

AN APPROACH TO THE MANAGEMENT OF THE RIMU FORESTS.

(F. E. Hutchinson.)

At the present time, when national economy is essential in every line of activity, and when in national forestry, revenues from timber sales are not available to provide for large-scale establishment of exotic plantations, it is opportune to examine more closely than has been done, the possibilities of economical perpetuation of the native forests.

The national department is charged with the administration of $7\frac{1}{2}$ million acres of native forest, of which $5\frac{1}{2}$ million acres are classed as commercial. In normal times timber sales decrease this area by about 30,000 acres per year. This 30,000 acres, instead of going immediately into young growth to provide for future needs, is from the forestry point of view completely lost, not even the most primitive form of management being applied. It is considered that some investigation of the possible value of this forest as **future** resource should now be made.

An attempt has been made, therefore, to sketch a possible method of approach to the problem, and to forecast the probable results. The scene has been laid in Westland, because there it may be definitely assumed that the question of agricultural use of the land does not enter in; because younger trees and regeneration are more abundant there than elsewhere; and because large compact areas of State Forest exist sufficient in extent to make economically possible the process of conversion from the mining of a wild forest to the permanent management of a forest more or less normal in character.

The State Forests of Westland include some $1\frac{3}{4}$ million acres, of which the 1924 inventory classes somewhat over one million acres as commercial. The present normal annual cut for the region is 70 million feet, equivalent to an area worked over of 7,000 acres per annum, taking the average yield of the areas actually pulled off as 20 M., and the area of young growth, low density, pakihī, etc., as being equal to the area from which the timber has actually been removed. The utilisation of these forests has centred round Greymouth, extending up the Grey Valley, and south to Ross, working back from the railway lines leading from those two directions to the port. The opening of the Otira tunnel gave **an added stimulus** to sawmilling, and now the Westland

Region is supplying the whole of Canterbury, much of Nelson, Marlborough, and the southern North Island, and a considerable export to Australia, so that it is the chief producing centre in New Zealand. The Grey Valley, and most of the good timberlands between Greymouth and Ross, were naturally first exploited, and are now showing signs of exhaustion. Most of the remaining timber is already under sawmill license, while extensive areas of cutover land exist. From the Waitaha River southward, however, are extensive areas of milling forest not yet opened up, due to distance from the railhead at Ross. The bulk of the future supplies of accessible timber in the Region are to be found probably between Ross and Okarito.

The forest inventory of 1924 gives the present area of commercial forest in the Region as just over one million acres. If the present rate of cutting is maintained, then the industry would have a life of 140 years. Allowing for the reduction of the North Island supply, the probable increase in demand, and the increase in the proportion to be supplied by Westland, a gradual increase up to a total of 150 million feet per year might be allowed. This would see the present reserves exhausted in roughly 85 years.

Under present methods of working the forest, that would entail the extinction also of the forest industries in the Region. The cutover land, however, is in this Region certainly unfitted for agricultural settlement, and is lying practically as waste land, except for the river flats. Experimental replanting with exotic conifers has been done on the Experimental Station, but the cost of planting is so great as to be considered excessive, while success so far is uncertain.

On the forest areas at time of working is always to be found a very considerable quantity of young growth, occupying, in clumps, groves and patches often up to 30 per cent. of the area. The possible future value of this young growth has so far been entirely neglected, and its destruction by breakage, or by subsequent slash fires has been considered of no moment. On much of the cutover land, however, some of this material has so far escaped destruction and is still present and available. Regeneration has started over practically the whole of the cutover area, but recurrent slash fires have destroyed most, the remnants being mainly in swampy pockets where growth is not good. Nevertheless, small areas exist everywhere which demonstrate that under favour-

able conditions the rimu can regenerate and develop successfully through the seedling and sapling stages, even after logging, burning, and grazing.

It is considered quite possible so to handle the forests that they may produce indefinitely, thus providing for a permanent forest industry, and a solution of the cut-over land problem based on the indigenous type, namely, the rimu, a tree round whose use our utilisation industry is now based, and which is evidently well adapted to the site conditions obtaining. It is also considered possible to obtain this result at a cost greatly below that of replanting to any of the exotic conifers which may in the course of time be proved suited to the conditions obtaining.

In considering the placing of this forest area under management, three points appear to be essential. That there be no curtailment of production from the Region; that no increase in logging costs be incurred; and that an adequate or paying yield be secured. The point at issue is, can the forests be converted from the wild to an approximately normal condition without a shutting-off of production, or a rise in the cost of timber, and further, can the conversion be made from revenue without capital investment.

It is considered that this can be done. In support of this view, the following material is advanced.

It may be conceded that in the present forests prior to logging, increment and decrement are equal; a postulation usually accepted for virgin stands. The industry, to maintain present production, will need 7,000 acres per annum to support it. This means that it will work over the whole available area in 140 years. If the cumulative increase up to double the present cut is accepted, the area cut over will increase gradually from 7,000 acres per year to an annual area of 15,000 acres at the end of 85 years, by which time the area will have been gone over.

Is there any chance that by the end of that period the raw material for future operation may be obtained from the lands now cut over, and shortly to be worked? Under present haphazard conditions it is impossible, of course, but it can be made to come to pass, it is believed, without violating the three conditions mentioned just above.

Granted adequate protection from fire, the extensive areas of land now cut over will make a substantial contribution, but excluding this entirely, and basing the calculations wholly on the area now in front of the industry, it will be taken that the area cut over next year, for instance, has 85 years before it in which to develop a crop

of millable timber yielding on an average 10 M.B.F. per acre.

There are two sources of material for this future cutting, young growth now present on the area, and regeneration to become established subsequent to cutting. The latter will probably not be able to make any contribution to the second working 85 years hence, as the growth rate of the rimu under present virgin conditions is admittedly slow. A rotation of 170 years might be taken at present, lacking full knowledge, as being conservative, quite in line with sound forestry practice in the Northern Hemisphere, and a convenient figure for the problem advanced. This opens the way to a double cutting during the rotation, the area being worked twice in the lifetime of the tree, the present young growth to form the second working 85 years hence, while the regeneration now to be established will furnish the third cutting, commencing 170 years from now. Such a system of working is good sound practice in initial organisation of a wild forest. Its successful application rests, however, on the ability to secure the second crop from the young growth now on the area. If that young growth can produce a crop equivalent to 10 M.B.F. per acre gross, it will keep the industry going, and will provide a yield equal to the present average, thus ensuring that logging costs are no higher than the present average figure.

Beyond that it is not advisable to go, on the data now to hand. It can be accepted, though, that if this first reworking can be successfully attained, the goal is within reach. The present stands average only 20 M. per acre on the areas actually worked, about half the gross area. The ultimate yield of fully stocked stands of rimu of an average of 24" D.B.H. is from 80 to 90 M. per acre. With increasing yields due to silvicultural practice, the margin for error, for increased cut, etc., is ample, while a reduction in the length of any technical rotation usually follows the application of silviculture to wild stands.

The crux of the matter rests, therefore, on the young growth now existing on the areas being worked. The amount of this young growth present varies greatly, naturally, but is always considerable. Present practice removes the trees down to about 14" D.B.H. as a rule, though it is doubtful if many of the smaller trees taken really pay for the cost of their extraction. Below this limit there are to be found a fair number of scattered individual trees of good form all through the areas even of good milling bush. Thus on one sample area from which 23 rimu trees of D.B.H.'s from 18" to 50", scaling

20 M. feet per acre were removed, there remained 11 trees of D.B.H. from 5" to 13", all of good form and health, and seemingly capable of making maximum growth. Six of these trees were from 11" to 13" D.B.H. This condition was general over all the area actually logged. In addition, there exist in practically all parts of Westland pockets of dense sapling and pole growth of areas from a square chain or two up to several acres, in which no milling trees at all may be found. These areas may be left untouched, or they may be slashed through by tramlines, cut out for tram sleepers, cribbing, etc., smashed in the felling of the larger trees adjacent, or knocked over by the snigging operations. The Westland Forest Experimental Station contained a very good milling stand as a whole, yet actually only 60 per cent. of the area was pulled off. Most of the remainder was occupied by clumps of young growth. Recurrent slash fires, followed by windfall of the scorched marginal trees, have reduced this 40 per cent. of young growth enormously, but quite unnecessarily. In the portions still intact, however, in spite of the fact that the stocking is in most cases far too high, an average increment of between 1 and 2-tenths inches per year is being made, and already, only twenty years since logging, many trees almost worth removing (twelve to eighteen inches) are to be found. Definite increment figures on these areas of poles and young standards will be available in 1933 when the sample plots on the Experimental Station are remeasured. What is urgently wanted before that data can be applied is a forest survey of representative areas showing the amount of such young growth, by size groups, which may be found on an average throughout the forests. Such a project has not yet been undertaken. It would be necessary to have such figures before any definite progress could be made with the problem in hand. Nevertheless, it may be accepted that the young growth is present frequently to an extensive degree. Whether there is any hope that it is sufficient to promise a future cutting in 85 years cannot be stated. If the condition of the Experimental Area immediately subsequent to logging is typical, however, then it is distinctly possible.

Moreover, should the forest survey reveal any possibility of attaining this second cut, the quantity of timber left may be considerably reinforced by raising the minimum D.B.H. of trees to be removed. This will reduce somewhat the volume per acre to be removed at the present cutting, but will not raise the logging costs. It is contended by the millers that the present system of roy-

ality on estimated standing volume is forcing them to cut trees that are a distinct loss to them. Quite apart from the fallacious presumption involved, it may be accepted as fact that probably no tree under 18" D.B.H. pays its way under present conditions. Utilisation could be furthered, therefore, by enforcing a more complete usage of the trees actually cut, but reserving from cutting the smaller-sized trees now taken which certainly cost more to handle than the timber in them is worth. "Selective logging" has been the bogey of the sawmillers since the inception of the Forest Service, and the spectre of higher logging costs is one reason why that Department has been so negligent in regard to the statutory charge that it manage the native forests. Actually "selective logging" would be a blessing to the miller in keeping off the market much O.B. timber now converted at a loss, and pushed on to a glutted market.

Nor need it be anticipated that the careful preservation of the young growth from destruction will raise logging costs. Present methods will certainly have to be modified, but there is room for considerable reduction of cost in most operations. The mobile power unit as exemplified in the caterpillar tractor has contributed the greatest single factor in the large reduction of logging costs in western North America since the war. It finds its greatest usefulness in low-yield stands of large trees growing on poor bottom—the very factors which apply in our own forests. Its general substitution for the present ground or overhead snigging system should make for both cheaper logging and better protection of the young growth.

The most radical change is necessary, not in logging methods, but in the administration of the forests. The forester must know his forest. He must know what is in it, by size classes, and where it is located. He must know definitely how much timber he can afford to cut, and from where in the forest it is best obtained. He must draw up a scheme for the systematic working of the tract, and then arrange for mills to work it as he desires it worked, with due attention to the protection of the young growth from damage in logging, and from slash fires. There would be no revolution in method, merely the definite adoption of the principle of conservation of the young growth for future use. Rationing, or allocation of the cutting areas would be an essential part of the policy, and would have to be considered well in

advance. Already the elimination of a number of mills in the northern part of the district through exhaustion of the timber is close at hand. The idea would be to determine for the south the number of efficient mills that the cut can carry, and to arrange for sufficient supplies ahead to depreciate them adequately. Moreover, it should be done immediately. The present slump has been most opportune in that it has slowed down the rate of cutting while initial investigation has been under way. With a revival of the trade and the exhaustion of some of the northern areas the push for opening up the southern forests will commence. It would be as well were the forest authority ready with a definite scheme of utilisation when that time comes.

To sum up the matter presented in this paper, it would seem from the data so far gathered in regard to the rimu forests of Westland that the following statements will hold good:—That if a start is made at once there is sufficient reserve of timber to carry the industry without curtailment of production for a period of about 85 years. That it may prove possible to provide for a second working over of the area commencing 85 years hence, provided by the young growth now present on the areas at time of cutting. That to realise this objective it should be necessary only to safeguard the timber from damage by logging, and by slash fires. And finally, that if this second working 85 years hence can be attained, the transition from mining the wild forest to managing a perpetually producing forest can be successfully achieved.

The data necessary to put the plan into effect are:—First, a knowledge of the increment made by pole and small standard timber, a project now well under way; and second, a forest survey showing the amount of such material available. This second project is not yet begun, but should be carried out immediately.

Should the results of these two projects show that sufficient young growth is present to promise a future cut say 85 years hence, then the organising of the forests on an 85 year cutting cycle should be a straight-out problem in administration of the cutting areas. The scheme could then be put into effect immediately.

Our knowledge of the silvical nature of the rimu forests is still most fragmentary, and we cannot claim to have made more than a beginning on the problem of securing adequate natural regeneration over large areas.

Research into this phase of the problem must be continued and extended. With regard to the young growth already on the areas, however, we are on firmer ground. We know that the material is present, and seemingly growing well. It is an asset already half-way to realisation. There is reason to believe it may be sufficient in extent to carry the industry in future, perhaps equally as well as the present virgin stands if given adequate protection. This belief should therefore be checked, and if found to be justified quantitatively, a start on the perpetual operation of the rimu forests can be made immediately.

