Session 7
Paper (c)

HARVESTING AND ENVIRONMENTAL ISSUES

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Introduction

I know this session is on ground-based logging, but some of the environmental issues I want to talk about cut across both cable logging systems and ground-based. I just made the title more general, but as I go through, I will highlight the differences between ground-based and cable.

In the past when I have spoken to meetings such as this, I have usually come armed with "what's been done wrong" slides and I'm at a bit of a loss to find any more. I have to go to the slide library to dig out the ones from the past. This is a good omen, I now have a clear impression that environmental issues are well accepted by management and workers alike.

During the week I've been up here and in my previous field trips I've seen benching, burning, and backhoes tackling the landing problems. Restocking of landings is widely practised. This will reduce the water shed from landings, and stabilize the fill. That's important because compacted landings can shed thousands of litres of water in a rain storm.

The other aspect I've seen is that the streams are being better treated, they are being used as coup boundaries for ground-based operations, or they are being pulled away from, where high lead operations are suitable, or the wood is being lifted out of them by skylining to the high land behind. There are examples where the backline has been moved to high land across the creek, and the wood has been lifted out.

Water bars, cut offs and sediment traps are now standard practice. Sediment pits are used in pumice country, I heard someone refer to it earlier as boys land, but I can assure you that parts of it aren't. Coarse sediment is particularly mobile and hard to handle. Pieces of indigenous vegetation are now being reserved by logging planners and crews as genuine attempts to treat the environment better. Even breakerouts know what is to be done. Not always why, and perhaps this is the next task, to explain to them how the processes work, so they can use some of that good old kiwi ingenuity in making the job better.

The list of environmental impacts from logging operations is large, fifteen minutes is not long enough to do much more than just scratch the surface. Generally the more important impacts fall under three headings, and I've called them landforms and soils, water resources and wildlife and fisheries.

Landforms and Soils

If we can just tackle the first one of land

forms and soils first. In general, the steeper the land, the greater the risk of erosion from mass failure. Where there has been loss of soil in shallow slips, it can lead to a forest with a pretty poor nett stocked area to gross stocked area ratio. Mass failure is the loss of soil as it slides off underlying parent material. This is similar to farmland which is usually dealt more disrespectfully to by Mother Nature because of the lack of protection.

The protection afforded to the soil is of two types, the first is that dry soil is stronger. The tree crop uses water which would otherwise make the soil as wet as pasture. Of course, during heavy or prolonged rain, even forest soils become saturated and indigenous forest set aside as reserves will fail under these conditions. On similar sites, forests are less prone to soil loss than pasture, but the playing field isn't level. Forests are usually relegated to the steeper ground. We have a harder job to keep our act tidy. During 75% of the 30 year rotation, forests provide protection. After felling, it may take up to 8 years to replace the canopy and root strength, so there is a period in there when the forest is vulnerable.

The other form of protection afforded to the forest is from roots. Up to 30% of a Radiata crop biomass is below the ground. Fine roots decay very quickly, probably in the first two years after felling, the soil reinforcement falls rapidly, and whole chunks of new forest can slip away, even if there is not a landing at the top that initiated it. All you can do is stock the forest as soon as you can, and hopefully get a break with Mother Nature.

The other steepland area that we tend not to see is the very steep area at the stream bank or the foot of the convex slope. For instance, in Mangatu where the bottom of the slope dips steeply into the river bed, and in the Marlborough Sounds where coastal erosion has over steepened the bottom. Over steepened stream banks in the Wairarapa are the first areas to slump into the stream. Even on the pumice plateau, one of the main sources of sediment is the collapse of stream banks. Retention of deep rooted vegetation will help stop slumps. Fine roots and the flexible tops of grasses will trap and recolonise sediment on the immediate stream edge. I don't want to get into a debate here about what is the best type of riparian vegetation.

Ground-based systems require more tracks and give quicker run off after storms. A high percentage of the ground is usually covered unless a planned tracking system is done. Cut-offs and tracks drain water more quickly, and compacted soils don't take it in. I don't want to talk too much more about compaction, Ross van Rossen spoke about it on Wednesday, and gave a very good coverage on it, and it, was mentioned in Fraser's talk just now. But I would like to pick up on a bit of John Firth's work. He looked at planting on skid trails, and he found that only 1 tree in 20 planted on the tracks made it to the final crop, and then it was considerably shorter and a smaller diameter than the others. This compared to 1 in 6 selected from the areas between the tracks. On difficult terrain, ripping isn't on to rehabilitate the tracks, and to keep the stocked area up, planting should be conducted on the soft fill, as close to the edge of the track as possible, and on the top edge of the batter, back far enough so we don't see the batter collapsing onto the track, complete with the tree.

Water Resources

The second major area I wanted to touch on was water resources. The rate of water loss from ground-based operations is higher than for cable operations. Following most clear felling operations, you can expect increases in stream flow, and with that more sediment as its taken out of storage in the stream bed, or from a stream bank. It takes about two years for nutrient loss from the cutover and sediment levels to return to normal. While I am talking about the increased water yields, when water increases in velocity, so does its capacity to carry sediment. So, as soon as you slow it down by turning it into a turn out or a sediment pit, the coarse material drops out first, then the medium material. Cut offs block up quickly in coarse grain sediment such as the pumice, so pits are the better option in turnouts, and they also need less maintenance. A sediment pit beside the Wahine stream has sediment from the landing and the road, (which has been in there for many years), drained into it. Course sediment settles out and the overflow goes into the stream. This is about the last ditch stand. Normally, you would try and control that sediment further back. Fine sediment may not settle for days.

Working during the rain can carry sediment directly into water courses, water bars and cut offs are ineffective because water runs down off the tracks, and directly into streams. An operation in the Tory Channel, where one of the permit conditions on this was that ground- based operations, (that is the two staging of logs down the ridge tracks, or along contour tracks, not along side cut tracks across the hill) was to cease on days when rainfall could cause run off. We estimate that run off would commence after about 5 mm per hour, in the winter when soils are saturated and after only about 12 mm per hour in the summer. This could result in the Contractor losing up to 40 days work per year but because the crew realises the importance of the marine environment they make this time up when the weather is fine. And a proportion of those 40 days would fall on scheduled days off anyway.

Some of our research work shows that during a storm, the sediment production is quite low, however the moment you put traffic on it, the rate of sediment production goes up. You still get your initial run off. But the moment you start putting wheel ruts down on the road, concentrating the flow, increasing the velocity, and bringing up fine material underneath the metal, you get a peak every time a log truck passes. Because you've got no control on your cut offs and water bars, that inevitably ends up running into the water course, so that's the background to that decision by Nelson Marlborough Regional Council to limit tracking during rain.

What can you do about fine sediment? Turn water down spurs instead of into gulleys, the slash on the ground can filter out the fine sediment. Drop a beak full of slash at the mouth of gulleys, so you catch any run off in the dry gully and store the sediment behind it rather than letting it go on to the road to be controlled. Long logs can cut across the heads of streams behind the ground-based unit, pushing debris and sediment directly into the water. A few sharpened out of spec logs, can be punched in by that useful machine, the backhoe. Its cured the problem of logs short cutting through the stream. This was done by the initiative of the backhoe operator. High stumps around stream crossings in

stocked areas of forest can fulfil the same role. If you haven't stopped fine sediment entering the stream by now, your only hope is dilution down stream and darkness!

Wildlife and Fisheries

Wildlife and Fisheries is what I have called the third most important issue. Wildlife I see as not as important as it will be in the future. But I see that the increasing presence of game birds in exotic forests, and indigenous birds using the exotic forests as habitat will become issues in the future. So that's all I intend to say about them.

Fisheries have usually been considered a North American problem, but some of you will remember that there was large scale fish mortality in the Motueka River in 1971, following the windblow, and the massive clean up. That was linked to higher water temperatures, which initiated disease and to low levels of dissolved oxygen downstream. Slash can be useful in slowing down water, and trapping sediment in ephemeral and very small streams. Slash may even keep water temperatures low where there is no riparian vegetation.

But where the streams are larger and the energy is so high that it could mobilise the wood and cause a log jam, slash should be kept out. Juvenile fish probably don't use streams in New Zealand with catchments smaller than 400 hectares. Adult trout, which are not indigenous fish, probably don't use streams in a catchment area less than 2000 hectares.

A study commissioned by Forestry Corporation of NZ and Tasman Forestry Limited in 1990 investigated the impact of slash on insect populations and water quality in Matea. Very briefly, the findings were that the lowest levels of dissolved oxygen occurred in streams with slash in them, and the variety and density of insects was reduced in streams with slash. Interlock slash in small streams did not move and posed no treats to log jams. Recovery of water quality and insect populations was well under way after two years, with full recovery in 7 years, that's if no log clearing occurred. Clearing streams had very large impacts on invertebrate populations, both density and diversity dropped immediately, but recovered completely in 2 years.

Summary

To summarise, the things you can do to reduce the environmental impacts we've looked at here are; to slow down run off, using all the techniques available; keep sediment, especially fine sediment, out of moving water, and plant cut over as soon as possible, including track edges and landings.