FOREST MANAGEMENT IN THE NOTHOFAGUS FORESTS OF NELSON-WESTLAND*

By E. E. ENSOR

Forest management in the Nothofagus forests in these two provinces is being achieved with little alteration to current practices, aided by improving utilization and markets, together with mechanical advantages in roading and logging. On the other hand, there is a large sawmilling industry coupled with a high demand for mine timbers, neither bearing any relationship to the forest capital and regenerative powers. This legend of inexhaustibility has been actively pursued by two generations of timber cutters.

The forests lie chiefly in the catchment of three main river systems—Grey, Inangahua and Maruia. Four species of Nothofagus prevail, red beech (N. fusca) on the warmer, moist sites; silver beech (N. menziesii) on the colder, wetter aspects; hard beech (N. truncata) on drier slopes and ridges, as well as the physiologically dry terraces, where sometimes mountain beech (N. cliffortioides) is associated. Podocarp elements are strong in the lower reaches of the Grey River and part of the Inangahua River where a more coastal climate prevails, but are absent from the colder Maruia Valley. Nowhere is there any large area of easy terrain bearing a single species, but rather overall an intricate mosaic of changing associations, complicated by mountainous topography with deep river systems and swamps. The best forests on the fertile river plains and gentle slopes have been cleared for farming, but too often much true forest land has become alienated and partially destroyed under the guise of settlement, even within the forest boundaries.

The initiation of forest management for sustained yield has gained impetus in recent years through the knowledge that the remaining resources are limited and that some measures are necessary to ensure continuity of production. Selection of these forests for intensive management has been encouraged by the prolific regeneration of the beech species and their vigorous growth, with ready markets for thinnings. It has been aided, too, by the gradual acceptance by the building trade of the beech timbers.

Management commences with surveys—for timber resources, for the subdivision of areas, and for location of roads and boundaries. The National Forest Survey, using aerial photographs, has almost completed the survey of timber resources by the sample plot method, which will provide forest types and volumes and indicate a final objective acreage. Subdivision of the forest into blocks and com-

partments has been commenced in two forests. The compartments comprise areas less than 100 acres and take into consideration forest types, topographical features, existing surveys and roads. To provide sequence in numbering, a master plan has been outlined on an aerial mosaic and numbers allotted while the field survey is being carried out, as required, for future sawmill areas, permit areas or silvicultural operations.

Roads, the vital arteries of management, are being planned as the opportunity occurs by the discouragement of the further use of the outmoded tramways. The formation of good roads during the initial cut of capital timbers, i.e. podocarps in particular, is very desirable, for in these indigenous forests it will be many years before a second major cut is obtained. However, in the meantime, there is a large volume of minor forest produce in the form of split and round timber which should be cut from overmature and malformed trees. In the past, only too often, there have been many attempts at timber extraction in the same area—horse-snigging for distances over two miles, followed by tramways and tractors, and there remains a partially-regenerating forest of low capital value with no proper access.

In these beech forests sawmills add annually well over 1,000 acres to the backlog of silvicultural slums. These cut-over areas are now in various conditions, ranging from partially cut-over with adequate regeneration, through many stages, to finally fire devastated wastes. The problem remains to bring these slums into full production once more and to co-ordinate future forest working along desirable lines.

It may be opportune at this stage to outline the silvicultural systems applicable. These have been collectively described by Hiley as “irregular forestry” and in this instance are an intimate mixture of the uniform system for limited areas of beech pole stands, selection system for the greater part of the partially cut beech forest—especially where podocarp elements are strong, clear felling in strips for mining timber from beech pole stands on steep hillsides, clear felling in exotic plantations and, finally, maximum exploitation in areas of low potential with laissez faire silviculture.

The adoption of one or the other of these systems is not fixed, but is determined by the present state of the area. For instance, in the beech forest where heavy felling has taken place or there has been a widespread wind throw, the resultant pole stand may be managed on a uniform system; but, there may be pockets bearing older trees, or perhaps groups of young seedlings, while beneath the high pole beech, it is not uncommon to find healthy podocarp saplings. These are the elements of a selection forest. In another instance, partial cutting has left a beech stand with over-mature culls and mature trees with short logs, together with a scattering of advance-growth beech of good form and some pole stage podocarps. Groups of young seedlings thrive in the openings and along tracks. This
approaches the selection forest type, but grades into the uniform forest type, depending on the degree of cutting. On the other hand, both these types may join low quality semi-pakihi forest, where maximum utilization is encouraged and protective measures are the only treatment prescribed. Again, suitable burnt forest margins are being planted with exotic pines, but within these areas there are remnants of the earlier indigenous forest and amongst the older pines there are groups of young beech seedlings.

These examples demonstrate the fluid nature of irregular forestry which takes advantage of the crop established and does not necessitate the felling of good quality advance growth or older trees with sub-standard logs in order to conform with a regular silvicultural system. Rather a system is adopted which is best suited to the forest crop for the present and over the greater part of the forest this will resemble the selection type. The large areas of forest already partially exploited preclude the following of a definite system, and while markets for sawn beech timber are in their infancy it is difficult to obtain complete utilization of all classes of trees during the initial cut of virgin forest.

The advantages of this mixed forestry are many. The forest will have a pleasing appearance with groups of seedlings and pole trees amongst older trees. The young trees are encouraged to grow tall and straight, with ample protection from wind. No alteration in current logging practice is required, and no large labour force is needed to fell "out of phase" trees or scarify the soil, because regeneration appears after a few years wherever logging takes place. This is assisted by the marking of desirable seed trees when necessary. Maximum yield and continuity of production are secured, a necessary feature where there is an insatiable demand for mining timber and fencing materials. Better trees may be reserved to produce future mill logs and will be available at the completion of the cut in virgin forest. The method is ecologically sound and well suited to these diverse types of forest where site conditions, fire, wind and insects all play their part in maintaining an irregular forest.

However, irregular forestry has some disadvantages, the chief of these being the greater care necessary during subsequent fellings. It will also be more difficult to determine the yield for the regulation of the annual cut, but for the present the cut is determined by the economic working of established sawmills and bears little relationship to sustained yield.

Accepting this mixture of silvicultural systems, the forester must approach the work of silviculture with a liberal view, prepared to carry out, for example, the thinning of pole stands, stand improvement, fellings in a mixed crop, or transplanting of wildlings in a bare corner. The thinning of red beech pole stands has been carried out over some 100 acres in Hukawai and Granville forests. This presents many problems due to the diversity of diameter classes and the irregular distribution of good stems. Delayed thinning of the dense
hardwood stands has produced crops containing many whips, while larger trees are often of poor form. In the broken country the pioneering of extraction routes is difficult, and it is often necessary to thin heavily to obtain an economic return. It is quite different from plantation thinning—groups of smaller trees are by-passed, intermediates are lightly culled, while larger trees of good form and vigour are reserved at intervals in an attempt to retain 100 millable stems per acre. On the other hand, small pockets may contain stems all of poor form or of a less desirable species for sawn timber, when clear-felling is resorted to.

Silvicultural work in the partially regenerated forest may well be termed Timber Stand Improvement, as, not only does it release the seedlings from competition with weed species, but it also removes the culls from both mature and immature trees. Worthless stems are ringbarked to permit steady decay from tree top, thus reducing damage to seedlings. Where no suitable regeneration has occurred because of fire, etc., wildlings may be transplanted. The work requires experienced woodsmen, who know their trees and markets and do not destroy a saleable tree. Again, the foreman must know his forest and not carry out intensive work in difficult sites merely to obtain a uniform tidy appearance. Swampy areas are by-passed, but in these places kahikatea (*Podocarpus dacrydioides*) is slowly regenerating. Other podocarps scattered through the beech are also carefully preserved. Timber Stand Improvement has been commenced at Granville and the East Inangahua Forests, and some 200 acres have been treated. An example from the latter forest illustrates the stocking of a partially cut area after this treatment.

<table>
<thead>
<tr>
<th>Red Beech</th>
<th>Silver Beech</th>
<th>Rimu</th>
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</thead>
<tbody>
<tr>
<td>Trees, semi-mature</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Saplings—0-2 in. d.b.h.</td>
<td>420</td>
<td>167</td>
</tr>
<tr>
<td>2-4 in. d.b.h.</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>4-6 in. d.b.h.</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Seedlings to 6 in. height</td>
<td>170</td>
<td>72</td>
</tr>
</tbody>
</table>

These figures are for 1/10th acre, making a total of some 8,000 seedlings and saplings per acre. Adequate stocking at this stage approaches 4,000 seedlings per acre.

Timber Stand Improvement fellings are being carried out by permittees cutting the overmature cull green and dead standards for posts, railway sleepers or mining laths, together with any undesirable young growth and suppressed stems for round mining timber. Retention of healthy mature trees and vigorous pole-stage trees of good form will ensure a continuous sawlog supply. Good trees are reserved by marking conspicuously with white paint using a pressure oil-can, which permits easy marking over rough terrain.

To sum up, a brief account has been given of the first steps in beech forest management and the difficulties in determining a silvicultural system which may be readily applied to forest treatment on a
wide scale, making the best use of advance growth. Examples are
given of the diversity of forests and the method used to deal with
them, and it is felt that more emphasis should be placed on this work
to ensure continued production from our indigenous forests.

REFERENCES

(2) Troup, R. S. Silvicultural Systems.