

# THOUGHTS ON WESTLAND RIMU FORESTS

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## INTRODUCTION

In an address to the Institute some years ago I referred to the strength that would accrue to our national forest estate if our management was "firmly based on a tripod of Pinaceae, Fagaceae and Podocarpaceae". In striving to arrive at a realistic assessment of the potential strength of the third leg of this tripod, I recently visited Westland, during which visit, by courtesy of Forest Service FRI and Conservancy staff, I spent one day at Mahinapua Forest, inspecting some of the sample plot work done by the Canterbury School of Forestry in 1928-34, and another day at Ianthe and Wanganui Forests, looking at the selection logging operations.

My impressions, described below, may be of interest.

## MAHINAPUA FOREST

Mahinapua Forest, astride the main highway south of the village of Rimu, seven miles from Hokitika, contains the site of the old Westland Experimental Station, where a few thousand acres of logged terrace lands were established to a range of exotic conifers during the years 1923-30. As the Station perimeter included considerable unplanted areas containing relatively undamaged remnants of rimu stands in various stages of growth, and as the area was under reasonable protection from fire and cattle, it became the base of operations when in 1928 the Forest Service invited the Canterbury School of Forestry to undertake research into the potentialities of the rimu forests of Westland. This work, which entailed the establishment of numerous sample plots, continued until closure of the School at the end of 1934. It then lapsed until 1953, when it was revived by the Forest Service, who have since maintained and expanded the work. A list of references, covering much of this work, is appended to this article, while the plot records, and many unpublished reports, including those of the School of Forestry, are on file at FRI.

My first inspection on this trip was of a group of plots at the eastern boundary of the old Experimental Station, established in pockets of pole-sized material which had escaped destruction in logging. My initial impression on entering the plots was of a completely familiar scene. Soil, ground cover, and the height, composition and density of second and third tier components, all seemed exactly as memory pictured them. The moss-covered log on which I sat with Peter Allan and Russell Coker, sorting out the records, might well have been the same log on which I had sat for the same purpose forty years ago, with Charles Foweraker, Phil Whitehead, Dave Kennedy, and others of the Canterbury School. The podocarp overstands, however, revealed tangible evidence of growth and development. Measurements of d.b.h. over a range of indi-

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viduals taken at random showed increases of up to 6 in. over the corresponding entry in the 1928 record, which I had with me. The few kahikatea had all made growth approaching the maximum figure quoted; the silver pine and miro, also few in number, were at the lower end of the scale; while the majority of rimu fell within the bracket of 4 to 6 in. increase.

These random figures are, of course, of no special significance, and were not surprising since they fell within the pattern established by the periodic remeasurement of the plots—that is, a basic growth rate of 1 to 1½ in. in breast height diameter per decade. This rate is comparable to that of many western American species known to me, and is also, I understand, the basic growth rate on which the management of Finnish forests has been developed. However, there was considerable personal satisfaction in comparing the individuals before one's eyes with the book entry for the same trees in 1928—rather like meeting old friends face to face.

No heights were measured at this time, but the subjective impression was that both total heights and heights to green level had moved significantly upward. Crown classification is admittedly a subjective, and perhaps even an arguable field, but in this case I was comparing my own current assessment against my own previously recorded observations. On this basis, the movement of dominant to co-dominant, and co-dominant to intermediate, which is the general rule in stands of this character, had actually taken place, though to a much less degree than had been anticipated.

On the other hand, mortality on all plots had been surprisingly small, except on one plot where a presumably precedent stand of silver pine was in process of being overtopped and outgrown by rimu. Here several silver pine had succumbed. Considering the heavy initial stockings, some deaths from intra-specific suppression might well have been expected, but though Chavasse's plot records show a few deaths between 1934 and 1953, I saw no dead rimu, either standing or fallen, during this brief inspection. This was so, even on one plot where the 1928 record had anticipated a probable significant loss from windfall owing to exposure following logging along one side, and had noted a tendency to thinness of crown, owing to wind-thrash. In spite of this, no deaths were seen, though the crowns still show evidence of wind-thrash.

The general appearance of all these plots was still that of considerable overstocking; and the thought recurred that the thinning experiments in mind when the plots were installed might even now be carried out, and could yield useful information. However, the term "pole stands" is perhaps no longer applicable, since most members of the dominant and co-dominant crown classes now exceed 12 in. d.b.h. and are thus by definition "standards" rather than "poles" In fact, the plots now contain an appreciable mill log content, which was not the case originally; though admittedly this is due only partly to growth and partly to a change in utilization standards.

One strikingly obvious change was in the plant cover on a strip of unplanted clearing between the rimu plots and the

exotic plantations. Occupied in 1928-34 by a plant cover 3 ft high, in which bracken fern was the chief constituent, and in which careful search had revealed a sparse stocking of almost emergent rimu seedlings, this tract is now characterized by an almost pure stand of manuka, 10 to 12 ft high, and already attenuating.

Time did not permit a search to determine the fate of the rimu seedlings. However, we did locate one of the nursery transplant beds set out in 1929. This had been stocked with wildling rimu seedlings from 1 to 12 in. high, lifted from the side of an adjacent snig track. After study of growth in the transplant bed, these were intended to be used for experimental planting in the cutover strip referred to above, but this was not done owing to closure of the Canterbury project in 1934. This was the one item of the School of Forestry work not located and reported upon by Chavasse during his studies in 1953-56. It was therefore with considerable personal satisfaction that the bed was located without difficulty. Practically all the transplants had survived their grossly overcrowded conditions and had made height growth up to 20 ft. They can thus no longer be considered suitable as planting stock.

Moving next to the western side of the highway, we entered an area of five acres on a moderately steep slope in an elbow of Sandstone Creek, which the loggers had by-passed, seemingly through inability in those days to pull over a ridge. The stand had been judged in 1928 to be overmature, and it was considered a suitable area on which to watch the progress of stand perpetuation. Areas were cleared and bared for the reception of seed, with reference to overhead cover and distance from seed trees; and some rimu and kahikatea seedlings were noted to have germinated on the reception areas during the years 1928-34. These seedlings have now disappeared, and third tier vegetation has reoccupied the cleared areas. However, though an overthrow of some years ago had brought the heads of three trees across the line, the numbered trees on the plots seemed to be all present, and from appearance to be no further on the road to decadence than when the plot was installed. A few measured at random were found to have grown at better than 1 in. d.b.h. per decade, indicating an appreciable increment of mill log volume. Chavasse has suggested that this stand, which is more typical of the slopes than of the terraces, will maintain itself on a group basis. This appears to be a reasonable theory, but it is obvious that the longevity of rimu is greater than first thought.

### IANTHE AND WANGANUI FORESTS

It was an uplifting experience to watch the selection logging being carried out by Forest Service personnel in the terrace stands of Ianthe and Wanganui Forests. The aim here is to remove a payable cut in the form of mature trees while leaving, and avoiding injury to the remaining crop and younger material. The conversion period, from wild forest to fully-managed selection forest, is taken as 120 years, with regular cutting cycles of 40 years. Thus there will be four cuts during

the conversion period. Regeneration is expected to occur in the spaces released by logging, to provide further crops into the indefinite future. At the same time, maintenance of the forest cover should prevent deterioration of the site. The project has been described in papers to ANZAAS and in departmental reports by Franklin and his co-workers, so I record here only my own personal impressions.

The basic premise seems sound, and the practical difficulties in developing and applying a new technique are fully appreciated. Comparison of current areas with those treated earlier showed a rising level of effectiveness. I trust this can be maintained, as I was left with the impression that the layout of cutting areas, marking, etc., is still somewhat over-rigid. Teutonic was the word that came to the tongue. I think that the three points of minimum injury, maximum growth of material to form the second cutting cycle, and securing regeneration for future cycles, might be furthered by a more flexible approach to areas cut over, d.b.h. limits, and volumes removed per acre in the present cutting cycle.

Having, from a ridge top in Ianthe Forest, looked down on to the Waitaha flats, scene of School of Forestry studies in 1932-33, I had rather vividly in mind that a feature brought out in that study—the appreciable individual area of many of the stands of uniform character composing the forest mosaic—is still valid, and might be made further use of to avoid injury to stands of non-merchantable character. Similarly, a reduced volume extracted from some unit areas might avoid considerable injury, and be balanced by overcutting at other points to open up spaces for regeneration, and to achieve the overall average removal of, say, 1,200 cu.ft per acre. Obviously, in a selection operation, success will depend on achieving the right blend of clear cutting on some unit areas, and thinning on others, which is why the selection system is the most difficult system to apply.

With regard to thinning, I feel there is still much to learn. The rimu is amazingly tenacious of life, and Franklin's recent report, which includes a study of current increment on treated areas, indicates a substantial power of recovery after long periods of suppression. Nevertheless, I think that, owing to deformity, etc., many of the trees left standing will never make mill logs. The question followed: should they not now be removed to release growing space and soil nutrients for more promising individuals? The "scarifying" experiment will give some useful leads on this, and on the related question: at what point does exposure become a limiting factor?

The extent of damage in logging still seems of major significance. I noted the improvement brought about by use of the Timberjack in place of the ground snagging winch, but, while admiring its ability to pull a payload under the worst conditions of ground, I was rather dismayed to see what its passage did to the soil, and to the roots of adjacent trees. The non-use of material broken in felling also worried me. Establishment of, for example, a coreboard plant at Harihari might help in this direction.

These points are relative, and do not lessen my tribute to the energy, initiative, and clarity of vision of those who have conceived and are applying this pioneer project in forest management.

### CONCLUSIONS

Cogitating on what I had seen, my thoughts followed the following track.

My first visit to Westland coincided with the opening of the Otira tunnel in 1923. Since that time I have watched the felling of rimu forests from Nelson Creek and Bell Hill to beyond the Waitaha, and from the sea to the Alpine Fault. Two facts seem significant. The first is that no part of this area has been returned, or allowed to return, to podocarp forest: while the second is that so far no alternative use has been found for the greater part of it. It therefore lies desolate and unused.

On the first point, while much still requires to be learnt as to the factors governing the regeneration of rimu, it can be asserted with confidence that, had only protection from fire and from cattle been applied from the time of first logging, the terraces cut over during the twenties—those traversed by the highway south from the Teremakau to the Waitaha River—would now be carrying young podocarp stands of sufficient extent to promise a second crop roughly equivalent to that of the original forest. There would thus be a present landscape of high aesthetic value, in place of desolation, together with a timber resource in the making, albeit its time of realization might seem far distant by comparison with radiata pine. Destruction of seed sources means that this result cannot now be expected from existing cutover land, but it does give hope that desolation need not necessarily follow future logging.

On the second point, the native infertility of the soils has been compounded by forty years of ineffective efforts to develop the areas for pasture, to the point where neither the agriculturist nor the forester can recommend any present course of action which will bring these cutover terraces into gainful use.

Turning now to the uncut stands from Lake Ianthe to Jacksons Bay, these form the only large and unified area of podocarps left in New Zealand. If the podocarps are to have any future stake in the country, let alone to form a substantial leg to a tripod, in terms of my opening metaphor, then it is essential that these stands be worked in such a way that they are perpetuated and not destroyed. While happy to be assured that all terrace stands will in future be selectively cut, I was apprehensive to note that on the morainic ridges, which traverse the forest from the foothills to the sea at fairly regular intervals, clearfelling proceeds as of old. The general expectation appears to be that eventually these ridges will be planted to exotics, but clearfelling is proceeding at an annual acreage greatly in excess of that of planting, and it is obvious that this position will continue for many years to come.

I heard a suggestion that, meantime, the State Forests might be opened to large-scale grazing. However, if it is agreed that the ultimate future of these lands is to be forest, I would oppose the presence of cattle at any stage. They trample any regeneration, they pug the soil, they bring in gorse, and they introduce a human element with a vested interest in burning off. Fires thus become endemic, and degradation is the inevitable result. Rather, I suggest the alternative of logging with some care to save existing young growth, protecting all the forest land from fire and cattle, and letting a volunteer stand protect the site until the establishment of fibre-using industries in Westland enables it to be removed and replaced at a reasonable cost. The first element in this recipe might require that the departmental logging now in force on the terraces be extended to the ridges also, thus securing full control of logging on the whole of the State forests. The second element is, in Westland, relatively cheap. Regarding the third element, I suggest that it would be found under these conditions to have a considerable podocarp constituent. In stressing this point, I am thinking first of the scenic highway which runs the full length of the forests, and secondly of the long period which must elapse before an alternative use can be made of the land.

In fact, on certain strategic areas it could even be good economic sense, as well as good public relations, to plant up vacant areas with rimu, at about 300 seedlings per acre. It cannot be said in Westland that rimu does not regenerate—under certain conditions it does so profusely. The great obstacle is that it is so very badly distributed. Much more information is necessary before we can proceed confidently, and time is running out. It is therefore vital to expand and accelerate the research programme. I gathered, however, a distinct impression that the existing organization is stretched to its limit, merely to maintain existing projects. It was heartening to be told that the School of Forestry is establishing a field base at Harihari, and the second thought followed naturally that a co-operative arrangement might again provide for the School to concentrate its resources on certain aspects of the project. This would be a great step forward, but it would require to be matched by a redoubled effort on the part of the Forest Service.

This would, of course, require money, and money is allocated according to priorities. In presenting a plea for reconsideration of priorities, I point to the fact that, for over half a century, the greater part of the revenue from the cutting of Westland's forests, on both private and public lands, has left the province to build up the economy of more favoured regions of the country. Surely it would be to the general good not only of the province, but of the nation, to invest a slightly greater modicum of Westland's timber revenues in completing the work so ably begun, and safeguarding the future of the south Westland native forests. I feel that, if devastation continues on the ridges, the terrace stands will be eroded, and sooner or later their position will become untenable. A forest type of great beauty, unique to New Zealand, will then be

lost to the world; and in the light of present knowledge and financial feasibilities, we cannot at this stage feel assured that anything better than desolation will replace it.

I therefore put it in the form of a challenge to the forest authority, to which I might look for a thoughtful and considered reply.

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