to be ripped in two or into flitches.

Log Scaling Procedure - Log volume is assessed using the centre diameter overbark/length method. Volumes are obtained from the NZ Forest Service Metric Cylinder Volume Tables. Each log is identified by attaching a numbered tag to the butt end and also by painting the number on the side of the log. The assessed log weight is recorded along with tag and tree number. Logs requiring ripping have their statistics recorded before further processing occurs.

RIPPING AND FLITCHING

Because of the limited payload capability of the Lama helicopter which, to date, has been the largest helicopter used for logging in New Zealand, it is necessary to precision rip logs either in two or into flitches so that they can be extracted (and retain the minimum log length specification). This is done by using a light weight 'Alaskan' mill. This consists of an adjustable frame incorporating, in a horizontal plane, the cutter bar of a 90 cc powersaw fitted with special ripping chain. The frame slides along aluminium rails which are spiked onto the top of the log. Cutting speed is 25-50 cm/minute. The most time consuming aspect of work is shifting the mill from log to log and setting up for cutting.

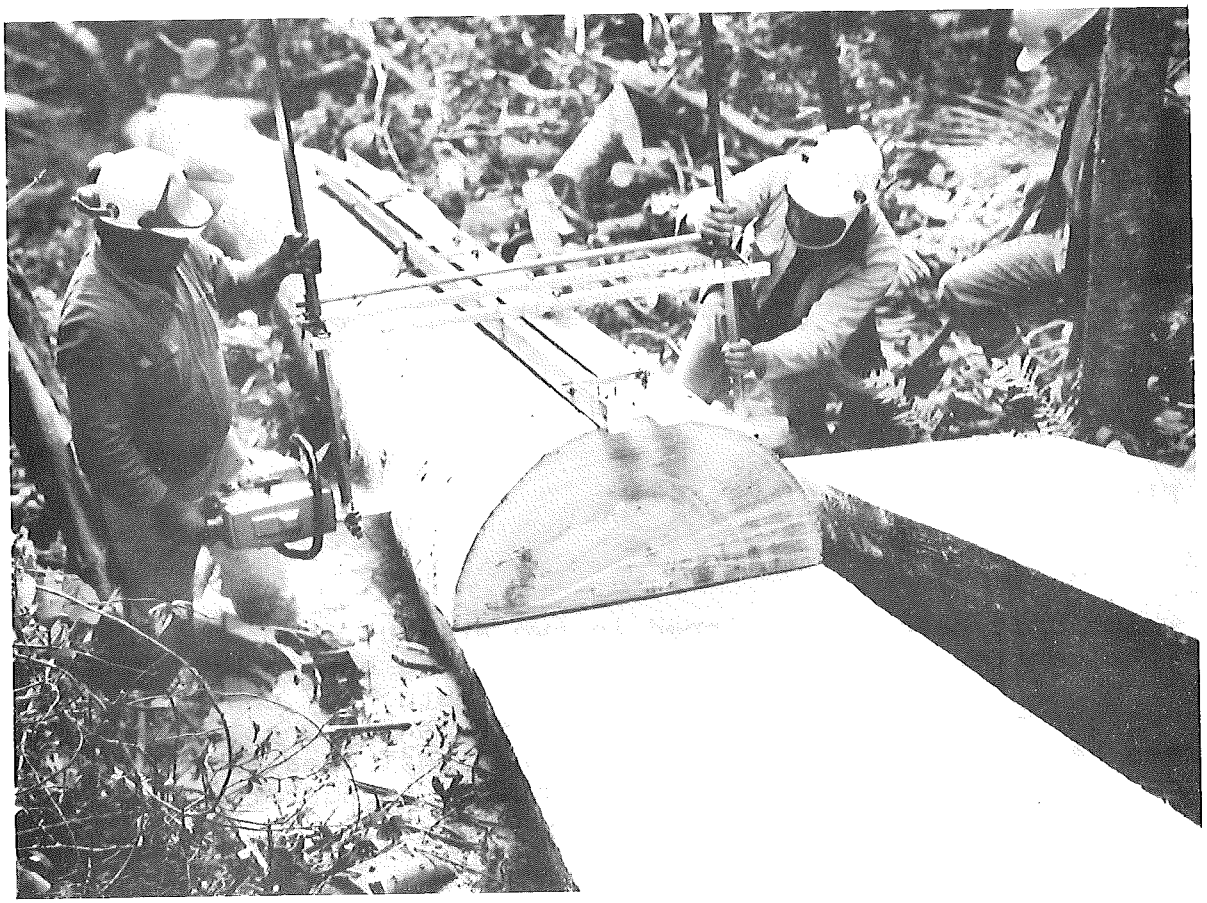
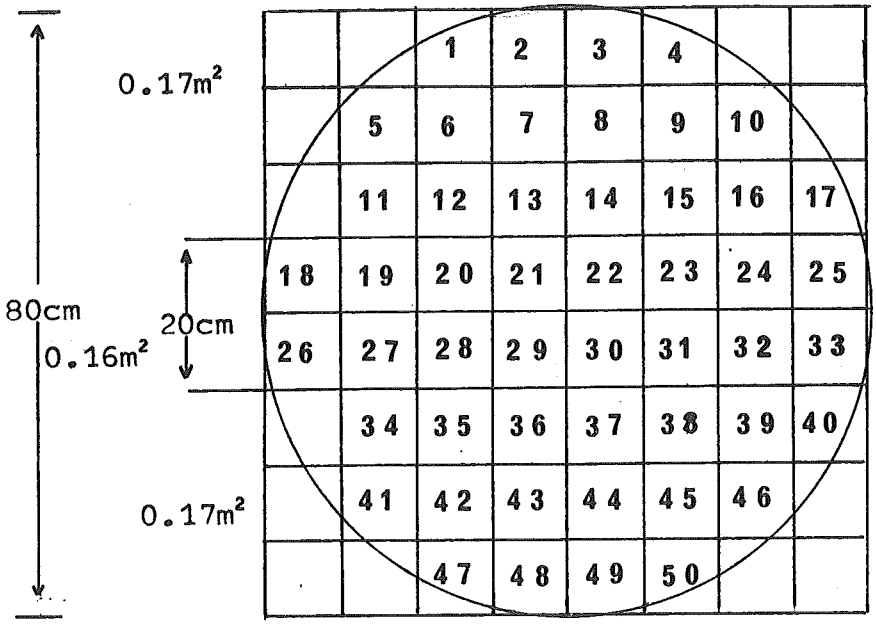


Plate 1. - 'Alaskan' mill ripping kauri log.

The mill requires 2-3 men for efficient operation. The following equipment is required:

1. 'Alaskan' mill and ripping powersaw
2. Guide rails
3. Additional conventional powersaw
4. Fuel and Oil
5. Assorted Wedges
6. Pinch bar
7. Diameter and 20 m tapes
8. Steel Ruler
9. Line and line level
10. Hammer and nails
11. Aerosol paint and crayons (or chalk)
12. First aid kit
13. Radio (optional)
14. Fly

Logs which only need to be ripped in two are cut from centre to centre, (butt to head). Where a log has to be broken down into three or more flitches a method of ensuring equal weight distribution between the differently shaped flitches has been devised. The cross-sectional area at the log centre is calculated and divided equally amongst the flitches to be cut.



Each cm = $0.01/m^2$

Cross-section area = $0.50m^2$

The cross-section area of each of 3 flitches is therefore $0.17m^2$. So the centre flitch will be 20cm thick.

Log Dimensions CDOB : 80cm Length : 3m Volume : $3.0m^3$
(The log must therefore in ripped into 3 pieces so that each piece will weigh less than 1000kg)

The geometric centre of the butt end of the log is established and lines marked 10cm above and below this point. The log is then ripped twice parallel to its access producing 3 flitches of the same weight.

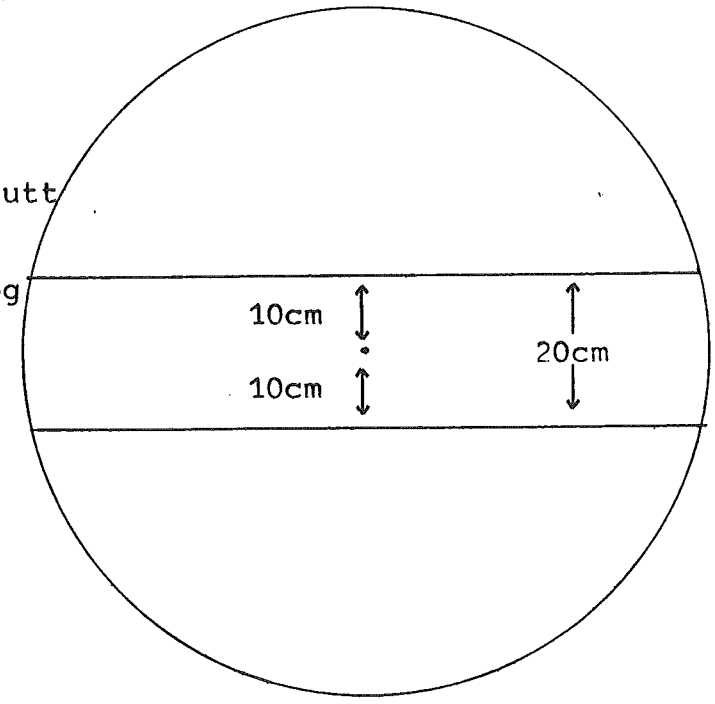


Figure 1: Example of the procedure for determining equal weight distribution between flitches in a log which requires ripping into 3 pieces.

In the example depicted in Figure 1. the cross-sectional area at the log centre (80 cm CDOB) is 0.50m^2. The cross-sectional area of the 3 flitches to be cut is therefore 0.17m^2. This cross-section data is then plotted on graph paper at a convenient scale, (1 cm = 10 cm in this case). The thickness of the centre flitch can then be determined by inspection, (20 cm in this example).

In practical terms it is possible to work with several diagrams, each one depicting, say the mid-point of sequential 10 cm diameter classes. It is then possible to interpolate between diagrams for actual log diameters.

The geometric centre of the butt end of the log to be ripped is then located and the width of the centre flitch marked. If the log is then ripped at the marked positions parallel to the axis of the log the log will be cut into flitches of equal weight.

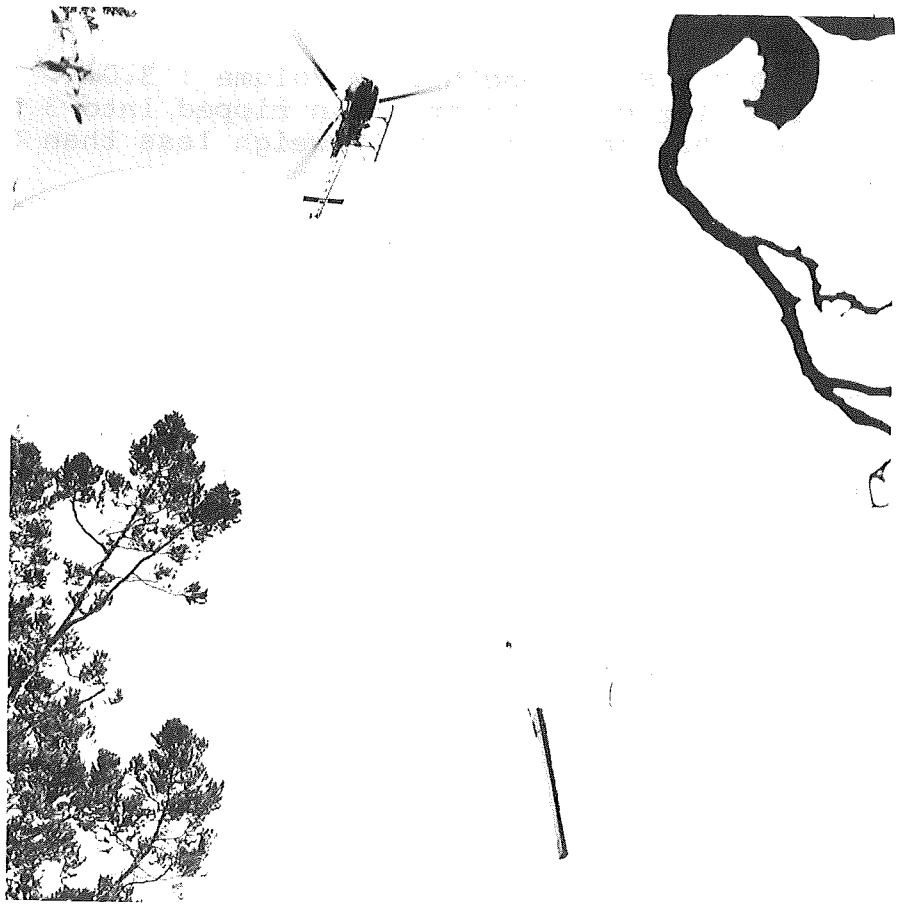


Plate 2. - Precision ripped flitch being extracted by a Lama SA 315 B helicopter.

CUTTING TO LENGTH

Cutting logs to length is usually done by the cross-cutters. This can be a hazardous activity when trees are lying on steep terrain. Logs must be completely severed one from the other for helicopter extraction. This is vital as helicopters do not have the power reserve to break-out logs that are not entirely freed.

ACKNOWLEDGEMENT

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REFERENCES

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NZ FOREST SERVICE 1976 Table of metric cylinder volumes. Govt. Printer. Wellington.

PHOTOGRAPH CREDITS

	Plate
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