### LIBRARY

Department of Biodiversity,
Conservation and Attractions

This PDF has been created for digital preservation. It may be used for research but is not suitable for other purposes. It may be superseded by a more current version or just be out-of-date and have no relevance to current situations.

#### Managing your plantation

#### Year - 1 to 0

#### **Site Preparation**

Site preparation is essential to eliminate all competing vegetation. The planting site should be cleared and burnt, and then ploughed, unless the site is already pasture. Where ploughing is not feasible, scrub control may be assisted by means of herbicides.

Road building is necessary to provide reasonable access for fire protection, future removal of forest produce, and maintenance work. The road or track network should be planned so as to divide the plantation area into suitable sized compartments, which may vary from 20-100 hectares. Local Shires may have regulations governing the maximum size of pine compartments.

External firebreaks are essential and these must be kept clear by annual maintenance. Most Shire authorities who have been involved with pines have specific requirements for plantation firebreaks.

#### **Planting**

Pine seedlings are raised in the nurseries from seed sown direct into the soil. When removed for planting, the seedlings are open-rooted and their roots must be protected and kept moist. Planting is carried out during the months of June and July when the soil is thoroughly wet. In wet areas mound planting may be necessary, while in the drier coastal sand plain north of Perth "furrow lining" is practised to maximise moisture retention. If required, fertilizer should be applied and clover sown at the time of planting. On some soil types establishing clover at this time will greatly improve soil fertility and ensure continued good growth of the

Pines are planted relatively close to each other to prevent excessive branch development, and to provide for later selection of well formed trees. The spacings currently recommended vary from 3 m  $\times$  2.5 m (1,330 trees per hectare) to  $3 \text{ m} \times 3.25 \text{ m}$  (1,000 trees per hectare). For the successful establishment of pines it is essential to eliminate all competing weed growth in the first year.

#### Tending your plantation

A pine plantation requires considerable attention throughout its life to maintain it in a healthy condition, and to promote the production of high quality timber. In some instances, on the less fertile sites, refertilization may be necessary.

The various management activities needed to achieve and maintain a healthy, vigorous, productive pine plantation include:

#### Between years 1-3

#### Scrub Control

Regrowth of native scrub, eucalypt coppice, or grass compete with pines for moisture and nutrients. Left unchecked they can severely impair pine growth rates. Control of this regrowth is usually necessary in the early years. This can be carried out by the use of herbicides, slashing, or cultivation.

#### Between years 3-10

#### Pruning

Unlike most eucalypts, pine trees retain their lower limbs, and this results in the formation of knots which lower the quality of the timber. To produce timber free of knots, the lower limbs must be removed by pruning. Initially, all standing trees should be pruned to two metres above ground level. This provides easy access generally, but particularly for fire control. Subsequent prunings are generally restricted to trees selected as crop trees. Pruning is usually carried out with secateurs, hand saws or mechanical equipment. The height to which the stems are pruned and the number of trees selected for pruning is the decision of the owner or manager. However, severe pruning can inhibit the vigour of the trees. At least one-third of the tree's total height should be left as green branches.

#### Between years 9-20

#### Thinning

The intensity and frequency of thinnings, and the length of rotation adopted, depend on market opportunities and the type of product required. In Western Australia the opportunities for selling small logs are limited and the commonly accepted aim is to grow high quality sawlogs in the shortest possible time. This is achieved by non-commercial early thinning, thus reducing the number of trees to the final crop early in the rotation. Given access to markets, the early thinnings and tops of later thinnings will produce fence posts and wood for manufacture into particleboard. Thinning is a most critical operation especially on drought prone sites. If thinnings are delayed drought deaths can occur about Year 12, if dry summers are prevalent. When drought deaths do occur the plantation manager loses the choice of which trees to retain for his final crop. His crop trees are also placed under stress, and will grow slowly.

Uncontrolled fires kill pine trees. It is essential that adequate measures be taken for the early detection and suppression of fires in, or close to the pine plantation. Firebreaks and roads must be maintained yearly to the standards and specifications of the local Shire. Insurance is available through the Australian Forest Development Institute which represents private forest growing interests in Australia. Further information can be obtained from the West Australian Chapter, P.O. Box 254, West Perth, 6005.

#### Costs and returns

Total undiscounted returns for P. radiata on a good site over a 30 year rotation could be in the region of \$14,000 per hectare, at current prices, whilst total undiscounted returns for *P. pinaster* over a 30 year rotation could be in the region of \$4,500 per hectare at current prices. To place these costs and returns into context, the following comments should be taken into consideration:

Two measures of profitability are Internal Rate of Return (I.R.R.) and Net Present Value (N.P.V.) (the latter is also referred to by other names, e.g. Net discounted revenue.) These are calculated from information on expected future plantation costs and returns, and years of occurrence of the cash flows. In addition, an interest rate has to be used in the calculation of N.P.V., and account has to be taken of inflation. The I.R.R. is the interest rate that equates the present value of expected returns to the present value of expected costs. The N.P.V. is the difference between the present value of expected returns, and the present value of expected costs. Full details of calculations of profitability can be found in Hiley (1956), and N.S.W. Forestry Commission (1978).

#### Tax concessions

Certain State Land Tax concessions are applicable to private forests. Details can be obtained from the State Taxation Department at 2 St. George's Terrace, Perth.

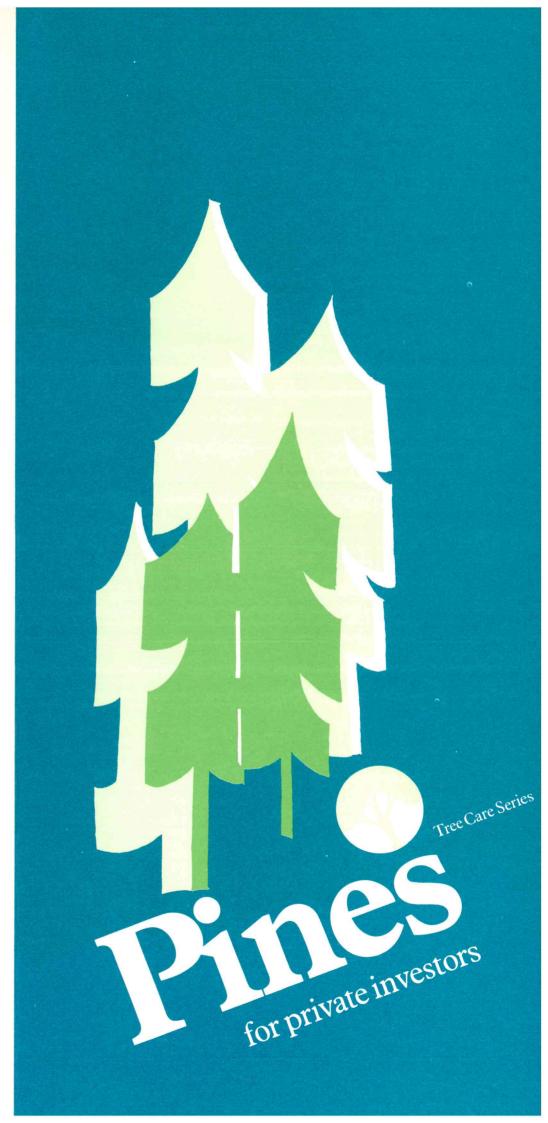
Forest operations are classed by the Income Tax Assessment Act (1933-66) as a form of primary production. For the person classified as a primary producer the same taxation considerations apply to planting and tending a forest crop as to most other crops. Such classification is not automatic, and information on this subject is available from the Commonwealth Taxation Office at 1 St. George's Terrace, Perth, or should be sought from public accountants.

#### **Further information**

Information Branch Officers of the Forests Department of W.A. will be pleased to give information on request, and to discuss any matters mentioned in this brochure. A computer service to forecast plantation growth, and likely financial returns based on information provided by the investor, is also available at a small charge There are also professional and private

forest consultants and contractors available who can provide full and detailed assessment and management advice. Forest contractors are available to carry out establishment and maintenance works as required. Further information can be obtained from: Hon. Secretary, Australian Forest Development Institute, Western Chapter,

P.O. Box 254 WEST PERTH. W.A. 6005



#### Pines - wood for the future

#### Are you interested in investing in the future of Western Australia?

Planting pines can be a profitable exercise both for yourself and for this State.

As we approach 2000 A.D., the profitability of growing pine is increasing. Softwood, produced by pines, has a number of advantages over native hardwoods: it is fast growing, light, has a high strength to weight ratio; it is easy to work and nail; and cheaper than hardwood to transport. Although subject to insect attack, and rot, the timber may be treated with preservatives, and used for any building or outdoor work. It is also used in furniture, cabinet making and veneers.

Native hardwood forests, such as jarrah and karri, can no longer meet the increasing demand for sawn timber in W.A., and to conserve this timber resource, the Forests Department of Western Australia, is progressively reducing the hardwood cut.

Western Australia's overall domestic consumption of timber is expected to increase as the population increases (Figs 1 & 2).

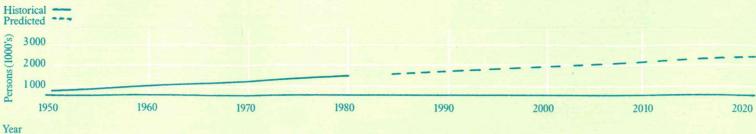
The predicted shortfall between timber supply and demand may be filled by either local producers, or by importing wood. The second option has problems. The availability of sawn timber on the world market is expected to decrease steadily (Forests Department of Western Australia, 1984). By 2050 A.D. sawn timber for import may be either unavailable or too expensive for extensive use.

This pamphlet is intended as a guide for potential investors, and outlines basic procedures for the growing and marketing of pine.

Estimates of expected costs, based on current market figures, are also provided, but it is emphasised that these figures are approximations and may vary widely according to local conditions.

Estimations of expected returns are complex, and must take into account many variable market factors and prices. Before deciding to invest in pine we suggest that you discuss your specific situation with Information Branch Officers from the Forests Department of Western Australia, Rural Advisory Service, 50 Hayman Road, Como, 6152, Ph: 3676333.





Source: Future Timber Supplies for Western Australia (1984). Forests Dept. of W.A.

Figure 2: - Past consumption & future demands for timber in W.A.

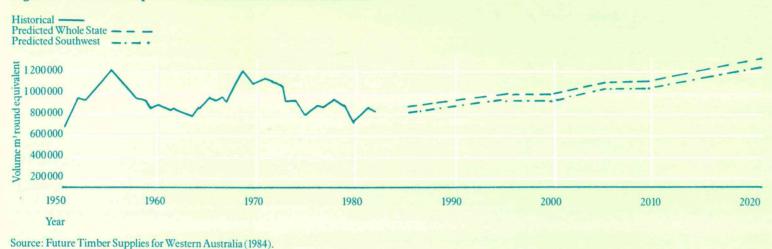
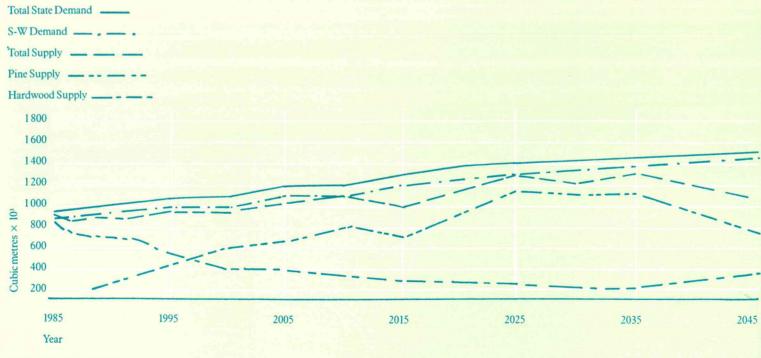


Figure 3: - Sawlog supply & demand 1985-2050



NOTES: 1. Pine Supply

- 1 Is based on an annual rate of 2800 ha/year until the year 2008, made up of 2300 ha/year radiata; 500 ha/year pinaster.
- 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.
- - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.2.2 Is based on levels of cut prescribed in General Working Plan 87, Forests Dept. of W.A., (1982).
- Excludes the resource on the Shannon basin, and the proposed northern jarrah reserve. 2.4 Allows for sawlogs from jarrah regeneration after the year 2018. 2.5 Assumes 100000m³ sawlogs from private property until 1990, reducing to zero at 1995.

Source: Future timber supplies for Western Australia (1984).

#### **Existing supplies**

At present approximately 86 per cent of Western Australia's overall timber production consists of hardwood, and only 14 per cent of softwood. Of the timber suitable for sawmilling, 94 per cent is hardwood and 6 per cent is softwood. The situation will soon alter radically. By the year 2000 A.D. over 60 per cent of the timber milled will come from softwood plantations and less than 40 per cent from native hardwood forests (Fig. 3). In order to minimise the cost of timber to consumers and maximise the employment within Western Australia which is generated by timber use, this State has planned for self-sufficiency in timber production by 2050 A.D. However, there is still a large discrepancy between predicted production from State pine plantations and predicted demand (Fig. 3). In December, 1983, the Government managed 57,036 ha of pine forest and there were approximately 12,000 ha of private plantation.

To attain self-sufficiency, a pine planting programme of 3,500 ha per year was proposed in 1976. Three thousand hectares to be planted by Government, and five hundred hectares per year from the private sector. In fact neither the Government nor the private sector has been able to consistently reach these goals. Hence, there is a vital need for private investment in new pine plantations each year to supplement Government planting.

# Growing pines

# Which Pine?

Experimental plantings of various pine species throughout the south west have demonstrated that there are two species suitable for management as plantations in Western Australia.

These are Pinus radiata from California and Pinus pinaster from the coastal areas of Portugal and France.

Each species has characteristics which make it suitable for different areas in the

Pinus radiata is the faster growing of the two, and at present provides most of the softwood milled in W.A. It does, however, require a deep, fertile loam for best growth and has mainly been planted in the major river valleys of the south west, such as the Blackwood Valley between Bridgetown and Nannup.

Pinus pinaster, by contrast, can be grown in less fertile soils, and successful plantations have been established on the coastal sand plains near Perth. This species also needs less water than P. radiata, but is slower growing. One characteristic of the species that bodes well for the future is that it may be grown on very poor soils, with the use of phosphate fertilizers. How?

Pine in Western Australia is grown commercially on a 30 year cycle or "rotation." At different stages in the rotation, the plantation must be tended in order to encourage maximum growth and ensure high quality timber. At the same time, the plantation will yield certain products. Table I shows typical products and specifications. The yield or volume of wood produced by the plantation depends primarily on rainfall, fertility, and

management regime. Figure 4 shows a possible management programme for Pinus radiata plantations in the Blackwood Valley and gives some idea of the costs you may expect to incur.

A management programme for Pinus pinaster is shown in Figure 5.

These programmes produce little by way of intermediate financial return, but are designed to realise maximum returns from the final product in the shortest possible period of time.

Alternative methods of management are possible using lighter, more frequent thinnings. These may produce earlier financial returns, providing a market is available for small sized logs. Due to their small size, high proportion of knots and juvenile wood, and coarse grain, these thinnings are not presently attractive for sawmilling.

There are three factors that must be considered before planting pines:

Where?

- . Rainfall: Both P. radiata and P. pinaster require a minimum rainfall of 700mm to maintain an acceptable growth rate for commercial timber production (Fig. 6). Both species may be grown in areas of lower rainfall, but will produce less timber.
- 2. Soils: Pinus radiata grows best on the more fertile soils such as red loam and red loamy gravels but may be grown on yellow sand and some lateritic sands with the addition of fertilizers. Pinus pinaster grows well on both yellow and grey sands, but requires fertilizing. A minimum soil depth of 50 cm is recommended for both species.
- obviously affect the profitability of your venture and in most cases distances of more than 70 km from your expected market will be uneconomic. The type of timber you produce will also affect your market. Most mills have minimum specifications for the logs

they will accept (see Table I).

3. Markets: Transportation costs will

Table I Pine products, specifications, and markets (1984) Specifications\* Markets **Products** Diameter Bunbury, Bridgetown and Small pine round logs 7-20 cm 1.8-4.8 m (small end under bark Mundijong 2.7-5.4 m Metropolitan and Dardanup Logs for particleboard 7.5-15 cm (small end under bark) large end not to exceed 30-35 cm u.b. Metro, Balingup, Bridgetown, Nannup and Case logs, etc. 2.1-2.7 m 13-20 cm (small end u.b.) 2.1-4.8 m

and Pemberton

Variable up to 2.6 m Metropolitan

(as nominated by

buyer)

Not less than 20 cm

Not less than 35 cm

(small end u.b.)

(small end u.b.)

			-
Table 2			
Pine products an	daverage	ctumnage	* (1984)
I me products an	uaverage	Stumpage	(1)01)

Mill logs

Peeler logs

(for high quality sawn timber)

(for high quality veneers)

Product	Average Stumpage
Particle-board log	\$ 6.00 per m <sup>3</sup>
Case log	9.00 per m <sup>3</sup>
Fence posts	12.50 per m <sup>3</sup>
Mill log from thinning: Pinus pinaster	17.00 per m <sup>3</sup>
Pinus radiata	25.00 per m <sup>3</sup>
Mill log from clearfelling	36.50 per m <sup>3</sup>

\* Stumpage is the value of the timber as it stands, uncut. † These figures are approximate only and should not be used as the sole basis for calculation of returns.

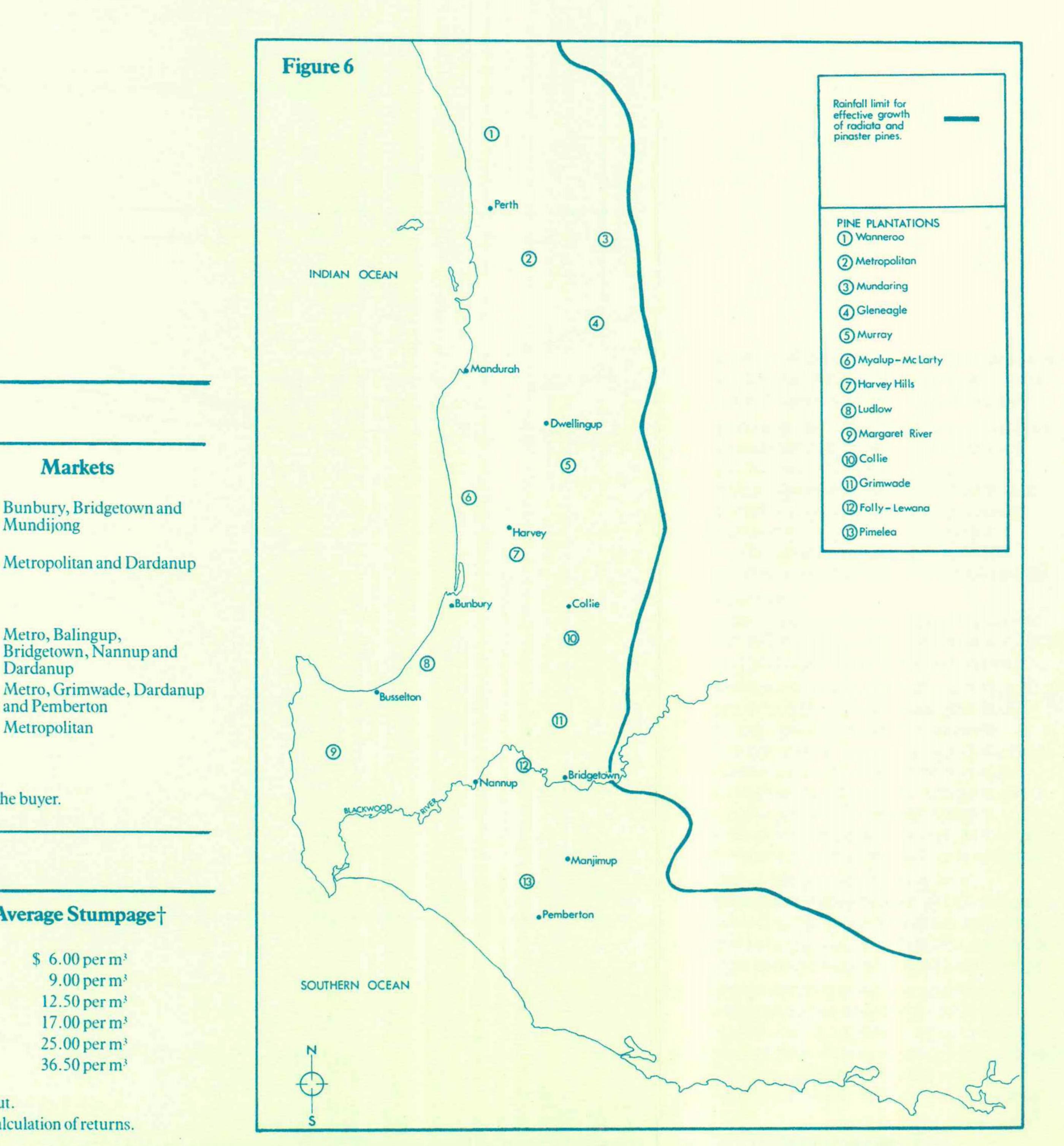


Figure 4 Pinus radiata: A possible management programme on red loamy soils. -1 Purchase Land\* Clearing \$250 \$ 35 Weed control Prepare & plant to 1330 stems per hectare (s.p.ha.) \$135  $(3m \times 2.5m \text{ spacing})$ Roads & firebreaks \$ 30 Weed control 3-5 Low prune to 2m Cull malformed stems High prune 350 s.p.ha. \$200 Select final crop trees High prune 200 s.p.ha. 7-9 \$150 Select final crop trees 9-11 Particle, case First thinning \$540-\$1,125 & fence-post from 1330 s.p.ha. to 350 s.p.ha. 18-20 Particle, case Second thinning 50 \$1,550-\$1,875 from 350 s.p.ha. & fence-post to 200 s.p.ha. Sawlogs \$ 33 Roading 30 Harvest, clearfell \$12,045 Sawlogs crop trees Annual Maintenance Total prod'n. \$390 (w \$13 p.a. \$14,135-\$15,045 Total Est. Returns/ha

. Returns/ha‡

\* Land prices vary from area to area and year to year.

Operations

Year

Costs are based on 1983 figures and are approximate only. These figures may vary considerably according to site conditions.

cost/ha†

Returns are estimates only, and dependant on distance from markets. (See table 2 for stumpage) ☆ First financial returns.

## on yellow coastal sands. -1 Purchase Land\* \$ 30 \$ 20 Plant to 1000 stems per hectare (s.p.ha.) $(3m \times 3.25m \text{ spacing})$ \$ 50 & fertilize Weed control \$ 10 \$ 10 Weed control Low prune to 2m & cull 3-6 \$100 malformed stems \$ 65 Refertilize High prune 250 s.p.ha. Select final crop trees High prune 100 s.p.ha. 10-14 \$ 90 \$ 65 Select final crop trees Refertilize 11-15 First thinning 公 \$300-\$625 Particle, case 50 to 250 s.p.ha. & fence-post 18-25 20 50 Second thinning \$970-\$1,100 Particle etc. to 100 s.p.ha. Sawlogs Refertilize \$ 65 30 Harvest, clearfell 95 \$3,670-\$4,290 公 Particle etc. crop trees Sawlogs Annual Maintenance \$330 Total prod'n. 300 (a \$11 p.a. Total Est. \$4,940-\$6,015 Returns/ha

product volume. Returns/hat

Figure 5

Pinus pinaster: A possible management programme

\* Land prices vary from area to area and year to year.

**Operations** 

- Costs are based on 1983 figures and are approximate only. These figures may vary considerably according to site conditions.
- Returns are estimates only, and dependant on distance from markets. (See table 2 for stumpage) ☆ First financial returns.

Forests Department of Western Australia, (1984). The Treloar Report. A feasibility study concerning the lease of Manjimup farmland for pine forests. Perth, W.A. Forests Department of Western Australia, (1984). Future Timber Supplies for Western Australia. Perth, W.A. Hiley, W.E., (1956). Economics of

References

Plantations. Faber and Faber, Ltd., London. N.S.W. Forestry Commission, (1978). Pine

Planting in New South Wales. Sydney, N.S.W. Compiled by Peter Richmond for P.J.

McNamara, Acting Conservator of Forests.

Forests Department of Western Australia.

<sup>\*</sup> Anyone wishing to sell pine logs should discuss the required specifications with the buyer.