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RADIATA PINE: WOOD AGE AND WOOD PROPERTY CONCEPTS

D. J. COWN

Forest Research Institute, New Zealand Forest Service,
Private Bag, Rotorua, New Zealand

Wood, which is composed of aggregations of plant cells, is unique as a major industrial raw material and exhibits characteristics such as anisotropy (distinctly different properties in different planes), hygroscopicity (capacity to lose or gain moisture depending on the local environment), and variability in properties.

Variability in wood arises from structural differences at several levels ranging from ultrastructural (within cell walls) to geographic (regional effects); but perhaps the most significant source of variation in radiata pine wood properties occurs within individual stems. Wood is produced on an annual cycle by the regenerative cambial sheath which is beneath the bark and completely encircles the stem, branches, and roots. Hence, during each growing season a new layer of woody tissue is superimposed on the existing wood. However, the nature of the wood cells is strongly dependent on the actual age of the cambial tissue at any stem level and more or less distinct wood zones can be distinguished within trees, dependent largely on the position of the wood in relation to the centre of the stem and the top of the tree.

Two important wood properties are basic wood density (the amount of dry wood per unit of green volume) and tracheid (wood cell) length. Both of these features vary in a predictable manner within stems as illustrated in Figs 1 and 2. With wood density in particular the pattern of variation is virtually constant at any stem level, and shows an increase outwards from the centre, tending to level off as the tree ages. Although the changes are gradual across the growth zones, the pattern lends itself to the concept of a central low density core, followed by a transition to high density outerwood.

The pattern for tracheid length variation is similar to that for wood density except that the longest cells occur at about half stem height and the central zone represents a cone rather than a cylinder.

In contrast to the above wood zones whose properties are largely determined at the time the wood cells are laid down, heartwood formation is a dynamic process, continuing from about age 15 years onwards. Hence the extent of heartwood development is dependent on tree age (Fig. 3).

These patterns occur as predictable features of all radiata pine trees but the quantitative aspects are significantly influenced by tree-to-tree variation (genetics) and site-to-site variation (environment). It is only by recognising the inherent variability of the raw material, that efficient utilisation methods can be evolved.

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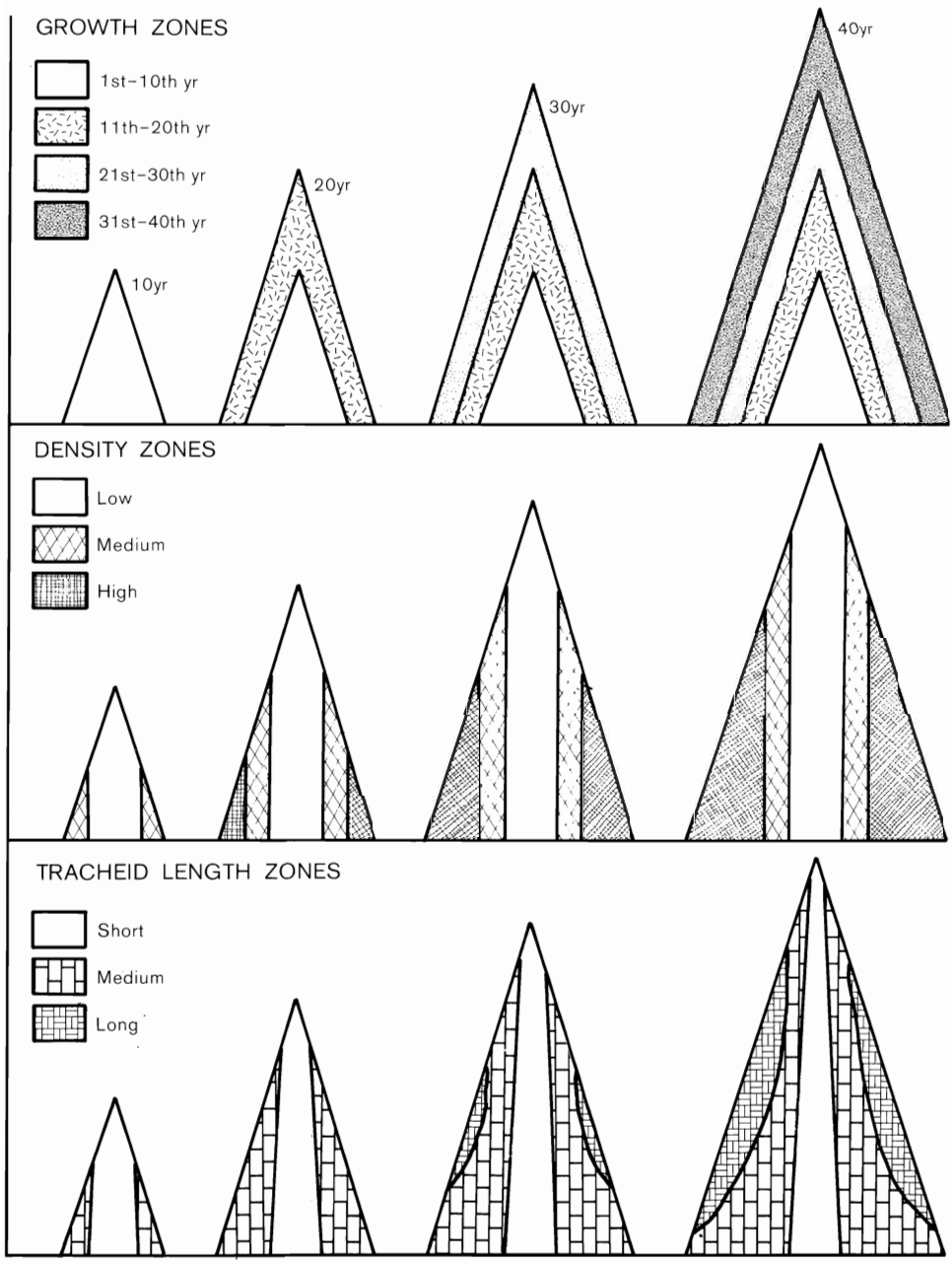

FIG. 1—Radiata pine wood property zones.

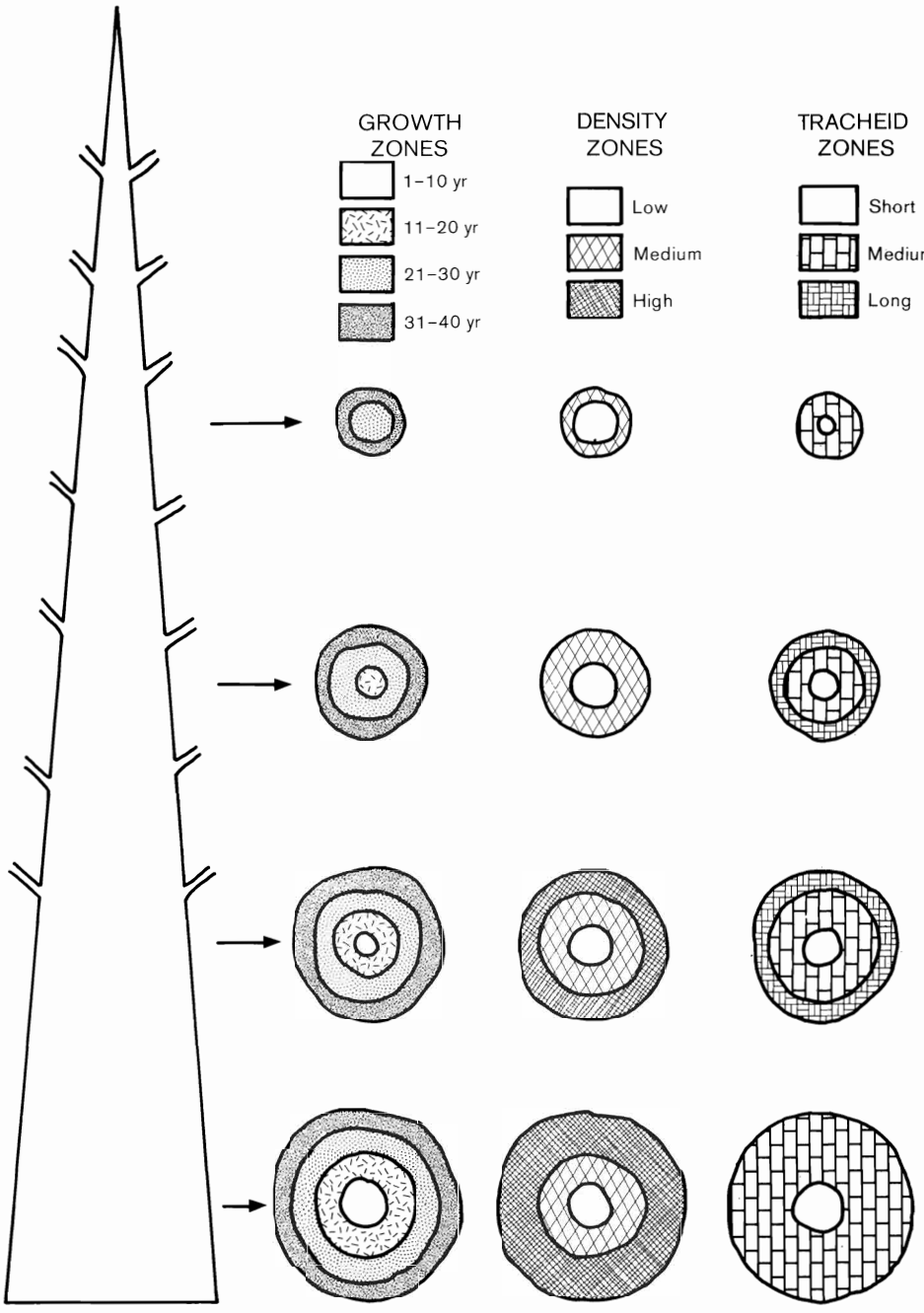

FIG. 2—Radiata pine wood zones.

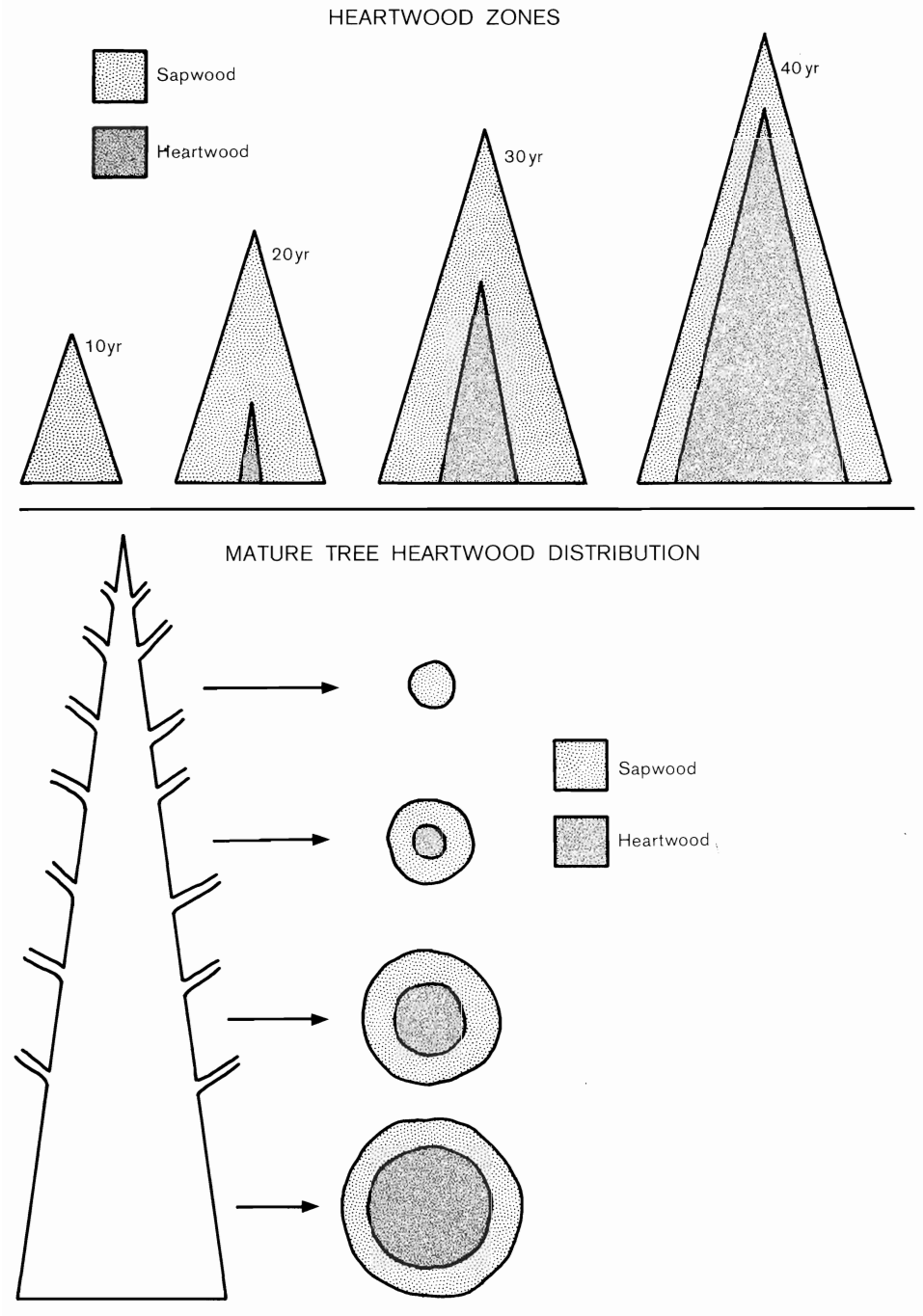

FIG. 3—Radiata pine wood property zones.