LOGGING INDUSTRY RESEARCH ORGANISATION
NEW ZEALAND

ISSN 1171-6932

REPORT

Vol. 20 No. 20 1995

RIGGING OPTIONS FOR THE NORTH BEND SYSTEM

Dave Bennett
Mike McConchie

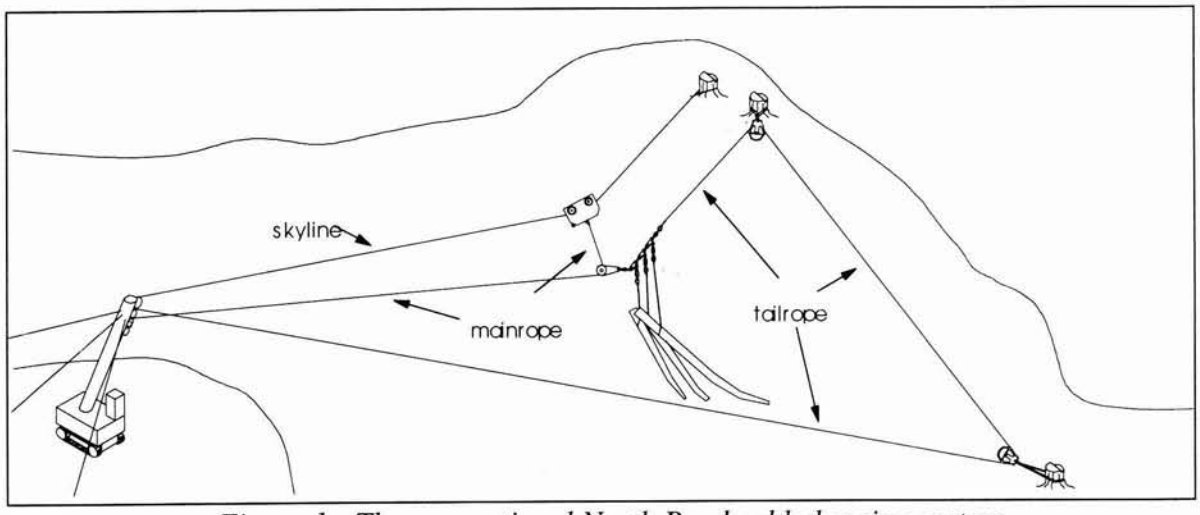

Figure 1 - The conventional North Bend cable logging system

ABSTRACT

The North Bend system is a widely used cable logging system. Variations on the conventional rigging arrangement can increase the productive capacity of an operation by providing more control, increasing available lift or reducing the number of rope shifts required. The variations discussed are: (i) attaching the tagline to the carriage, (ii) bridling (sideblocking), (iii) switching the positions of the mainrope and tailrope, and (iv) putting a rider block on the tailrope which is connected to the butt rigging. The effects on production are discussed, based on a study of one operation.

INTRODUCTION

The North Bend system is probably the most commonly used skyline logging system in New Zealand and has the following advantages over skyline systems with other rigging arrangements:

- the equipment is relatively inexpensive, simple and robust
- the amount of lift on the logs can be easily controlled by varying the air pressure activating the tailrope brake; this is particularly useful in maintaining partial suspension of the logs over broken terrain.

A conventional North Bend layout is shown in Figure 1. (Full descriptions of the North Bend system are contained in Conway, 1982 and Liley, 1983). Some of the problems encountered using the conventional North Bend are:

- it can be difficult to place the strops accurately to hook on the next drag

- when lowering the drag on to the landing, the carriage tends to run away from the hauler as the fallblock is lowered meaning the drag cannot be landed close to the hauler unless the skyline is lowered; this is a problem particularly where the slope of the skyline near the tower is steep or the flat area in front of the hauler is limited.

Retrieving the wood along the edge of a setting can require many block shifts if the mainrope and tailrope are retained in their normal configuration. (Kellogg 1987a and 1987b contain more complete explanations of some of these problems). The following techniques will help to overcome these problems and can also make the system more effective in the following ways:

1. Attaching the tagline (sometimes called the slackpuller) to the carriage.
2. Bridling (this is a technique which allows extraction of logs which are not directly under the skyline).
3. "Switching" the position of the mainrope and tailrope at the end of a setting.
4. Putting a rider block on the tailrope.

ACKNOWLEDGEMENTS

LIRO wishes to acknowledge the assistance of Rhys Carroll, the crew of Carroll Skyline Logging Limited and Brian Tuor of Cable Logging Specialists..

RIGGING OPTIONS

Attaching the Tagline to the Carriage

Attaching the tagline to the carriage enables the mainrope to be pulled out while the carriage remains stationary. It is possible to use this system on haulers using a tagline drum driven by a slipping clutch. Figures 2(a) and 2(b) illustrate that by

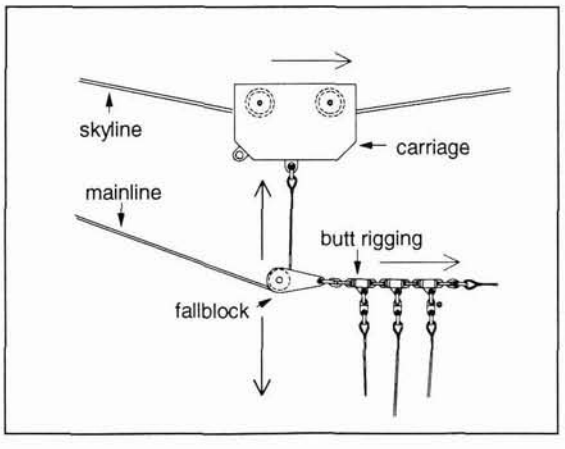

Figure 2(a) - As the tailrope pulls the butt rigging away from the hauler, the carriage is free to follow along the skyline. The fallblock rises and lowers depending on the mainrope tension. This can make it difficult to place the butt rigging accurately

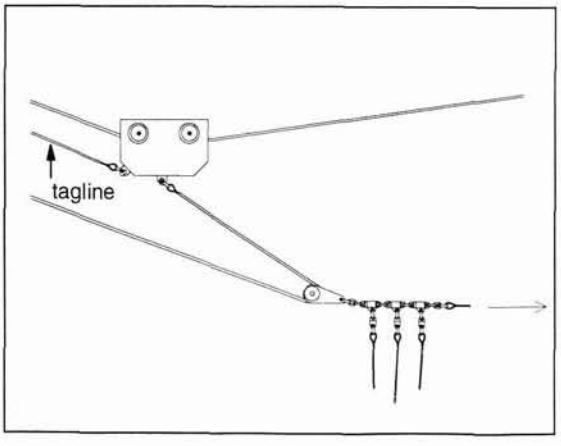

Figure 2(b) - With the tagline attached to the carriage, the carriage is held stationary while the fallblock is pulled away from the carriage. By adjusting the tension of the mainrope and tailrope, the position of the butt rigging can be controlled accurately

holding the carriage in position with the tagline (that is, the tagline brake is applied), the butt rigging can be located more accurately. When the drag reaches the landing, the carriage can be held close to the tower with the tagline, and when the mainrope is let out the fallblock and rigging will fall almost vertically, landing the drag close to the base of the tower (Figures 3(a) and 3(b)). This is an advantage where there is only a short distance from the base of the tower to the edge of the landing or the slope of the skyline is steep near the tower, as the drag can tend to run off downhill as the mainrope is let out.

Operating the tagline

Some haulers use a slipping clutch to drive the tagline drum during inhaul and also to brake the tagline drum during outhaul. (The clutch rotates in the same direction during both operations but the torque exerted is lower during outhaul. Torque is controlled by adjusting the air pressure that activates the clutch). Other haulers use a combination of a slipping clutch for inhaul and a disc or band brake to apply tension to the tagline during outhaul. During operation, the hauler operator needs to engage the tagline band brake when the carriage is stationary, and engage the tagline clutch or brake while the carriage is moving. Some haulers allow the operator to preset the pressure for each phase, but where this cannot be done, the operator may have to adjust the pressure manually during inhaul and outhaul. While requiring the hauler operator to have some additional dexterity, any extra effort by the operator should be compensated for by the reduced effort required of other workers and the increased efficiency of the operation. Sufficient rope must be kept on the tagline drum so that it is wound in at the same speed as the mainrope. (If the tagline drum is relatively empty, its effective diameter is reduced so the rope speed will be lower for a given drum speed (RPM)). If the carriage and drag freely run forward under gravity just after the drag has broken out, the tagline may become excessively slack. Delays could result if the tagline becomes fouled in slash, logs or stumps. The amount of slack may be reduced by

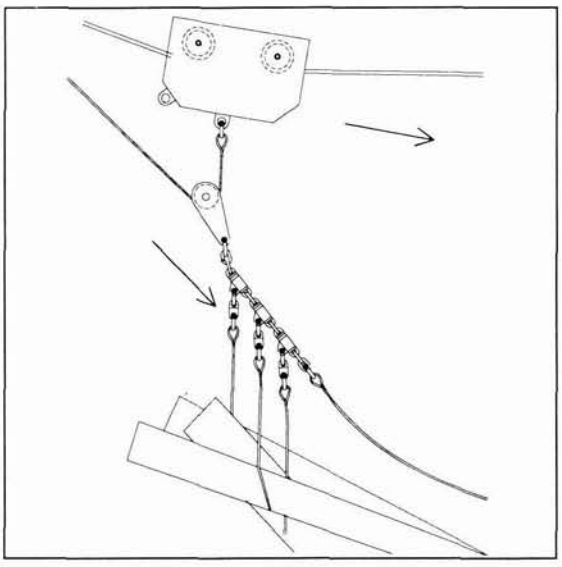

Figure 3(a) - As the mainrope is let out to drop the logs on to the landing, the carriage and drag run away from the hauler

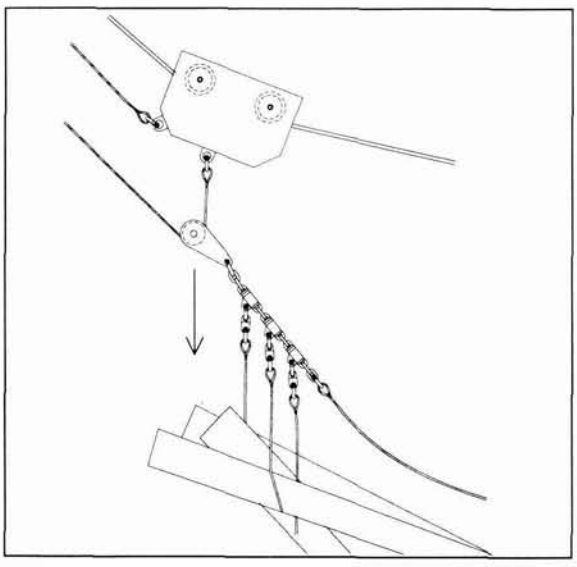

Figure 3(b) - When the mainline is let out with the tagline holding the carriage in place, the fallblock, butt rigging and logs will drop almost vertically

applying the tailrope brake. Overheating of the tagline clutch or brake is unlikely to be a problem on haulers where they are watercooled, although this could possibly occur where air-cooled clutches or brakes are used. As pressure on the friction pads increases, the heat generated, the power requirement, and wear all increase. As the tagline is not required to apply any force to the carriage during inhaul and outhaul, the tagline clutch or brake air pressures should be as low as possible while keeping the tagline taut and maintaining good spooling on the drum. (See the hauler manufacturer's specifications for approximate pressures).

Bridling

Bridling allows extraction of logs which are not directly under the skyline. Bridling is achieved by moving the tail block away from the skyline (Figure 4). This effectively enables a shift to a new corridor by moving the tail block but leaving the skyline in the same place. The main advantage of bridling is that the skyline may be left anchored on a high point providing good deflection, while the tailblock is moved to a lower point. This effectively increases the available deflection.

While bridling may be seen as a way of reducing time taken for rope shifts (as the skyline anchor is not shifted), inhaul and outhaul times are increased because more mainrope is fed out as the rigging travels away from the carriage. Care must be taken that the time saved by reducing rope shifting time is not outweighed by increased inhaul and outhaul times, particularly where there are skyline anchors available close to the tailblock.

The bight area is much larger when bridling, so it may take longer for the breakerouts to walk in and out of the bight. Log breakage during breakout can be less than for conventional North Bend as the logs turn more slowly as they are pulled toward the skyline corridor. The amount of lift exerted on the logs is reduced until the logs are directly under the skyline. Having the tagline attached to the carriage when bridling greatly improves control when positioning the butt rigging. Bridling pulls the skyline away from its "straight line" position (between the tower and the tailhold) hence the loads imposed on the tower are in a different direction to those imposed when not bridling. Careful attention must be paid to the actual direction that the skyline and mainrope are pulling the tower during inhaul. This

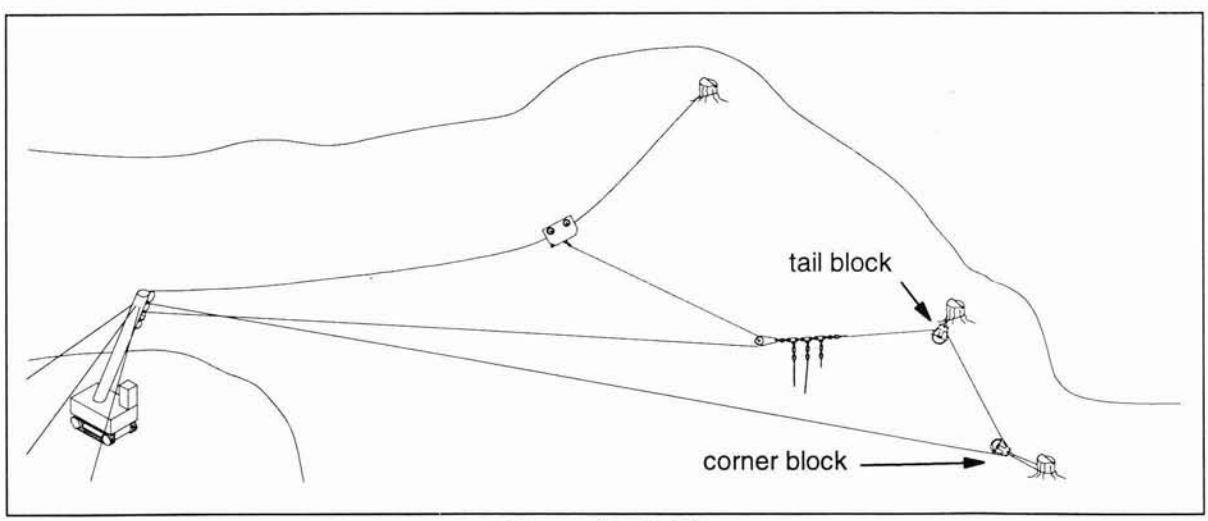

Figure 4 - Bridling

"actual lead direction" must not be outside the "maximum angle of yarding" recommended by the manufacturer. Guylines must be placed so that adequate stability is provided for the tower, and that the load is shared by more than one guyline.

"Switching" the Positions of the Mainrope and Tailrope

Normally a North Bend system is operated so that the tailrope is placed over wood that has not yet been extracted (or outside the boundary of the setting). Most rope shifts then consist of moving the skyline anchor and tail block toward the corner block (Figure 5). This is done so that the area from which the logs have been extracted is the safe area for the breakerouts. The breakerouts can then walk over relatively clear ground to get out of the way of the drag. If this layout is maintained to the boundary of the setting, to extract the wood along the boundary the tailblock may need to be shifted several times. To prevent the tailrope from becoming fouled in the logs being extracted, it may also be necessary to move the corner block several times (Figure 6). By "switching" the positions of the mainrope and tailrope, what was the corner block now becomes the tail block and the wood along the boundary can be extracted without positioning more tailrope blocks along the setting boundary (Figure 7). Care must be taken when locating the

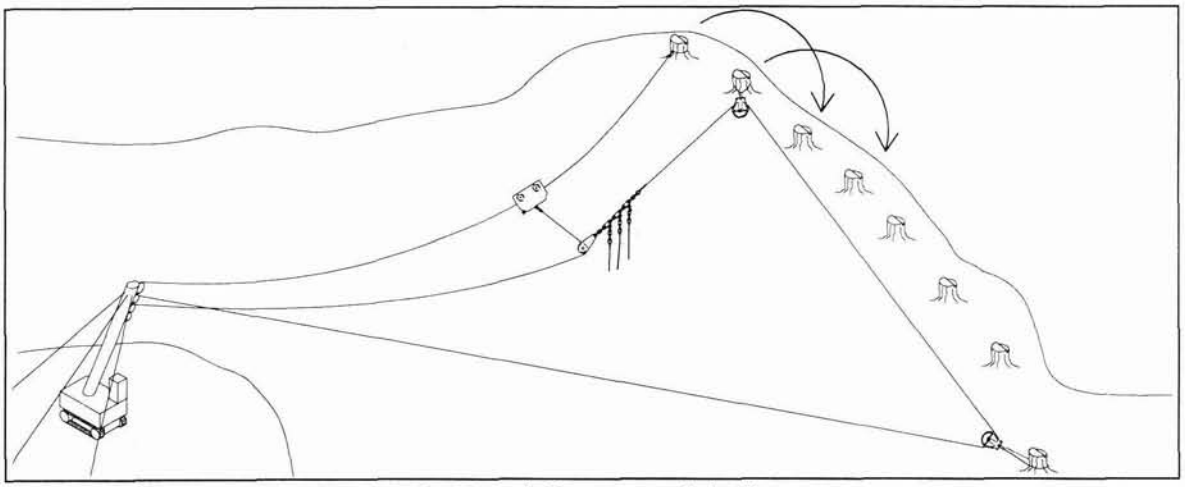

Figure 5 - Usual direction of shifting ropes

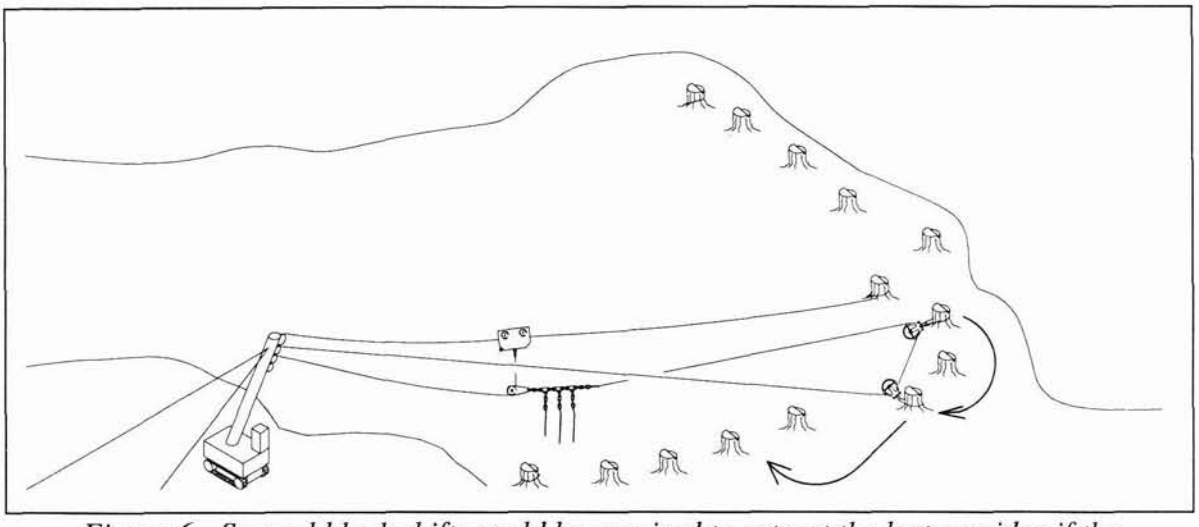

Figure 6 - Several block shifts could be required to extract the last corridor if the tailrope was kept"ahead" of the mainrope

new corner block so that the mainrope and tailrope do not rub against each other. The tailrope should not run underneath the skyline as ropes could burn if the skyline was lowered on to the moving tailrope. As when bridling, attention must be paid to the effective lead direction and guyline placement.

Placing a Rider Block on the Tailrope

Placing a rider block on the tailrope (between the hauler and the corner block) is another method of getting the butt rigging close to the setting boundary (Figure 8). This system can also be used to obtain additional lift from the tailrope. This may be useful where the deflection is poor and the lift provided by the skyline is inadequate. Care must be taken that the tailrope is not over-tensioned. As the angle of the tailrope around the tailrope blocks is smaller, the load on the tailrope block anchors can be much greater than for normal operation so anchors may need to be stronger than those usually used. As this is a variation of bridling, attention must be paid to the effective lead direction and guyline placement.

EFFECTS ON PRODUCTION RATES

A production study has been carried out of the Madill 171 owned by Carroll Skyline Logging. During the study the North Bend system was used, with the tagline attached

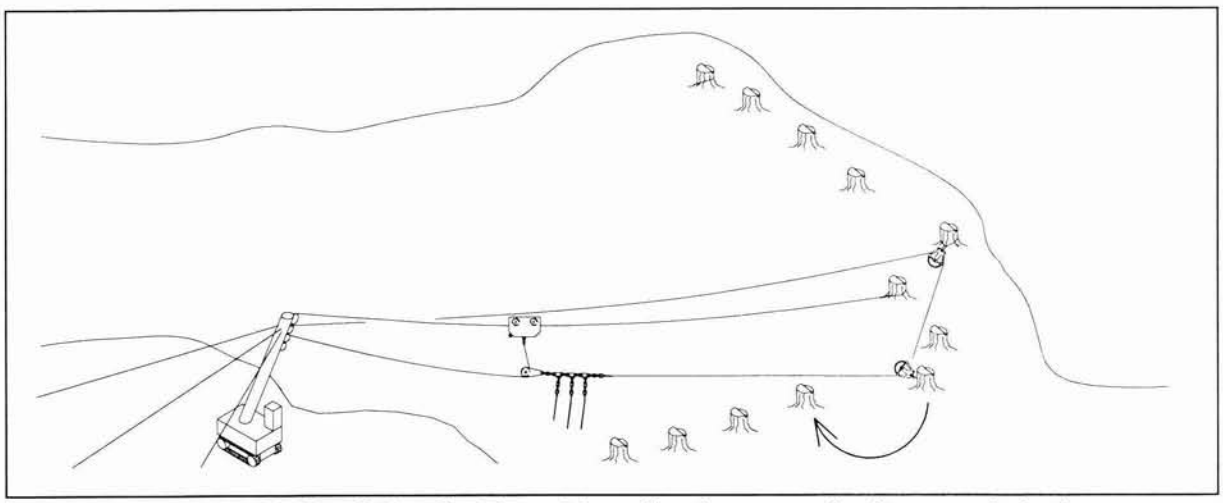

Figure 7 - North Bend with position of mainrope and tailrope switched

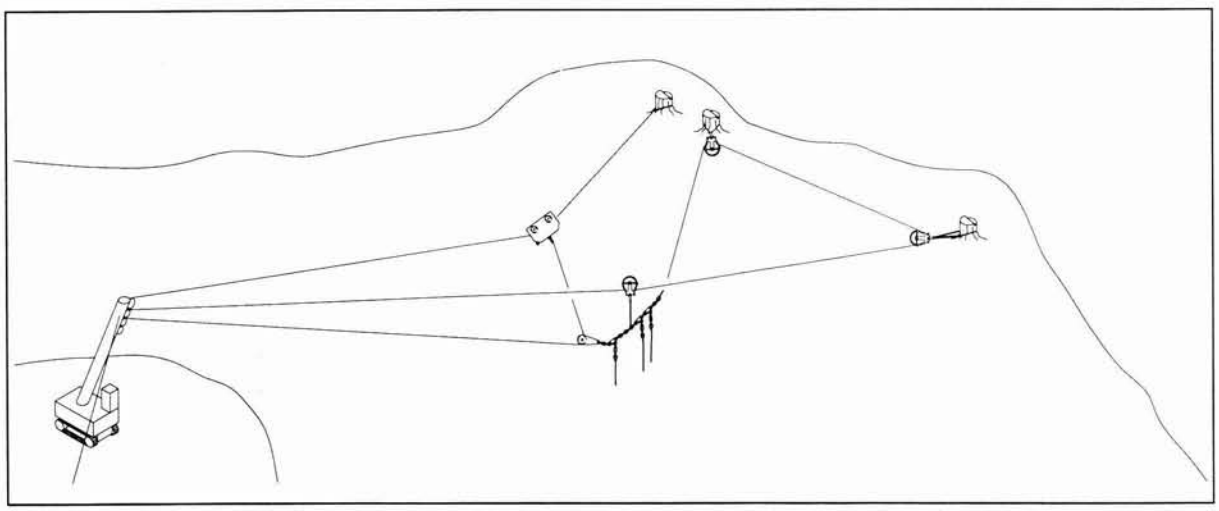

Figure 8 - Rider Block on Tailrope

to the carriage. Bridling was performed over much of the setting and the mainrope and tailrope were switched to extract logs from the edge of the setting. These techniques were effective in maintaining production levels in difficult parts of the setting (McConchie, 1995).

REFERENCES

Conway, S (1982) : "Logging Practices" Miller Freeman Publications Inc. 432 pp.

Liley, W.B. (1983) : "Cable Logging Handbook". LIRA.

Kellogg, L. (1987a) "A Cable Hauling Trial with the Madill 071 - Using Three Different Rigging Systems". LIRA Report Vol 12 No. 11.

Kellogg, L. (1987b) "Small Landing Operation: A Study with a Mobile Hauler and a Knuckleboom Loader." LIRA Project Report, No. 32.

MCConchie, M. (1995) : The North Bend Rigging Option - Operating with a Tagline". LIRO Report (in prep).

For further information, contact:

LOGGING INDUSTRY RESEARCH ORGANISATION
P.O. Box 147,
ROTORUA, NEW ZEALAND.

Fax: 0 7 346-2886 *Telephone: 0 7 348-7168*