SUMMARY OF DISCUSSIONS FOLLOWING PAPERS

F. J. N. WILLIAMS

Opening the discussion of the first paper, by A. Cunningham —

Crequer asked about the prospects for aerial seeding of eroded areas.

Cunningham replied that this method would be limited to the easier, low altitude sites.

Chavasse asked if he thought that training of specialized professional staff should specifically include engineering.

Cunningham answered by stating that he envisaged a marriage of the disciplines of the forester and engineer and that specialized training would also be needed for non-professional staff.

Usmar inquired as to the reaction of engineers to proposals for extensive contour roading.

Cunningham replied that there had been only limited discussion so far but that reactions had included interest and promised co-operation.

Molloy agreed with the principle of "mini-roads" for low rainfall areas but stated that in high rainfall areas he favoured helicopters in the long run.

Cunningham said that bridges would certainly be needed in high rainfall areas and that in any case there should be landrover tracks to all major catchments. He did not think that culverts would be required if an outward slope of 2° was used or that rubble slips would be a significant problem.

Molloy stated that in the Styx Catchment the old bench roads could not cross the bluffs and side creeks and that, while culverts would deal with the latter, bluffs would still be a problem today.

Cunningham agreed but said that explosives and winches would play a part.

Spiers proposed light cableways, such as are used in Japan.

Cunningham replied that these could be justified only where intensive work was to be done.

Swale contended that the rapid deterioration of the vegetation in some areas demanded immediate aerial seeding trials, using helicopters.

Cunningham questioned the term "rapid rate of deterioration". There had been little change in the Kawekas since 1890 but, because of improved access, many more people were now aware of its state. He considered that more research was needed rather than a large-scale haphazard programme.

Armitage asked about the potential for spraying rubber emulsions to stabilize eroding surfaces.

Cunningham replied that there would be applications, but that, as it required machinery, good access would be essential. Colin Sutherland had used it at Mangatu, and it was widely used on roadside cuttings. The technique uses a non-toxic emulsion spray which can include straw and this is followed by fertilizers and grass seed. Tree seed or plants can follow later.

Hutchinson stated that some 50 years ago tracks with an outward sloping profile had been tried in the Rocky Mountains but that they had deteriorated within a year. Experience in the Orongorongos confirmed this. He contended that an inward sloping profile with drains and culverts would be needed.

Cunningham said that he appreciated the comment and that an outward sloping profile would in any case be dangerous when handling machines in hazardous conditions. A grade of 1 in 6 would probably be the maximum under conditions of high rainfall, ice and snow.

Following delivery of paper by E. D. Revington —

McKelvey asked if the capacity to absorb 6 in. of rainfall would reduce flooding of the Whakatane catchment during a sustained rainstorm.

Revington replied that it would, up to a fall of 6 in., but that above this the effect would decrease rapidly. Hurricane Dinah had released nine inches in eight hours in the upper catchment, resulting in a flow of 60,000 cusecs. If the cover had contained no grass but all trees there would have been an appreciable difference.

McKelvey inquired whether or not the type of cover affected the hydrograph peak.

Revington answered that it would be affected for low intensity storms only.

Rawson asked what, if any, effect the pumice overlay on the greywacke had.

Revington said that little study had been done on the pumice overlay. No doubt it did absorb a certain amount of rainfall but it was probably of limited value in a high intensity storm.

McKee asked if there was any difference in run-off potential between forest and grassland.

Revington stated that, above saturation point, there was little difference.

Groome inquired about engineers' liaison with foresters and asked if he was planning to get a forester on his staff. He also pointed out that there was an Agricultural Engineering course. Was there any engineering course which included forestry?

Revington stated that finance was the major problem and that there was no basis for the arbitrary administrative rate being levied on local authorities at the moment. Although he could use a forester, other requirements were perhaps more urgent. More-

over, the Forest Service was of great assistance — providing its services completely free.

Chavasse contended that priority catchments should be picked out in each area.

Revington replied that, because of the urgent need for flood control this was the case anyway and that other aspects were, of necessity, frequently being ignored.

McKelvey asked if he agreed that the main benefit of protection forest was that its deep rooting habit stabilized stream beds, thereby reducing erosion and the effects of flooding.

Revington agreed that this was an important function but pointed out that stabilization was not synonymous with flood control. Even in heavy protection forest, slips often tended to extend rather than cover over, leading to accelerated erosion.

Olsen asked about the rate of bedload movement in the lower Whakatane and the nature of the streams feeding detritus into it.

Revington replied that considerable meandering in the lower reaches as well as progradation on the shoreline indicated that there had always been a large bedload. The pattern of erosion had been complicated by the pumice eruptions and pumice sand was distinct from greywacke detritus. The pumice showers had been fairly continuous and their effect was shown by the fact that Tarawera ash had already reached the lower Whakatane.

Olsen asked if he considered that ungulates caused accelerated erosion and consequently a flooding problem.

Revington replied that he was not conscious of any significant acceleration. In his opinion the river surveys of 1947 and 1963 had not shown any great loss in channel capacity.

Purnell inquired as to the effectiveness of engineering works in flood control.

Revington cited an area at the confluence of the Whakatane and one of its tributaries where some 15 to 20 acres had been lost. A series of small groins were constructed using A-frame willow pole trestles every 10 ft with a pole across the top. This resulted in a 5 ft build-up of silt over a 10 chain length and the reclamation of 2 acres in 5 months.

Another very effective method was to plant a continuous line of willows along the bank, anchoring them by cable to railway irons driven in vertically.

Following delivery of paper by P. C. Crequer —

Grayburn asked whether in his experience he had ever had to decide on a method — *i.e.*, tractor or hauler extraction — purely on economic grounds.

Crequer replied that this applied only in cases where new equipment was to be purchased and even here it depended on the availability of various machines. Theoretical decisions were usually overridden by local factors.

Revington inquired as to the effects of downhill logging in accelerating erosion.

Crequer did not consider it an important factor as the water retention of logged areas usually remained high and regeneration was adequate.

Cameron differed on the opinion that "until relatively recent times logging was forestry in New Zealand . . ." and suggested that this might still be the case. He did not feel confident about Crequer's assertion that logging was becoming an enlightened and integral part of forestry practice.

Hart asked if he considered that utilization was an important factor in the planning of logging operations.

Crequer contended that it was more economical to sort in the mill yard, where more mechanical aids were available, and that handling in the forest should be minimal.

Fitzgerald asked what amount of advance planning for logging was needed when establishing an exotic forest.

Chequer stated that none was needed. Roading requirements changed very quickly during the rotation. Establishment of main roads for the first thinning could be attempted, but it was not worth while to look any further ahead.

Fitzgerald asked about advance planning of planting layout.

Crequer replied that the main requirements were for species suitable for utilization and to stick to a topographic unit — *i.e.*, ridge-top to ridge-top.

McKee opined that handling should be done in the bush in order that the various products — sawlogs, thinnings, groundwood or chips — could go direct to their market.

Crequer considered most bushmen were ill-equipped to decide on the best use, and that it was much better done on the mill skids. Sorting in the bush would cause lower productivity "all along the line".

Following delivery of C. G. R. Chavasse's paper —

McKinnon asked if the standard of roading should be related to the finance available.

Chavasse replied that it would be desirable to form roads to the ultimate desirable standard because of the disproportionate cost of upgrading later.

Cone agreed with the suggested standards but argued that classifications should depend on the amount of use a road would get.

Chavasse said that narrow bush roads were easier to maintain and could take more traffic in winter than wide roads, which were subject to frost lift.

McKee maintained that, while a 2-chain width was needed for construction later, planting to the water-tables would leave the final width at 45 ft.

Chavasse again pointed out that if this had to be widened later costs became very high.

Wren stated that Forests Products used two main types, one 30 ft wide for thinning and another 50 to 60 ft wide for logging. These networks resulted in a 9% and 15% loss of productive area, respectively. This loss could only be regained by extending the productive area, which increased the distance of haul from an average of 17 miles to a maximum of 25 to 30 miles, thereby increasing logging costs.

Chavasse contended that loss of area was not the same as loss of increment. As he had pointed out in his paper, there was no loss of increment in spruce with roads 5 metres wide, nor in beech with roads 12 metres wide.

Brown stated that roading could be justified by the saving in walking time. Intensive management could involve 20 visits which at a dollar per hour could cost $20. This would justify 1 mile of road per 250 acres.

During slides following delivery of paper by M. C. Goudie —

Grayburn asked if they had a staff shortage.

Goudie replied that they did not. They had only one full-time trained nurseryman, but employed outside labour for jobs such as lifting.

Hinds inquired why they had changed from 6 to 10 rows per bed.

Goudie answered that they could now grow more seedlings in the same area if fertility requirements were closely watched.

Rawson asked about the advantages of mid-mounted tractor implements.

Goudie replied that any unevenness in the ground had much less effect than with rear-mounting.

A questioner asked if the lifting machine tended to hypnotise the operators.

Goudie replied that it did. Although it lifted 100,000 trees per day, men were rotated and spent only 2 hours per day on it.

Rawson inquired about the use of windbreaks or hedges.

Goudie answered that hessian windbreaks were first used but proved ineffective in the strong winds with high temperatures. Acacia hedges were used at present as well as a claying technique to bind the surface.

McKee asked if the 50 chain rows tended to funnel the wind.

Goudie replied that, theoretically at least, if the rows were in the same direction as the prevailing wind, trees would be protected by their row.

Swale asked about pre-sowing treatment of seed.

Goudie replied that it was soaked in water 24 hours, drained, stratified 28 days at 40°F in calico bags using a coloured tag system. Germination tests were carried out on filter paper to determine the number of viable seeds per pound. It was not treated with a bird repellent. The fertilizer used was Aquasol, a soluble N, P, K plus trace element mix. Finally, he stated that seedlings 6 to 8 in. high were essential for machine planting.