

obtained university qualifications in subjects that appeared to have more prospects.

A. R. Entrican, for all his outstanding achievements and vigorous personality, appears almost a flat colourless figure, and one is astounded that A. L. Poole, Director-General from 1961 to 1970, gets only one mention, although management of native forests (a matter of much lip service throughout the life of the Forest Service) made considerable progress in his day, and the exotic planting programme was built up rapidly under his guidance.

Forestry in New Zealand has been studded with colourful personalities, and there have been notable clashes, such as between Entrican and C. M. Smith. But these have been rigorously excluded from this book — a pity, for some information about personalities would make for lighter and brighter reading. However, if anyone wishes to read a succinct, factual account of the history of the N.Z. Forest Service, the book can be recommended.

V.T.F.

THE OUTLOOK FOR TIMBER IN THE UNITED STATES.
Forest Resource Report No. 20. U.S. Department of Agriculture, Forest Service, October 1973. 367 pp. Price \$US 3.25.

The first review of the U.S.A. forest resource, published in 1920, stated that the total national cut was five times as great as the annual growth and that the cut for trees of sawtimber size was ten times the annual growth. Opinions such as these must have contributed much to the general belief in the 1920s that a world wood famine was imminent. Subsequent reviews of the U.S.A. resource were not so alarmist and by 1962 the annual cut was reckoned to be only about 60% of the annual growth.

In October 1973 the U.S. Forest Service published its latest resource review — a full 367 page document with a mass of statistics and projections. All a reviewer can attempt is to highlight and comment on a few selected aspects which he considers may have some interest or relevance to New Zealand readers.

The first section of the report deals with recent trends, and the current position. The area of commercial timberland in the U.S.A. is 202 million hectares (22% of the total land area). Of this, the U.S. Forest Service owns only 18% (mostly in the west), other public agencies own 9% and the forest industry holds 14% (mostly in the south). The remaining 59% (some 120 million hectares) is owned by farmers (26%) and other private owners (33%). To have such a high proportion under such diverse ownership must present a considerable planning problem.

By area, hardwood forest types predominate (54%) but by volume and utilization softwoods are more important. The total volume of commercial timber in the U.S.A. is estimated at 20 thousand million m³ (64% softwoods). The net annual growth is estimated as 527 million m³ (303 million m³ softwoods). This is equivalent to an average mean annual incre-

ment of 2.6 m³/ha/annum (3.6 m³ for softwoods). The estimated average potential (assuming adequate stocking and management) for all forest types and sites is 5.2 m³/ha/annum — a very low value when compared with any exotic forest in New Zealand. Volume losses by destructive natural agents (fire, insects, disease, etc.) in 1970 were estimated as 125 million m³ (equivalent to 24% of the net average growth) — tragically, but understandably, most losses were in the over-mature stands of the valuable western softwoods.

Roundwood removals in 1970 were estimated at 346 million m³ (255 million m³ for softwoods). This is equivalent to only 65% of the average net annual growth, but there were considerable species and regional variations — e.g., the softwood cut was equivalent to 84% of the net growth, compared with only 40% for the hardwoods. Western softwoods of sawtimber size were on average being utilized at a rate more than twice the net increment.

By end use, 51% of all removals (54% for softwoods) were for sawlogs, 9% for veneer logs, 32% for pulpwood, and 4% each for fuelwood and miscellaneous uses (1970 figures). To put New Zealand's total roundwood removals (including exports) of just over 8 million m³ in perspective, they were equivalent to about 2% of the total U.S.A. production, or about half as much as the U.S.A. used in 1970 as fuelwood!

The major effort of the report is in development of projections of future supply and demand. Three sources of supply are considered. The initial supply projections are made on the assumption that forest management will continue at 1970 levels. By this, production can be expected to increase from 346 to 535 million m³ by the year 2000. The greatest increase will be in the south, where production will increase from around 120 million to 250 million m³; of the latter, 165 million m³ will be softwoods, 80% of which will be in sawtimber tree sizes.

The second series of projections considers the additional volumes offered by the opportunities of intensive management and utilization — e.g., such measures as better control of regeneration, thinning (both to waste and with extraction), salvage, fertilization, protection against insects, disease and fire. For trees of sawtimber size, these measures could produce an additional 3% in supply by 1980, rising to 25% by 2020, but this requires an additional average expenditure of \$US 74 million per annum.

The third source of supply is imports. In 1972 the U.S.A. imported a roundwood equivalent of 82 million m³, 50% as sawn lumber, 41% as pulp products and 9% as plywood and veneer. With the exception of plywood and veneer (which were mainly Asian hardwoods) nearly all imports were Canadian softwoods. Exports in the same year were equivalent to only 37 million m³ (including 14 million m³ as log exports). By the year 2000, imports could reach a roundwood equivalent of nearly 140 million m³ (including 31 million m³ of sawn lumber and 22 million tonnes of pulp products). Canada and the tropical hardwood regions will continue to

be the major suppliers. Imports from the exotic plantations of Africa, Latin America and New Zealand are unlikely to be significant. (Hosking's 1972 estimate of a New Zealand export potential in roundwood equivalent of 15.4 million m³ is nearly double our present total production, but this is equal to only about 11% of what the U.S.A. expects to be importing at that time.)

Exports by the U.S.A. in the year 2000 are expected to be the equivalent of 50 million m³.

Demand projections were developed for each major end-use category for a range of basic assumptions. Even the most pessimistic predicts rises in consumption for all major uses. By the year 2000, consumption could be as high as 650 million m³ — nearly double that of 1970.

Comparison of projected timber demand and supply shows that the supply situation is likely to be . . . "most critical" . . . for softwood timber for lumber and plywood but "relatively favourable" for pulp and paper manufacture. To achieve a balance between supply and demand, the price of softwood lumber and plywood is expected to rise, relative to 1970 levels, 50 to 60% by the year 2000; the equivalent rise in the price for paper products is only 15 to 20%. Stumpage prices associated with these increases could be expected to average more than double 1970 levels. Greater use of non-wood materials is a possible alternative, although this appears to have undesirable environmental and economic impacts.

The report leaves no doubt that U.S. forestry has a great future, but there are many problems. Perhaps the greatest is that of convincing somewhat indifferent financial authorities and forest managers of the need for timely silviculture. Many research programmes will need serious revision. This is particularly so in the south, from where so much is expected, especially in saw and veneer log sizes, but where so much effort, by the tree breeders in particular, has been directed almost solely towards pulpwood products.

As a potential exporter, New Zealand can never provide more than a few percent of the U.S.A.'s expected imports, but the U.S.A., because of the sheer size of its demand, is going to influence markets in almost all the countries to which we are likely to export. The greatest deficiencies in future wood supplies are going to be in the quality saw and peeler logs, especially those which produce clear and clear-cutting grades. Such quality cannot be obtained from the relatively small unpruned trees that will make up an ever-increasing proportion of the U.S.A.'s (and the world's) future supplies. We in New Zealand are at present almost alone in having the species and the techniques for growing an acceptable alternative on relatively short rotations and, because of our insignificance on the world scene (our total wood production is equivalent to only 0.4% of the world production), we will never find ourselves in a position of over-supply. Markets for the products of the short-rotation sawlogs regimes seem assured.