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TECHNICAL NOTE TN-27

CUTOVER WASTE ASSESSMENT
- A Comparison of Sampling Techniques and Intensities

INTRODUCTION

Most New Zealand forestry companies assess the volume of merchantable wood left on the cutover after harvesting. With greater emphasis on quality management in recent years, there has been more importance placed on the accuracy of these assessments. Most companies set a limit of 10 to 15 cubic metres per hectare of merchantable wood left on the cutover as waste.

The most common waste assessment method is Line Intersect Sampling (LIS). It has been used in a number of different ways, many similar to that described in the New Zealand Forest Service Wagner Logging Waste Assessment, Manual of Procedures. The sampling pattern recommended in the manual is a square with 100 m sides, each side of the square counting as one sample line, with one square per hectare.

There are doubts within the industry as to the accuracy of the estimate from LIS relative to the set limits. There is some justification for this:

- the layout of plots commonly used does not adequately allow for the non-random orientation of the waste wood which can lead to a biased result

- results for individual plots within a setting are often highly variable. This means that a large number of samples are required to adequately describe the site.

In this study, five sampling techniques with varying sampling intensities, were applied over an area of cutover with a known volume per hectare of waste wood. Line intersect sampling was one of the systems used.

The objective of this study was to determine the most accurate and cost effective sampling technique. The actual volume of waste was not the issue, although a block representative of a typical cutover was selected.

METHODS

Four one hectare blocks were located within an area of ground-based logged cutover. Each block was fully assessed to establish the total volume of merchantable wood volume. All pieces meeting specifications of greater than 3.7 m in length with a small end diameter (SED) greater than 10 cm, were measured and then had a volume calculated. Five different sampling techniques were then applied within each of the four blocks. Three types of area plots (100*th* hectare, square, circular and transect) were used to collect up to a 12% sample. Two types of line intersect plots were also used:

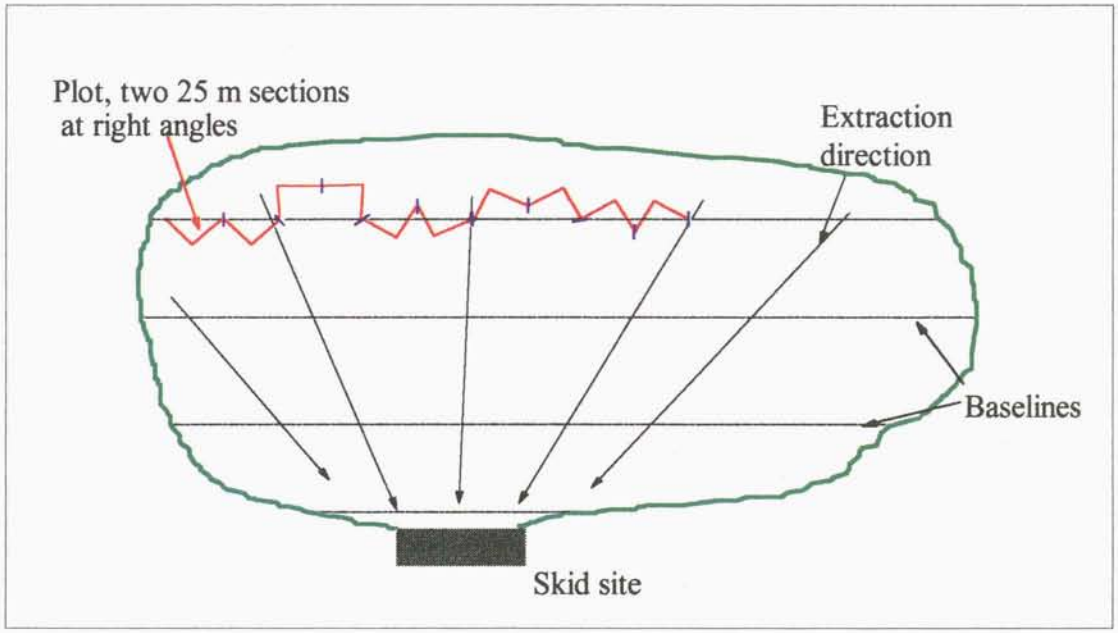

Figure 1 - Layout of Zig Zag LIS plots

50 m circular lines in two 25 m semicircular sections (circular LIS) and 50 m Zig Zag lines in two 25 m sections at right angles (Figure 1) Zig Zag LIS.

All plots were randomly located.

Time study data was also collected during the various cutover assessments in order to compare the costs of each system.

The usefulness of any assessment method is related to its cost of implementation. It should be remembered that cutover waste assessments are typically looking at small volumes of low value material, 10 to 30 m^3/ha of pulp logs. The benefit of spending a lot of money to determine its exact volume must be considered when determining sampling intensity.

The results of each of the sampling techniques were compared with the known total volume to compare the relative accuracy of each system.

RESULTS

Sampling System Results

Zig Zag LIS lines and square area plots yielded smaller percentage errors than the other systems.

The Zig Zag LIS had significantly less bias than the other systems.

Sampling System Costs

Zig Zag LIS had the lowest labour cost per hectare at all sampling intensities. This is because it can be carried out quickly and easily by one person.

All the other systems require two people to complete the plot layout, measurement and recording.

CONCLUSION

The Zig Zag LIS was the most cost efficient system. It gave an answer that was at least as accurate as the other systems, at a substantially lower cost.

More detail on this study is available in LIRO Project Report No. 60.

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