SESSION 1

Paper (a)

# CHARACTERISTICS OF THE NZ FOREST SERVICE NEW CROP RESOURCE

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## SUMMARY

Some key features of transition crop stands in which FRI studies have recently been carried out are reported. Tree size and pruned height variability have implications for harvesting and transportation.

## INTRODUCTION

The NZ Forest Service new crop resource is commonly differentiated into the transition crop (stands established in the 1940s and 1950s) and the young crop (stands established since 1960).

Stands of the transition crop are notable for their diversity. A wide range of silvicultural treatment has been implemented in these stands. Varying establishment practices and pruning and thinning schedules applied over a wide range of sites, together with varying clearfell ages will result in stands that vary in total volume, stocking, tree size distribution, branch characteristics and pruned height at the time of clearfelling. This paper does not attempt to generalise about this variable resource. Rather the objective is to describe the salient features of some example stands in which FRI studies have been carried out recently.

An FRI log grading trial was carried out in 9.1 ha of Compartment 1036 Kaingaroa Forest. Subsequent to this trial a log grading exercise was carried out on a smaller scale in 4.7 ha of Compartment 112, Golden Downs Forest. Stand histories for these stands are given in Tables 1 and 2.

Both stands were assessed prior to clearfelling by a MARVL (Deadman and Goulding, 1979) pre-harvest inventory. In addition an AVIS (Geerts and Twaddle, 1985) exercise was carried out in the Compartment 1036 study to monitor how well the logging gang was able to sort logs using proposed standard log grades (Whiteside and Manley, 1985).

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TABLE 1 - Stand history for Kaingaroa Forest log grading trial area (part of Compartment 1036/01.1)

| Year | Age | |
|---|---|---|
| 1953 | 0 | Regeneration 5000 stems/ha |
| 1960 | 7 | Waste thinned to 742 stems/ha<br>Low pruned 0-4.0 m |
| 1967 | 14 | High pruned 4-5.8 m, 342 stems/ha |
| 1972 | 19 | Production thinned to 300 stems/ha |
| 1984 | 31 | Clearfell |

TABLE 2 - Stand history for Golden Downs log grading trial area (part of Compartment 112/02)

| Year | Age | |
|---|---|---|
| 1957 | 0 | Planted 1763 stems/ha |
| 1963 | 6 | Low pruned 0-3.0 m, 915 stems/ha |
| 1966 | 9 | High pruned 3.0-6.0 m, 543 stems/ha |
| 1968 | 11 | Waste thinned to 735 stems/ha |
| 1970 | 13 | Waste thinned to 223 stems/ha |
| 1985 | 28 | Clearfell |

## KEY FEATURES

### 1. Size

The mean top height of the Compartment 1036 study stand was 42 m at the time of clearfelling. Although mean tree dbh (diameter at breast height) was 47 cm tree size was extremely variable with dbh of MARVL assessed trees varying between 20 and 73 cm. Tree volume ranged between 0.4 and 5.8 $m^3$ with a mean of 2.4 $m^3$. Total recovered volume was 657 $m^3$/ha.

The mean length of butt pieces measured in the AVIS study (A. Twaddle, pers. comm.) was 26.1 m (range 10.0 - 39.1 m) with a mean volume of 2.2 $m^3$ (range 0.4 - 6.1 $m^3$). The 200 butt pieces measured had 166 merchantable top pieces (minimum length 2.4 m and minimum small end diameter 10 cm) associated with them. These pieces from above the first stem breakpoint had mean length 4.4 m (range 2.4 - 14.1 m) and mean volume 0.1 $m^3$ (range 0.02 - 0.6 $m^3$).

Twaddle noted that "while the top pieces represented 45% of the total number of merchantable pieces that must be handled during the logging operation they represented only 4% of the total merchantable volume and 1% of the total merchantable value". He estimated that 90% of all merchantable pieces above the first stem breakpoint were in fact extracted.

The study stand in Compartment 112, Golden Downs Forest had a mean top height of 34 m. Mean tree dbh was 50 cm (range 36-66 cm) and mean tree volume was 2.2 $m^3$ (range 1.0 - 4.0 $m^3$). Total recovered volume was 433 $m^3$/ha.

2. Pruned height

A feature of both stands was the variation in pruned height. Although both stands were nominally high pruned a considerable proportion of stems were in fact only pruned to 2-5 m. In the Compartment 1036 study stand 2% of trees were unpruned, 39% were pruned to between 2 and 4 m, 14% were pruned to between 4.1 and 6 m, and 45% were pruned to over 6 m. At the Golden Downs study 4% of trees were unpruned, 33% were pruned to between 1.8 and 4 m, 57% were pruned to between 4.1 and 6 m, and only 6% were pruned to over 6 m.

The consequence of this pruned height variation is that minimum pruned log length cut on the skids has to be kept as short as possible if the maximum volume of pruned logs is to be extracted. Figure 1 shows for different minimum pruned log lengths the percentage of pruned volume that would not have been extracted as a pruned log from Compartment 1036. For example if minimum pruned log length had been set at 3.7 m then about 19% of the potential pruned volume in the stand would not have been extracted as pruned logs.

The need for a short minimum pruned log length if growers wish to maximise pruned volume recovery in segregated logs obviously has implications for log transportation.

## COMPARISON WITH THE 'OLD-CROP'

A comparative study (C. Terlesk and M. McConchie, pers. comm.) of the clearfelling of a 29-year-old tended stand and a 48-year-old untended 'old-crop' stand highlighted differences

between the stands and the impact on logging productivity. The young tended stand (part of Compartment 1099, Kaingaroa Forest) had a mean dbh of 47 cm, and a mean height of 38 m while the 'old-crop' stand had a mean dbh of 60 cm and a mean height of 43 m. Mean tree merchantable volume was 2.2 $m^3$ in the young tended stand and 3.8 $m^3$ in the 'old-crop' stand.

However breakage during felling reduced the mean merchantable piece volume to 1.9 $m^3$ in the young tended stand and 2.7 $m^3$ in the 'old-crop' stand. Terlesk and McConchie observed that the reduced tree size in the 29-year-old tended stand had a marked effect on productivity through reduced haul loads.

Another major difference between the harvesting operations was that 43% of the feller's time was taken up in trimming branches in the 'transition crop' stand while harvesting in the 'old-crop' stand did not involve any trimming by the feller. In the recent Compartment 1036 trial 59% of the feller's time was occupied by trimming (M. McConchie, pers. comm.).

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Figure 1 – Cumulative % of Pruned Volume In Logs of Different Length