

SYMPOSIUM ON COMPARTMENT LAYOUT

We publish below the text of three papers delivered to the Annual General Meeting, Napier 1958, together with a resumé of the discussion which followed. A letter to the Editor on the same subject appears on Page 132.

THE CONCEPT OF A COMPARTMENT

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It is a commonly accepted principle that the compartment is the fundamental unit of management and it is generally believed that this principle should be the guiding one when deciding on the layout of newly established forests. The principle has often been stated in New Zealand, but it has rarely been analysed; as a result it has not always been followed to its logical conclusion. New Zealand's exotic forests show only too many examples of compartments which are far too large or far too small, which contain pure stands of dissimilar species, which have been located without any reference to considerations of site, which are uneconomical and sometimes quite impracticable logging units, or which for other reasons fall short of what should be an ideal management unit.

In discussing layout procedure and practice it is therefore desirable to consider just what is implied by the term "fundamental unit of management". The main implications would seem to be:

- (a) The compartment should be recognisable on the ground.
- (b) It should be covered by a reasonable uniform forest crop.
- (c) It should have the same objects of management throughout.
- (d) It should form the basis for all management records.
- (e) It should be a natural and economic extraction unit.
- (f) It should be permanent.

As a corollary to (b) and (c) it follows that a compartment preferably should be of the one species or the one mixture, and that the crop should be grown on the same rotation and under the same silvicultural system. We have then the concept of a compartment as "a permanently demarcated area of forest, growing the one species or the one mixture, and within limits uniform throughout both in its productivity and its general lines of treatment." This concept obviously cannot be translated into practice unless site is uniform, and therefore the important principle emerges that as far as possible compartment boundaries should coincide with site boundaries.

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The validity of this concept is confirmed by most authorities on forest management, although the exact definitions vary from one authority to another. To quote some examples:

"If the boundaries of a compartment can be made to coincide with those of a wood showing a certain composition or age so much the better."

Schlich, 4th Edition, 1911.

"A compartment is a portion of a forest that is as far as possible homogeneous throughout its extent as regards soil aspect and composition of the growing stock. As far as possible each compartment should be capable of treatment under one and the same silvicultural system."

Trevor & Smythies, 1923.

"Compartments are the smallest permanent units of area with which management is concerned. Ideally they form silvicultural units suitable for the purpose of making a description inventory of the crop and for prescribing details of management."

Jerram, 1938.

"It will be a help to management if each compartment can be potentially a silvicultural unit, that is to say, of uniform site qualities as regards soil, exposure, aspect, etc., which will give the same response to the same silvicultural treatment all over. It is desirable, though of less importance, that each compartment should carry *now* one forest type only, suitable for descriptive inventory and uniform treatment."

Brasnett, 1953.

Some of these authorities go on to stress that it is even more important for compartments to be permanent and to be readily identifiable on the ground. For this reason they consider permanent boundaries should always be topographical features or permanent roads, rides, or firebreaks. The most commonly accepted view is summed up by Jerram, who says:

"A compartment is primarily a unit of management; if it can be made to serve the purpose of silviculture as well so much the better."

It is of interest to note the historical development of this concept. Without doubt, compartments, as demarcated, named, or numbered areas, first came into being for purposes of direction; and this is still one of their main uses. We would not find it convenient to say to a gang of forest workers "Walk for two miles down such and such a road, turn to the left and when you come to the foot of a hill, sharpen your axes and start felling." And obviously Brigadier X or Forstmeister Y, or whoever directed individual French or German forests in the 14th and 15th centuries, had exactly the same difficulties. Finer subdivision of forests as a whole became necessary for direction and for day-to-day control. The next step was description. As the need for permanent management records became evident, so arose the need for

unit areas to be used for record purposes. It was entirely natural that the same unit areas should be used and that compartments should come to perform the dual functions of direction and description. It should be noted that for both purposes it was essential that the boundaries should be readily identifiable, whether by means of natural features such as a stream or a ridge, or by artificial ones such as a road or a ride.

During the next few centuries there were two major developments in forestry which had a profound effect on the evolving concept of the compartment as a unit of management. These developments, in historical order, were the growing realisation of the importance of site, and the mechanisation of logging.

The effects of site considerations on compartment thinking have already been amply illustrated in the quotations given above. In brief, some degree of site uniformity within a compartment greatly simplifies *prescription* as well as description. It thus leads to easier and more efficient forest management; though not essential it is on all counts desirable. The effects of logging considerations are the subject of a separate paper in this symposium. It is sufficient to say here that there have been no developments in logging methods which do anything but underline the need for compartment boundaries to coincide with topographical features. In broken country it has generally been found that compartments, as well as being self-contained management and silvicultural units, must also, for extraction reasons, be self-contained topographical units.

From this very brief historical review we see that there are four distinct components in the management concept of a compartment, *direction*, *description*, *prescription*, and *economic extraction*. These are the four considerations which a forester must have in mind when deciding on compartment boundaries. Sometimes, but not often, the considerations will be conflicting, in which case one or other must be judged as the more important. Here there is great room for debate, and to start it off I would suggest that economic extraction is the one of over-riding importance.

So far the discussion has been confined to the nature of a compartment and there should be general agreement on the principles enunciated. It is more difficult to reach agreement on the equally important subject of maximum and minimum compartment size. Both of course will vary greatly according to the size of the forest, the nature of the topography, the nature of the compartment boundary, and the intensity of management. However, it is possible to suggest some guiding principles, as follows:

Maximum compartment size should take into account two minor and two major considerations:

The minor considerations are:

- (a) The fact (to quote Jerram again) that "management will be greatly facilitated if compartments contain only one annual coupe."

- (b) The allied fact that management will also be facilitated and records simplified if compartments are small enough to be given silvicultural treatment in the one forest year.

The major considerations are:

- (a) In forests to be handled on a clear felling system, the need to avoid large continuous areas of inflammable slash following felling. In this connection it is of interest to note that the recommendations for staggered settings in an overseas consultant's report on Kaingaroa Forest were in effect recommendations for re-subdividing the forest into smaller compartments. Primarily for reasons of lessening the fire hazard, the consultants proposed that coupes should be less than 80 acres.
- (b) Of even more importance, particularly where sites are uniform, the need to avoid large unbroken areas of the one species and the one age class. Most obviously, a patchwork quilt pattern of small-sized compartments of different genera, different species, or different age classes within a species, is a far safer forest whether from the viewpoint of fire, wind, or insect damage. The question arises as to what, in this context, is "a small sized compartment". The question was posed verbally to the late Mr de Gryse. His reply was that for New Zealand conditions the maximum safe area for an even-aged monoculture was probably 50 to 60 acres.

From two quite different sources, and for two quite different reasons, we thus have a strong suggestion that maximum compartment size for pure even-aged stands in New Zealand should be of the order of 60-80 acres.

Minimum compartment size without doubt should be determined mainly by considerations of logging. Again, discussion on this matter is left to the author of a more specialised paper to follow. From this paper and from information previously acquired it does appear, as a general rule, that exotic compartments in New Zealand should be no smaller than ten to fifteen acres if logging is not to be made needlessly costly.

We have then some valid reasons for adopting upper and lower limits for compartments of, say, 80 acres and 10 acres respectively—by no means always, but as a reasonable generalisation for the types of forests most likely to be established or re-established in New Zealand. Provided that they are satisfactory as management units (direction and description), as silvicultural units (prescription), and as logging units (economic extraction), compartments of this order and size should be a big improvement on the old 300 acre rectangular block to which we are so accustomed; and provided that they are carefully disposed on the ground according to considerations of both site and forest hygiene, they should play a large part in helping us to grow healthier and more productive forests.