CONFIDENTIAL

FUTURE TIMBER SUPPLIES FOR WESTERN AUSTRALIA

REPORT TO THE MINISTER FOR FORESTS

FORESTS DEPARTMENT
OF WESTERN AUSTRALIA

SEPTEMBER 1983

FUTURE TIMBER SUPPLIES FOR WESTERN AUSTRALIA

EXECUTIVE SUMMARY

This study forecasts sawn timber supply and demand. It discusses the concept of net self-sufficiency for sawn timber supplies and it presents alternative schemes for afforestation with pine species.

For Western Australia, the demand for sawn timber to 2020 will steadily increase. The anticipated slight decline in per capita consumption will be more than offset by the expected increase in population. Substitution by non-wood products is difficult to forecast accurately, but is unlikely to have a major impact on demand. The Departmental estimates of future demand are consistently more conservative than those of other forecasters.

The indigenous eucalypt forests are slow growing, are limited in area and substantial portions have been committed to priority uses which exclude timber production. Because of this, fastgrowing pine forests are being established to provide an alternative timber resource. Three options have been examined to illustrate planting requirements to meet forecasted demands. These assume a Departmental programme of 2500, 3000 or 3250 ha per year, as well as a private programme of 500 ha per year. The level of planting by the Department required to meet southwest demand is shown to be 3,000 hectares, or 3,250 hectares if the whole State demand is to be met.

The concept of net self-sufficiency for sawn timber is explained. Timber can be efficiently produced in the south-west region, at a cost below that of equivalent imports, ensuring availability of supply for strategic needs and price stability. Growing and processing timber provides jobs, opportunities for investment, and other regional and social benefits. Self-sufficiency has been the subject of enquiry by several authorities on the Australian economy and has received qualified support.

Two species of pine, *Pinus radiata* and *Pinus pinaster* are suitable for large-scale planting in the south-west region. Because of its higher growth rates, *P. radiata* is the preferred species. Timber needs to be grown near to the processing plants. The likely sites for processing facilities are in the Bunbury Manjimup region.

Availability of Crown Land for softwood production is controlled largely by perceived conservation attitudes, which encourage pines to be grown on previously cleared farmland. However, the amount of farmland which is available may be limited, its price will be high, and opposition from some Local Authorities has already occurred.

Some 57,000 ha has been planted and a further 26,000 ha appears to be available for pine planting by the Department. An additional 52,000 ha of land is required to meet the anticipated needs to the year 2008.

This state supported programme of 78,000 ha (at 3,250 ha per year) could be planted in a variety of localities but for social, environmental or technical reasons four have the greatest potential :

1. Private property in the Shires of Capel, Busselton, Augusta-Margaret River, Dardanup, Donnybrook-Balingup, Manjimup, Nannup, Bridgetown-Greenbushes.

2. Areas cleared or affected by jarrah dieback in the Sunklands.

3. Scrubby woodlands on the coastal plain north of Perth.

4. Areas of private property exchanged for Crown land on which forestry is not a suitable land use.

The selection of priorities within these options will be influenced by the decision to use iether private or public funds to establish plantations.

If the proposal to meet the whole State demand is adopted, a pine forest of some 160,000 hectares would result by 2008 with no more than 25,000 hectares of this planted by private interests if current trends continue.

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CONTENTS

INTRODUCTION

This study concerns one of Western Australia's major resource management problems : supplying the State's requirements for timber in the future. It relates directly to Government's policy of guaranteeing the timber industry's resource base at the levels projected in the Forests Department's Working Plan 87 of 1982.

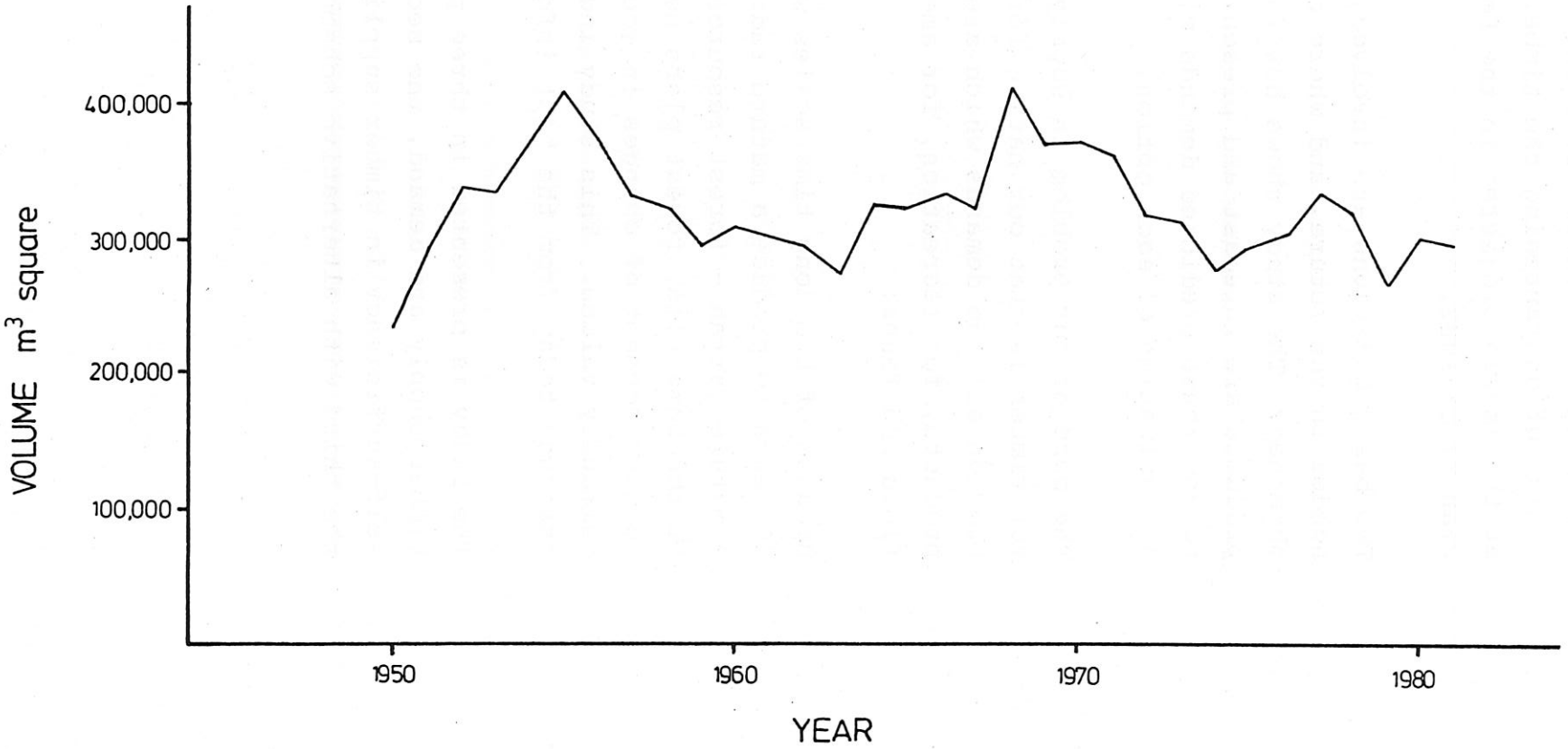
Two basic questions are involved, how much timber will be needed in the future, and where can these supplies best be obtained? The study shows how future demands for wood products are forecast and presents a number of options as to how these predicted demands might be met, together with an evaluation of each option.

The core of our problem in supplying Western Australia's needs for timber is that our native forest area is inadequate to provide all the demands which are made upon it for timber products, for recreation, for amenity and for conservation of flora and fauna.

Because of the long time scales with which forestry must work - 30 years to produce a mature radiata pine, up to 300 years for a mature jarrah - forest resource planning must be long term. At the same time, forest plans need to be revised periodically to take account of changes in economic and social factors and community values. This study indicates management needs as assessed today from the best information available.

The study is presented in three parts. The first deals with timber supply and demand, the second with the concept of net-self-sufficiency in timber supplies for Western Australia and the third with alternative schemes for pine reforestation.

Figure 1:— HISTORICAL TREND IN W.A. SAWNTIMBER CONSUMPTION
(Includes Plywood and Veneer) , 1950 – 1981



PART 1

TIMBER SUPPLY AND DEMAND IN WESTERN AUSTRALIA

The Demand for Timber

In forecasting future demand for wood in Western Australia, several factors must be considered. These include trends in per capita timber consumption, probable population levels and the extent to which substitute materials might be used. The methods used by the Forests Department to analyse these factors and to estimate future demand for timber in Western Australia are described in the following pages.

Although wood is used in various forms for many purposes this study concentrates on sawn timber. This is the primary use in Western Australia and is likely to remain so for many years given its basic role in house construction.

Trends in per capita timber consumption

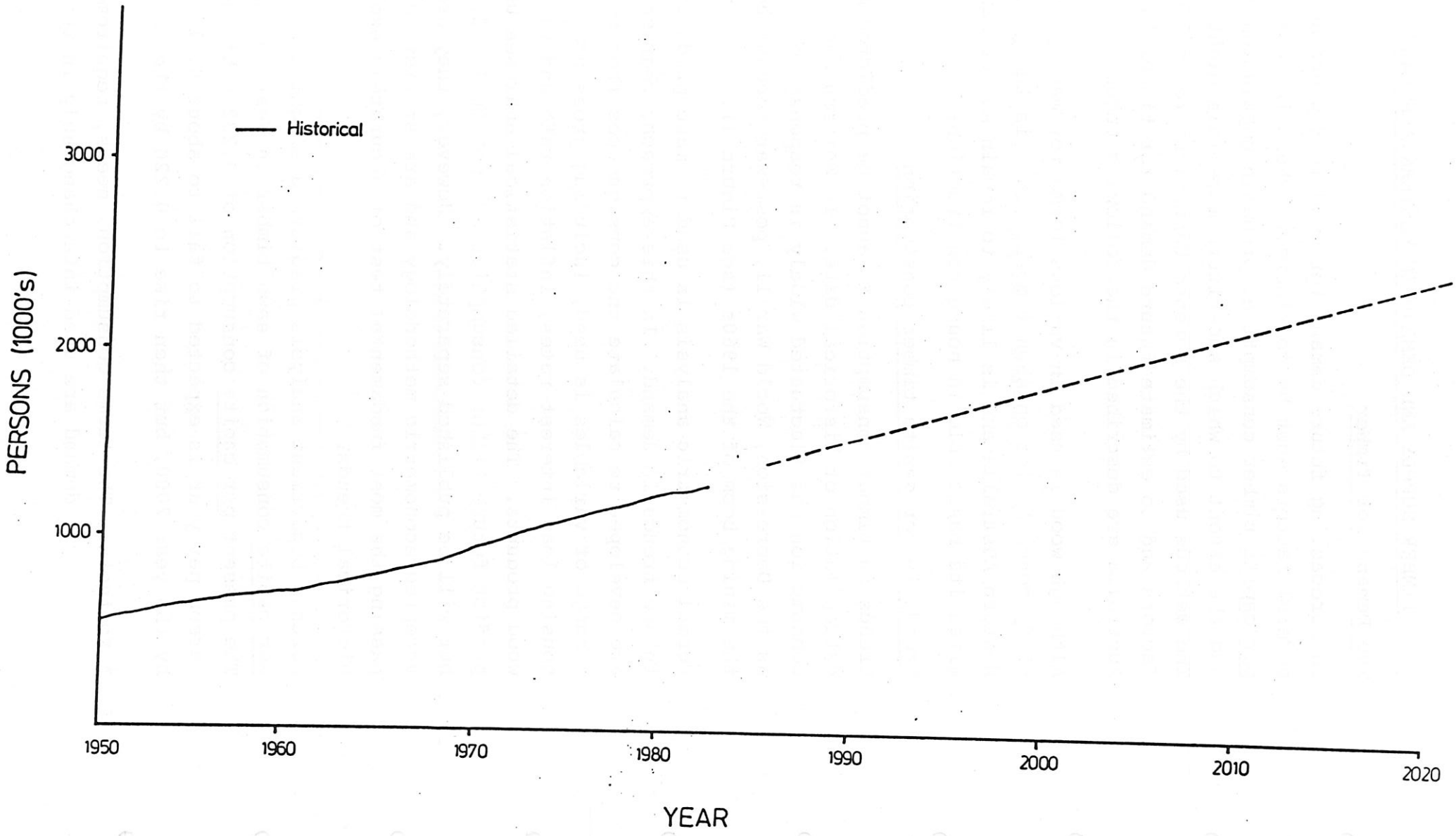
Trends in timber consumption * cannot be predicted merely by extrapolation of historical data. In Western Australia past consumption has fluctuated widely in response to events such as the Depression, World War 11, post-war reconstruction and the mining boom of the 1960s (see Figure 1).

Formal econometric analysis is used to make predictions of future trends in demand. In this approach, regression equations are developed to calculate the consequences from selected inputs. A range of variables is used, including gross domestic product, housing loan interest rates, inflation rate and the price of wood products. The detailed statistical analyses used to predict future timber consumption are not included in this paper, but will be published separately. However, they are based on accepted econometric methodology and are statistically valid, passing the most fundamental test of accurately explaining historical trends.

Forests Department analysis predicts a slight drop in future per capita consumption of sawn timber in Western Australia. The present per capita consumption of 0.232 cubic metres per person per year is expected to fall to about 0.217 cubic metres by the year 2000, but then rise to 0.220 by the year 2020.

* footnote: The terms consumption, needs, requirements and demand are used interchangeably in this study.

Figure 2 :— W. A. POPULATION



Per capita demand estimates are meaningless on their own. To be of use for planning purposes they must be combined with population data to describe total demand.

Trends in State Population

Future population depends on birth rates, immigration policies and the economic situation in Western Australia, the nation as a whole and the rest of the world. This study uses the latest population predictions of the Western Australian State Treasury which forecasts a State population of 2,184,200 in the year 2010 and 2,490,340 in 2020. Some demographers (e.g. Ruthven 1978) make higher predictions, but they are not based on the most recent information. Figure 2, shows past population trends in Western Australia and the Treasury projections used to calculate future timber needs. These figures are very close to the 'Series A estimates' made by the Australian Bureau of Statistics.

Future State Timber Demand

The per capita demand estimates and Treasury population projections have been combined to produce a forecast of State demand for sawn timber to the year 2020. The sawn timber demand figures are then converted to round timber equivalents by the use of conversion factors which take into account the state of sawmilling technology and the balance of hardwood and softwood expected to be used.

The calculations show that for Western Australia there is a steady increase in demand for timber at 2020, the anticipated decline in per capita consumption being more than offset by the expected upward trend in population (see Figure 3).

Comparison With Other Demand Forecasts

A number of other Australian authorities or economists have made timber demand forecasts for Western Australia. These include the Australian Bureau of Agricultural Economics (BAE) in 1977 and 1982, Dr. Ian Ferguson of the Australian National University (in 1973) and the Forwood Conference (1974).

The Forests Department estimates of future per capita timber demand are consistently more conservative than these projections as shown in Table 1.

Figure 3:- PAST CONSUMPTION & FUTURE DEMANDS FOR TIMBER IN W.A.

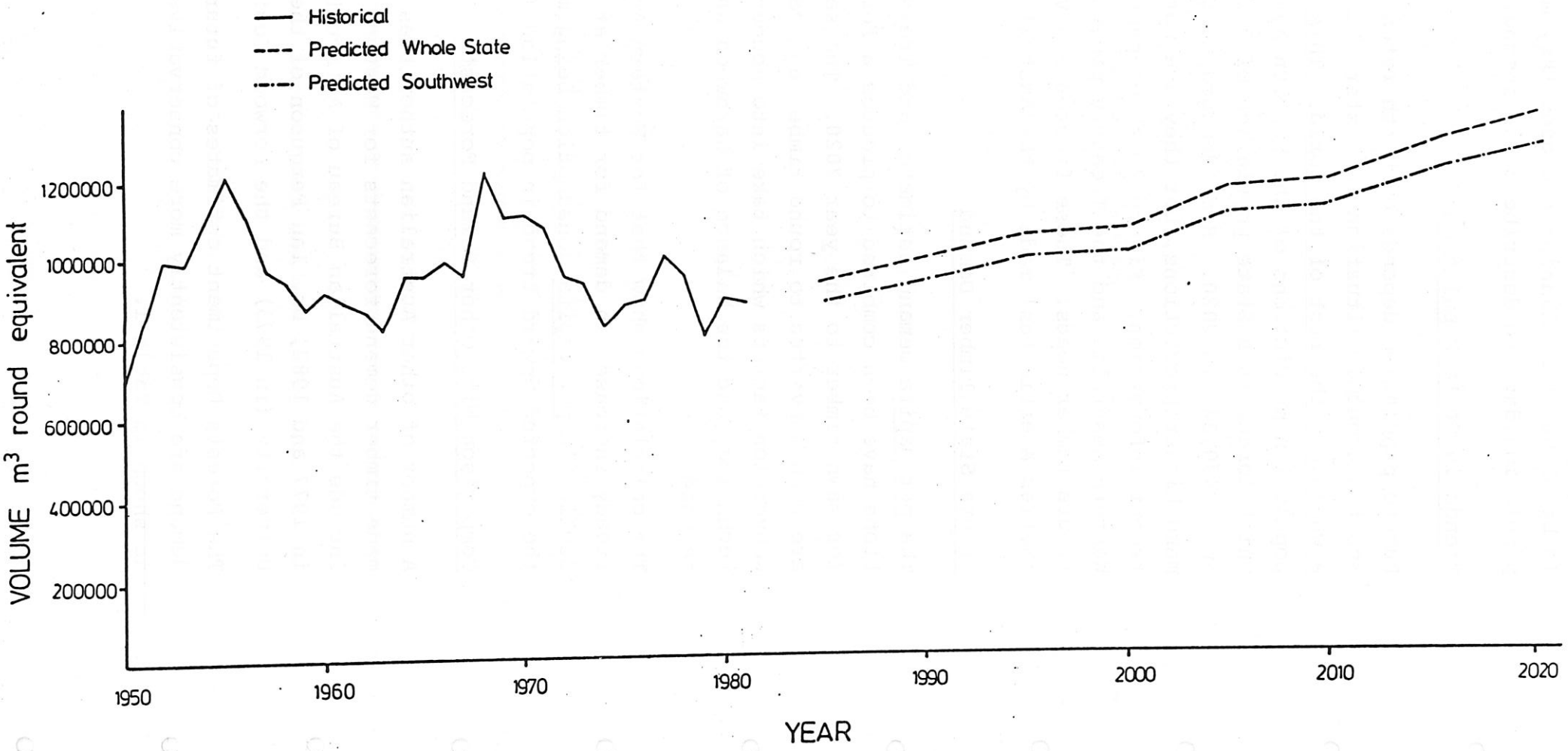


Table 1

Per Capita Demand for Sawn Timber in Western Australia
Comparison of Estimates
(m^3)

Source	2010	2020
Bureau of Agricultural Economics (1977)	.3903	.3925
Forwood (1974)	.3239	N/A
Ferguson (1973)	.2600	N/A
Bureau of Agricultural Economics (1982)*	(.4406	.5337
	(.4645	.5340
	(.5086	.5939
Forests Department	.2215	.2205

* The BAE predicts a range of likely demand to account for fluctuations in population or price of timber.

The difference between these predictions is very large. Even the lowest per capita consumption forecast by BAE is more than double the figure calculated by the Forests Department for the years 2010 and 2020.

These differences result in very large differences in forecasts of total timber demand. Table 2 compares the Forests Department and BAE 1982 "conditional" estimates of future demand at three selected points in time. Note that the BAE estimates were for sawnwood demands. These have been converted to roundwood data using the same conversion factors as in the Forests Department demand analysis. All figures have been rounded off.

Table 2

Sawlog Demand Forecasts in Western Australia by BAE (1982) and Forests Department (1983), in 000's m^3

Source	1995	2005	2015
BAE	1600	2000	2750
FD	1100	1200	1300

Part of the difference in demand estimates is explained by the use of different forecasting techniques and part by the assumptions made. The Forests Department forecast is used in this study because it is the most up-to-date, is based on recent domestic Western Australian data (and not Australian averages) and because the methodology is statistically sound.

As better information comes to hand from time to time, supply estimates are scaled up or down as the data determines. The Forests Department has the question of future timber demand under constant review and new estimates of demand are prepared for each five-year General Working Plan.

Wood Substitutes

It is possible that timber could be replaced in some of its uses in the future by alternative materials such as steel, aluminium, concrete or plastic. Some substitution has already occurred (e.g. concrete rafts for timber floors in houses) but it is very difficult to predict the extent of future substitution.

Direct price to the consumer is a major factor in determining substitution. However, the relative prices of different materials is likely to change considerably in the future. Since energy use in processing is a major factor in material prices, we can expect that the rapidly increasing cost of energy will in future discriminate against materials requiring high energy inputs for processing.

Table 3 summarises the relative manufacturing energy requirements of six common materials used in house construction.

Table 3

Relative manufacturing energy requirements for six common materials

Product	Manufacturing energy requirements (megajoules/kgm)
Aluminium	250
Copper	60
Glass	20
Brick & Tiles	4
Concrete	1
Wood	0.5

Source: CSIRO (Ecos 6 1975)

Thus timber already has a marked advantage, when both the cost and availability of energy are considered. This advantage is likely to increase in the future.

Futhermore, timber is biodegradable and its production and disposal result in less air, water and ground pollution than substitute materials (see Table 4).

Table 4

Comparison of Relative Pollution Problems with various building materials

Building Material	% increase in cost if the cost of their effect on the environment was charged to the consumer
Concrete blocks	48
Aluminium	28
Ready mixed concrete	24
Steel	9
Timber	2

Source: C.W. Dane, Oregon State University

With a rapidly rising world population and increasing industrialisation, pollution of the environment will be a most important future consideration. Disincentives are likely to be applied against the use of materials with greater potential for pollution.

Unlike the mines which produce the raw material for steel, aluminium and concrete, forests have numerous social and environmental benefits. They protect water supplies and provide recreation and habitat for flora and fauna at the same time as producing wood. There are even examples of forests providing all these services within large cities, e.g. Brussels overseas and Wanneroo plantations in Perth.

Wood is both adaptable and recyclable. It can be cut or moulded to fit any specified design using simple technology. Recent studies have also shown that timber-framed houses are more durable than any other type in areas subject to soil shrinkage or swelling or to earth tremors.

Therefore, while it is possible that some substitution of wood by other materials will occur in the future, the impact on the demand for timber will not be great. Wood consumption may increase if declining stocks of some non-renewable resources such as petroleum feedstocks for plastic production are replaced by natural cellulose. But apart from this the economic, environmental and social benefits of wood are likely to be more highly valued in the future than they are today, thus ensuring a continuing demand for it.

Timber Supply - Current plans to meet demand

The native hardwood forests in Western Australia have two disadvantages as timber production ~~forecasts~~ forests.

i) They grow very slowly. It can take 100 years for Karri and more than 250 years for Jarrah to regrow to mature stands. These growth rates would be acceptable if the area of forest was large enough. Unfortunately, past land use policies in Western Australia did not always

consider forest conservation and the remaining forest area is inadequate. Current rates of cutting in the original forest cannot be sustained until a sufficient proportion of regrowth stands reach millable size. Cutting must therefore be progressively reduced for a period of 60 - 70 years.

ii) The native forests must be shared for a multiplicity of uses, of which timber production is but one. Other forest values include water catchment, recreation, habitat for native fauna and flora and scientific study areas. Timber production is compatible with most of these uses and can proceed without adverse effects, provided logging is properly controlled and cutover forests are properly regenerated. However, in some special areas, timber production is not regarded as compatible with the designated land use. The timber in these forests is excluded from the inventory of timber resources. Currently, some 32 per cent of the Western Australian sawlog resource is withheld from timber production in such areas.

These factors have long been recognised, and explain the rationale for development of pine forests to provide an alternative future timber resource for Western Australia. There have been some 57,100 hectares of pine planted by the Forests Department up until now.

The establishment of pine forests in the southwest concurrent with a reduction in the hardwood cut aims to ensure softwood yields which will bridge the gap between the projected demand for timber and the supply available from the hardwood forests.

As a result of recent withdrawals of hardwood forest the sawlog supply forecasts have been reviewed, with some changes being made to the data on which the current General Working Plan No. 87 was based.

There are two parts to the supply forecasts, the first is based on native hardwood forests and the second on softwood plantations.

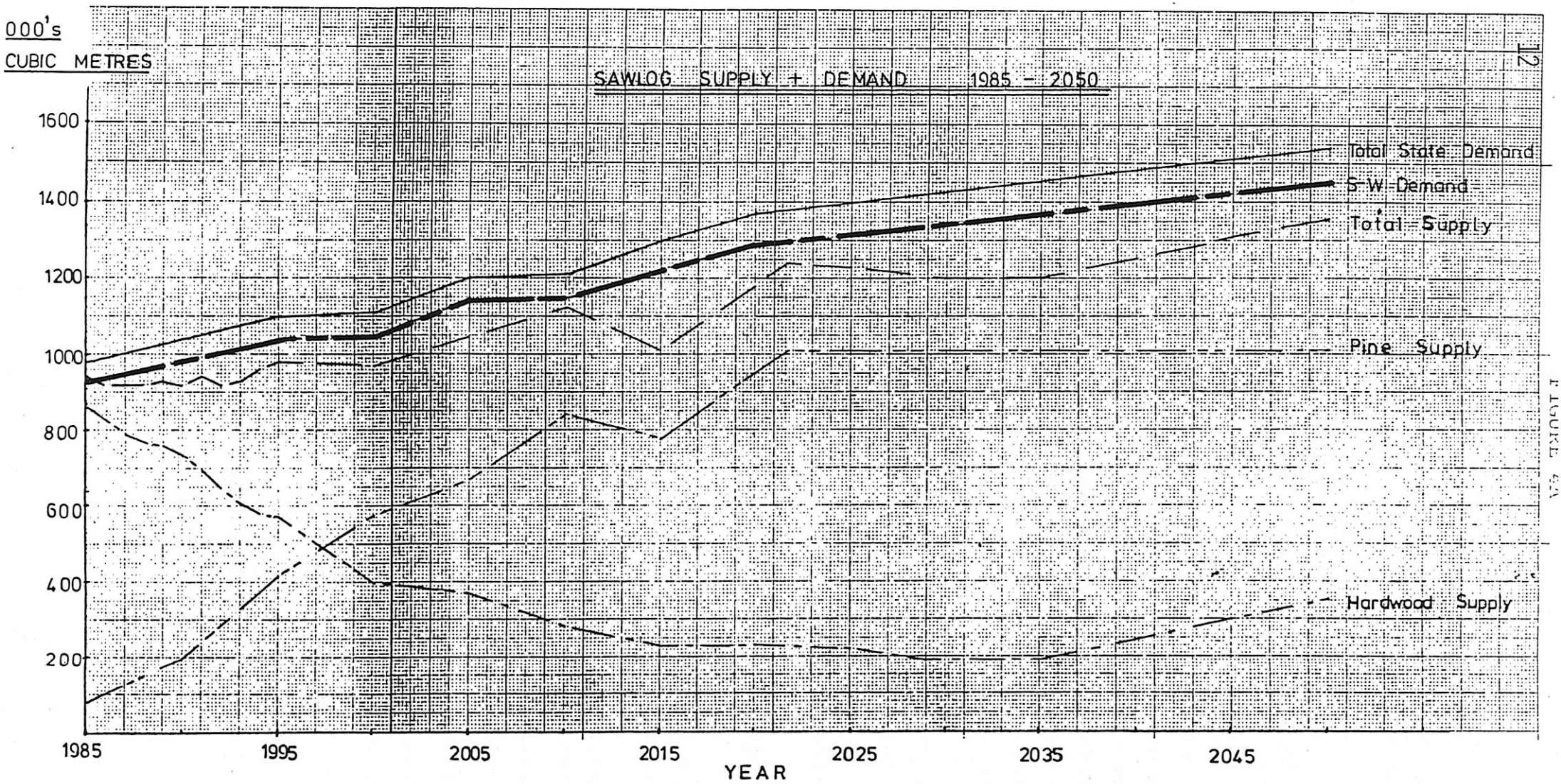


FIGURE 4.3A

NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 3 000ha/year until the year 2008, made up of F.D. planting: 2 000 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.

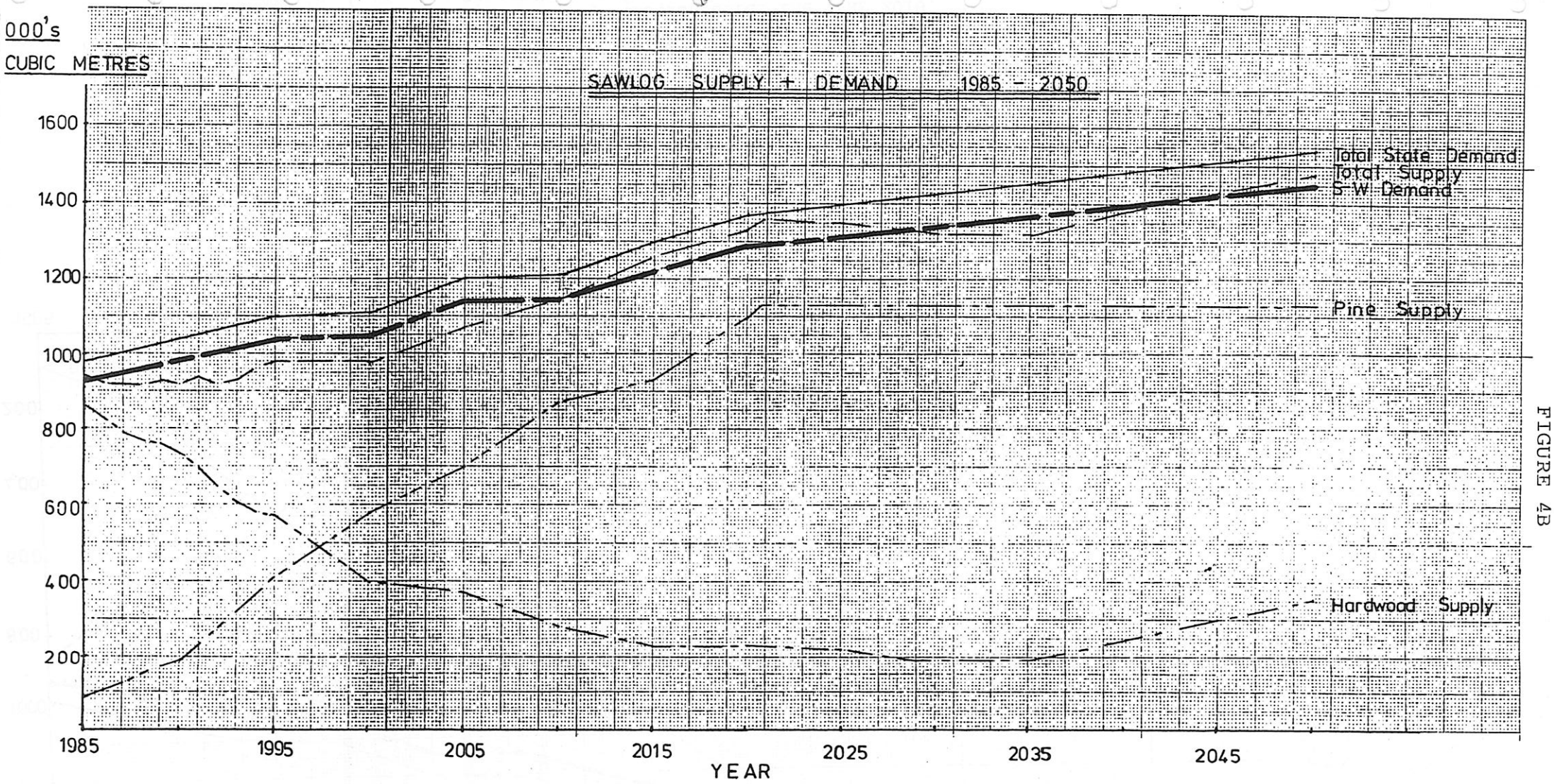


FIGURE 4B

NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 3 500ha/year until the year 2008, made up of F.D. planting:2 500 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.

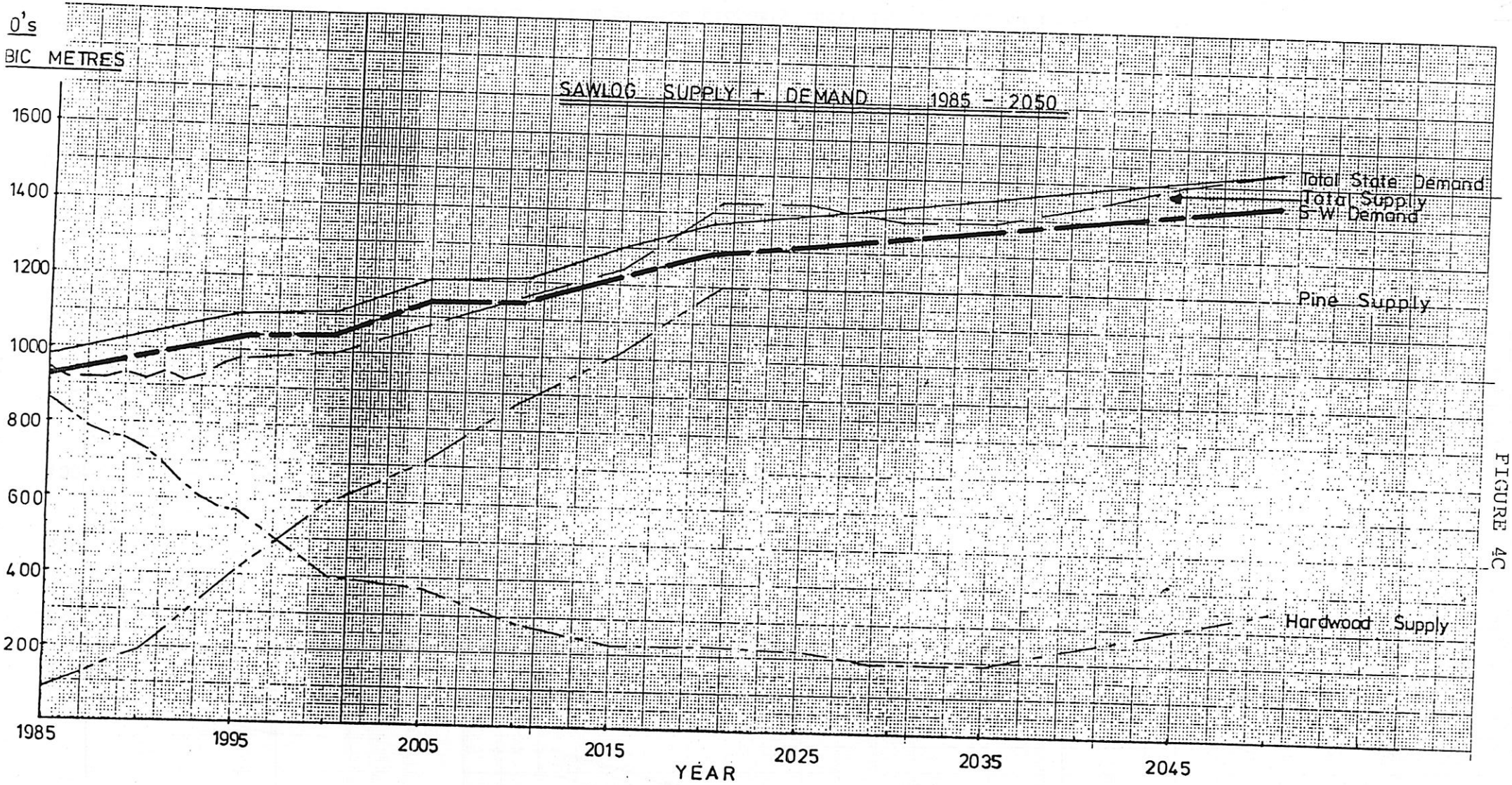


FIGURE 4C

NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 3 750 ha/year until the year 2008, made up of F.D. planting: 2 750 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.
2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m³ sawlogs from private property until 1990, reducing to zero at 1995

The revised hardwood sawlog supply forecast excludes the timber resource on the Shannon river catchment and on the proposed northern jarrah reserve. It includes an additional 50,000 cubic metres per year of jarrah regrowth from about 2020, which is expected to come from forest improvement works planned by the Government. It also includes approximately 100,000 cubic metres of sawlogs from private property until 1990 reducing to zero at 1995. It assumes no change in log standards, no significant change in sawmill technology and no change in hardwood markets.

The revised softwood supply forecast is based on an assessment of alternative planting rates and their implications in relation to demand forecasts allowing for possible losses of 10 per cent due to wildfire, wind, insect damage and disease. Examples of these alternatives are illustrated in Appendices 1 to 6.

In each of the softwood alternatives the annual planting rate of P. pinaster has been held constant at 500 hectares. This provides for continuation of the programme based on woodlands available in the Wanneroo district north of Perth which are not suitable for P. radiata. These alternatives also assume the establishment of P. radiata plantations on private property at the rate of 500 ha each year although this has seldom been achieved in recent years. P. radiata is the preferred species, as its higher growth rate makes it economically more attractive and the most practical selection to overcome forecasts of early sawlog supply deficiencies.

From the range of softwood supply options three have been chosen to illustrate annual planting requirements to meet forecast demand (App. 2, 3 & 4). The future pine timber supply forecast in those examples has been smoothed in Figs. 4A, B & C to indicate the way in which yields would be manipulated in practise, to meet the demand. The type of yield data available for these forecasts is shown in Appendix 7.

In preparing the supply and demand figures the population predictions from Figure 2 have been extrapolated at the same

rate of increase beyond 2020. Clearly, any demand forecast so far into the future is fraught with uncertainty. However, it is useful to illustrate the general picture over the period 2020 - 2050 and how this picture is affected by decisions taken now.

The demand lines for both whole state and south west only have been shown on these figures as it can be argued that transport costs to the Northwest from sawmills in the south would place locally grown timber in a less favourable position to compete with supplies from other sources, such as New Zealand.

The hardwood supply line on the figures is that described earlier.

The softwood supply lines assumes a State supported programme of either 2000, 2500 or 2750 hectares of P. radiata and 500 ha of P. pinaster per year as well as private P. radiata planting at a rate of 500 ha per year.

The programme would terminate in about 2008, which is 30 years or about one P. radiata crop rotation from the first year in which annual planting of P. radiata by this State exceeded 2000 hectares and in which Government adopted a policy of planting 2500 hectares of P. radiata and 500 ha of P. pinaster, annually.

If the softwood supply forecast in Fig. 4C was adopted with the associated planting programme there would be a State pine forest estate of about 135,000 hectares by 2008. This would amount to just over 6 percent of the State forest area.

If the forecast in Fig. 4A was adopted there would be a State pine forest estate of about 117,000 hectares by 2008. A planting programme based on Fig. 4B would result in 129,000 hectares by 2008.

Depending on whether the Government chooses to meet whole State demand or only south west demand the planting rate in either figure 4A or 4B would be adopted.

For the purpose of assessing locality options for establishing pine forest the higher rate of planting has been used as it is the most difficult to satisfy and lower rates can be easily compared by simple proportion.

PART 2

THE CONCEPT OF NET SELF-SUFFICIENCY IN TIMBER

The concept of 'growing your own' is generally referred to as 'Net Self-Sufficiency'. In a situation of timber net self-sufficiency in Western Australia, imports and exports would roughly balance and local forests would provide for local needs.

Before explaining the concept, it must be clearly understood that this discussion refers to the roundwood component of the forest crop used for sawing purposes, i.e. sawlogs. It does not refer to residue materials which are a byproduct of sawlog production, for example chiplogs.

The philosophy of timber net self-sufficiency for Western Australia has been debated for many years. There are those who believe that wood from elsewhere will always be available, that substitute materials can be used or that in a timber shortage prices will so increase that consumption will drop dramatically - i.e. people will simply learn to live without it.

Supporters of net self-sufficiency, on the other hand, argue that West Australia should, so far as possible, be independent in timber supplies. Where provision can be made, it is argued we should assure ourselves of adequate timber supplies at the cheapest possible price. Proponents of this view support the concept of multiple use forest management and of supplementary pine forests to offset declining sawlog production from native forests.

In the concept of net self-sufficiency, it is accepted that some 'specialty' timbers will always be imported and that a proportion of locally grown timber will be exported. (Interstate trade cannot be prevented under the Federal Constitution).

Because the concept is of such fundamental importance, it is desirable to elaborate on the arguments which support it. These can be summarised as Efficiency, Price, Availability, Strategic Advantages, and social Regional Benefit.

Efficiency

The southwest region of Western Australia can produce and deliver timber to Western Australian markets more efficiently than can any other timber supply area in the world.

Forwood (1974) indicated that timber production costs in Australia compare favourably with overseas costs, and that Australia should attain a comparative advantage in production of timber as more capital intensive methods are adopted to process the increasing volumes of domestic softwoods that will come on stream over the next few years.

Western Australia will be able to process sawlogs very efficiently in the future when modern capital-intensive pine sawmills are built and pine forests begin to yield high volumes of large sized sawlogs.

The two pines planted in Western Australia (P. radiata on the best sites and P. pinaster on the poorer sites) are well adapted to local conditions and their growth rates in Western Australia are similar to those found elsewhere for these species.

Price

The B.A.E. (1977) found that the costs of Australian produced timbers delivered to Australian markets are below those for equivalent imports.

Costs for freighting timber to the southwest from external supply areas are high. Currently, the costs for freighting timber to Perth from South Australia and to Fremantle from Singapore are some 15% to 20% of the average domestic retail price of timber.

Historical Australian consumption and import figures indicate that the southwest region of Western Australia has an economic advantage over other Australian timber supply areas in the production of timber for the southwest population.

This is supported by data which indicates that timber imports into Western Australia have always been small compared with those into the other mainland States - see Table 5.

Table 5

Sawnwood Imports as a Percentage of Sawnwood Consumption

	Overseas			Interstate		
State	1970	1975	1982	1970	1975	1982
N.S.W.	35.21	30.21	35.96	7.90	9.80	9.04
Victoria	13.48	16.72	21.26	25.93	24.86	20.51
Qld.	5.07	8.38	22.95	18.28	16.32	18.98
S.A.	40.50	47.63	33.87	18.98	12.72	10.04
N.T.	68.30	83.92	79.80	27.87	15.00	18.72
W.A.	11.10	5.92	6.74	0.12	0.07	1.60

These figures are explained by the isolation of Western Australia and by the efficiency of local production.

West Australian consumers are always likely to pay less for locally produced timber than for imported timber in the long term. Lower timber prices benefit consumers, check inflation and dampen demands for non-wood substitutes, which have environmental disadvantages compared with wood.

Availability

There is no guarantee that the southwest of Western Australia would be able to import large quantities of timber from overseas or interstate sources at economic prices in the future. Factors to consider are :

(i) World timber shortages and/or world regional shortages have been forecast.

(ii) Eastern Australia, as a whole, is aiming for self-sufficiency rather than an exportable surplus.

(iii) Freight costs for importing timber are high and will probably increase in the future.

(iv) Australia already suffers price discrimination on international markets and the disparity between prices paid by Australia and other major importers widens in periods of high international demand.

(v) World timber prices can be expected to increase steeply as world timber demands increase. Fairgrieve (1979) has predicted that international timber prices in real terms will increase by some 70% by the turn of the century.

These factors suggest that Western Australia would be taking a financial risk if it depends upon timber imports in the future.

Strategic Reasons

A dramatic demonstration of problems which can arise through reliance on imported timber supplies was the effect on Britain of the shipping blockades during World War I. The southwest of Western Australia is in a similar "island" situation with long and vulnerable lines of supply - especially the shipping lanes.

The Senate Standing Committee on Trade and Commerce (1981) has endorsed the strategic argument in its deliberations on the concept of sawlog self-sufficiency for Australia.

Social Benefits

Growing and processing timber locally provides jobs for West Australians. A South Australian study has shown that one job is supported by every 20 hectares of pine forest, once the pine forest estate has the full range of age classes.

Forestry has other regional benefits. Part-time employment is provided for farmers and seasonal farm workers. The regional tax base increases, together with local government infrastructure and public services. Foresters, forest workers and their families contribute to social, cultural and sporting life in country towns.

A pine reforestation programme also has sound conservation benefits by compensating for the timber production foregone in native forests set aside for other purposes, as recognised in the National Conservation Strategy.

A timber shortage in Western Australia would have a number of serious social disadvantages, for example :

(i) Reduced availability of wood-based commodities

(ii) Increase in timber prices that would fuel inflation, and disfavour the less affluent.

(iii) Disruption in industrial activity and employment in rural areas, with consequent exacerbation of the drift to the metropolitan area.

(iv) Increased demand for wood substitutes leading to adverse effects on pollution and energy usage.

(v) Demands to utilise timber in forest areas presently set aside for purposes other than wood production.

From the viewpoint of benefit to the State economy, employment and decentralisation, locally grown timber has many advantages over imports and softwood forests grown locally have some advantages over hardwoods.

Some Independent Views on Timber Self-Sufficiency

The question of timber self-sufficiency has been the subject of enquiry by several authorities on the Australian economy. The Australian Bureau of Agricultural Economics (in 1977), Douglas & Treadwell (1978), the Senate Standing Committee on Trade and Commerce (1981), the House of Representatives Standing Committee on Environment and Conservation, and King (1981) have each reported on this topic.

From their consideration of the question of whether Australian growers and processors of sawn timber could offer an economic alternative to the importation of sawn timber, the B.A.E. concluded that the desirability of self-sufficiency cannot be accepted as proven until further information on the potential for reduction in the prices of imports, as a result of building regulation changes, has been accumulated and evaluated.

However, the B.A.E. went on to say that "... it seems unlikely from the price information available that imports will be capable of displacing significant amounts of softwood timber from the market." They then calculated and recommended a pine planting rate for Australia to attain self-sufficiency.

Douglas & Treadwell (1978) were involved in the BAE study. They subsequently wrote: "When the various factors are taken into consideration, uncertainty remains about the desirability of Australia achieving self-sufficiency in sawn timber. It does seem likely, however, that domestic softwood timbers will attain a cost advantage over both imports and domestic hardwoods, whilst domestic hardwoods may be replaced by domestic softwoods and/or imports in the future ..."

Treadwell (1978) later stated that the BAE study concluded that "with the possible exception of some categories of fine papers, it would be in Australia's interests to pursue a policy of self-sufficiency in forest products".

In their 1981 report the Senate Standing Committee on Trade and Commerce reviewed the arguments for and against timber net self-sufficiency for Australia and concluded that it should be supported.

The House of Representatives Standing Committee on Environment and Conservation reported on the operation of the Softwood Forestry Agreement Act, and concluded that "the isolation of Western Australia justifies a softwood planting program...."

In 1981 King reviewed the world timber situation, and wrote :

"Australia appears to have a comparative advantage over most countries in the production of sawn timber, a comparative advantage which it should be prepared to exploit in the years ahead, both in this, and in future decades ...

... If I were in the Australian timber industry, therefore, I would not be unduly pessimistic about my sawn timber supplies in the short run, in this decade. However, I would seek to ensure that my supplies of softwood timber were increased locally for this is going to be the commodity in greatest short-supply towards the end of this century."

SOUTH-WEST OF WESTERN AUSTRALIA
FOREST AREAS

LEGEND

Pine Plantations

Karri Occurrence

State Forest, Timber Reserves (Forests Act) and other land under the control of the Conservator of Forests

National Parks

Flora and Fauna Reserves

Forest Regions

Forest Divisions

Forests Dept. Division Office

Forests Dept. Office

Towns

Prepared by the Mapping Branch for the Conservator of Forests, Mr. B. J. Bagg

No.	SHIRE NAME	L & S Misc. Plan
1	DANDARAGAN	866
2	GINGIN	786
3	CHITTERING	825
4	VICTORIA PLAINS	866
5	MOORA	883
6	GOOMALLING	896
7	TODDYAY	844
8	WANNEROO	
9	SWAN	
10	NORTHAM	
11	CUNDERDIN	80[illegible]
12	YORK	805
13	MUNDARING	903
14	KALAMUNDA	87[illegible]
15	GOSNELLS	
16	COCKBURN	
17	KWINANA	
18	ARMADALE - KELMSCOTT	
19	BEVERLEY	804
20	BROOKTON	806
21	PINGELLY	807
22	WANDERING	750
23	SERPENTINE - JARRAHDALE	
24	ROCKINGHAM	897
25	MANDURAH	749
26	MURRAY	745
27	WAROONA	760
28	BODDINGTON	739
29	CUBALLING	729
30	NARROGIN	726
31	WILLIAMS	691
32	COLLIE	693
33	HARVEY	715
34	BUNBURY	
35	DARDANUP	
36	CAPEL	719
37	DONNYBROOK - BALINGUP	727
38	WEST ARTHUR	710
39	WAGIN	686
40	WOODANILLING	690
41	KATANNING	688
42	BROOMEHILL	570
43	KOJONUP	689
44	BOYUP BROOK	607
45	BRIDGETOWN - GREENBUSHES	692
46	BUSSELTON	699
47	AUGUSTA - MARGARET RIVER	813
48	NANNUP	729
49	MANJIMUP	719
50	CRANBROOK	742
51	TAMBELLUP	567
52	PLANTAGENET	606
53	DENMARK	657
54	ALBANY	662
		661

METROPOLITAN REGIONAL AUTHORITIES

INDIAN OCEAN

SOUTHERN

PREFERRED AREA FOR FOR PINE FORESTS.

Rainfall limit for effective growth of radiata pine.

70 km radius of likely future processing facilities.

PART 3

OPTIONS FOR PINE PLANTING IN WESTERN AUSTRALIA

Choice of Species to Plant

From research extending back 50 years, two species of pine have been found suitable for large scale planting in Western Australia. These are Pinus radiata (radiata pine) and Pinus pinaster (pinaster pine). Radiata grows faster, producing high quality sawlogs in 30 years provided appropriate thinning regimes can be followed. The thinning requires markets for small, low quality material for particle board or pulp manufacture. Pinaster is slower growing, taking 40 years or more to mature, but it can be used on poorer and drier sites than radiata. Because of its higher growth rate, radiata is the preferred species wherever it can be grown, since it is economically more attractive and the most practical means of rapidly overcoming sawlog supply deficiencies.

Both species produce excellent timber with wide application in the building and furniture industries. Pine is less inclined to twist, does not shrink (as it is used only in a seasoned condition) and is much easier to lift, cut and nail than hardwood.

Both pines grow well only in a Mediterranean climatic zone. Radiata requires a minimum annual rainfall of 700 mm, whereas pinaster will grow well down to a rainfall of 550 mm. Neither species will tolerate the heavy gravel soils frequently encountered in the south west of the State, especially if the soil contains laterite boulders.

Within Western Australia only a limited area provides suitable soil and growing conditions (Map 1). The bulk of this area is located west of the Albany Highway, with smaller areas along the south coast and on the coastal plain north of Perth. Possible reforestation outside the south west zone is not considered in this study.

TABLE 7

SUITABILITY, EXTENT AND ENVIRONMENTAL ACCEPTANCE OF FOREST TYPES FOR ESTABLISHING PINE FORESTS

FOREST TYPE	Suitability for Conversion to Pine				Extent of the Forest Type (1) (hectares)				Environmental Acceptance			
	Climate		Soils		Crown Land		Private Property		Crown Land		Private Property	
	Radiata	Pinaster	Radiata	Pinaster	Forested	Other (2)	Forested	Cleared	Forested	Other (2)	Forested	Cleared
1. Karri	High	High	High	High	Large	Small	Med.	Med.	Nil	Nil	Low	Med.
2. Tuart	High	High	Med.#	High	Small	Nil	Med.	Med.	Nil	N/A	Med.	High
3. Wandoo, Mallet	Low	Med.	Low	Med.#	Large	Nil	Med.	Med.	Low	N/A	Med.	High
4. Treeless Plains South Coast	High	High	Nil	Low	N/A	Large	N/A	Med.	N/A	Med.	N/A	High
5. Northern Jarrah, Central Jarrah												
5.1 Fertile Valleys	High	High	High	High	Med.	Small	Med.	Large	Nil	Low	Med.	High
5.2 Sandy Soils Sunklands (3)	High	High	Med.#	High#	Large	Med.	Med.	Med.	Low	Med.	Med.	High
5.3 Jarrah West of Dunsborough Fault	High	High	High#	High#	Small	Small	Small	Med.	Nil	High	Med.	High
5.4 Sandy Soils Collie Coalfields	High	High	Low#	Med.#	Med.	Small	Small	Med.	Med.	High	High	High
5.5 Laterite/Bauxite	High	High	Low#	Med.#	Large	Med.	Med.	Med.	Nil	High	Med.	High
6. Southern Jarrah/Marri	High	High	High	High	Large	Med.	Med.	Med.	Low	Med.	Med.	High
7. Woodland of the Coastal Plain												
7.1 North of Perth	Med.	Med.	Nil	High#	Med.	Small	Med.	Med.	High	High	High	High
7.2 Bunbury to Perth	High	High	Low	High#	Med.	Small	Small	Large	Low	High	High	High

NOTES: (1) In describing the extent of the forest type
Large = 100 000 + hectares
Medium = 10 000 - 100 000 hectares
Small = <10 000 hectares

(2) "Other" means cleared, damaged, diseased or mined.

(3) Between Darling and Dunsborough faults

= with treatment

Other Factors

In addition to biological constraints, there are economic limits to how far pine forests should be established from processing plants. Some 50 - 60 per cent of the total cost of pine at the mill door is usually harvesting and haulage cost. The closer the forest is to the mill, the more economic the forest becomes. Present day harvesting technology dictates that the bulk of the pine resource should be located within 70 km of the processing plant, whether it be sawmill or residue-using factory such as a pulp mill. In the medium term, the most likely sites for pine processing facilities are in the Bunbury-Manjimup region. In the longer term a facility could be developed at Denmark or Albany if a sufficiently large resource were created in that area.

Given the major biological and economic limitations listed above it is possible to identify a range of locations suitable for pine reforestation in the south west. These are shown according to forest type in Table 7 which illustrates the availability of suitable Crown land and private property for pine planting and whether such land use is likely to be environmentally acceptable. From this table it is reasonably simple to reject alternatives which are, for obvious reasons, not worth further study. There are others which prove unacceptable on closer examination.

Since P. radiata is the preferred species, the only option considered here for P. pinaster is Crown land woodland north of Perth. There are 14,000 hectares of this area in State forest tenure and wood production is a favourable land use in conjunction with protection of underground water supplies. This area will sustain a programme of 500 hectares per year for the period under review.

Of the remaining options, those in which soils and climate are suitable for P. radiata and are environmentally acceptable fall into two categories, namely, private property and Crown land.

Using information from the Australian Bureau of Statistics approximately 450,000 hectares of private property has been identified as suitable for pine planting and is distributed as follows :

SHIRE	CLEARED HA.	UNCLEARED HA.
CAPEL	30,000	8,000
BUSSELTON	70,000	11,000
AUGUSTA-MARGARET RIVER	50,000	13,000
NANNUP	15,000	10,000
DARDANUP	20,000	-
DONNYBROOK-BALINGUP	45,000	16,000
BRIDGETOWN-GREENBUSHES	50,000	10,000
MANJIMUP	60,000	8,000
DENMARK	25,000	10,000
TOTAL	365,000	86,000

There would obviously be a considerable proportion of this area which is best suited for agriculture or horticulture but on some, the best land use would be silviculture. Just what proportion this is cannot be stated with confidence but is unlikely to exceed 10 per cent, that is 45,000 hectares and could be considerably less. Some Shires have expressed direct opposition to changes of land use from agriculture to forestry.

The availability of Crown land for softwood production is controlled largely by perceived conservation attitudes. These may be best summed up by quoting from the National Conservation Strategy for Australia, Section 33(h) and (i):

(h) "Promote the substitution of plantation products for native forest products, recognising that plantation forestry can reduce demand on native forests.

(i) Conserve viable native forests by avoiding clearing such forests for plantations and by concentrating plantations on previously cleared, or substantially cleared, areas."

This quote also reflects current Government policy.

The word "viable" in (i) can be interpreted from various viewpoints. If given a more strict environmentalist meaning the only areas of Crown land which could be considered available and suitable are those currently cleared or diseased on the Donnybrook Sunkland. This is approximately 11,600 hectares.

If the word "viable"is interpreted in terms of productivity for such land uses as recreation, water production, timber production, scientific study or educational demonstration of forestry there are quite large areas of the Sunkland and of the southern jarrah-marri forest type which would be suitable for pine establishment. About 40,000 hectares of the Sunkland north of the Blackwood river would be suitable.

Clearly the selection of options which could be used to provide self sufficiency in sawlogs for Western Australia dependson subjective value judgements. Only the following areas are reasonably assured of being available.

Area currently planted by the F.D.	57,000 ha
Area available for P. pinaster	14,000 ha
Area of Sunkland cleared or diseased	12,000 ha
Total	83,000 ha

Approximately another 52,000 ha are required from either private property or Crown land areas to meet the State supported programmes over the next 25 years. Yield forecasts already assume that private property owners will plant an additional 12,000 hectares. In past years some 17,000 hectares of private property have been purchased by the State for reforestation with pine.

It is possible to envisage several methods of funding on the areas suitable for planting which may influence the selection of options.

Private funds could be used to establish pine on Crown land or private property. Public funds could also be used to plant on Crown land, to purchase private property or to provide incentives to private property owners.

If the programme is concentrated on repurchased private property, State costs for land would be at least $78 million over the next 25 years. The possibility of incentive schemes or leasing arrangements currently under investigation could reduce costs.

It does seem likely however, that the State will need to either plant some areas of Crown land not either cleared or diseased, or consider exchanging Crown land unsuitable for forestry as a land use for more suitable private property if self sufficiency is to be achieved. There are extensive areas of treeless plains near the couth coast which might be appropriate for consideration.

PART 4

CONCLUSIONS

The data presented in this study indicates that Western Australia's timber needs in the medium term (to the year 2020) can be supplied from pine forests of 160,000 ha established in the southwest by the year 2008. It is assumed that 25,000 hectares of this area will be entirely private ownership.

The present area of pine forest is 69,300 ha, of which 57,000 is State-owned.

To reach the target figure for State supported plantations a further 78,000 ha needs to be planted by 2008 at a rate of 3250 ha per year. (Subject to continuing review in the light of future progress and changes in circumstances).

A number of alternative planting options have been considered. Many of these must be considered unavailable on social, environmental or technical grounds. Of the remaining options, the following have the greatest immediate potential for pine forest development by the State :-

1. Private property in the Shires of Capel, Busselton, Augusta-Margaret River, Dardenup, Donnybrook-Balingup, Manjimup, Nannup, Bridgetown-Greenbushes.

2. The planting of areas already cleared or affected by jarrah dieback in the Sunklands.

3. The conversion to pine of scrubby woodlands on the coastal plain north of Perth.

4. Exchange areas of private property for areas of Crown land on which forestry is not a suitable land use.

It may not be possible to purchase as much agricultural land as is needed to maintain the pine planting programmes. Incentive schemes to encourage farmers to plant pines on their own property

are as yet only at the investigation stage and the question of exchanging Crown Land in return for plantable private property also needs further examination.

If, because of these uncertainties, a shortfall in land from other sources occurs at any particular time it would be prudent to retain the options of clearing jarrah forest near Manjimup or in the Donnybrook Sunklands to consolidate existing pine forests in these localities.

Research should continue into improving productivity of both hardwood and softwood forests.

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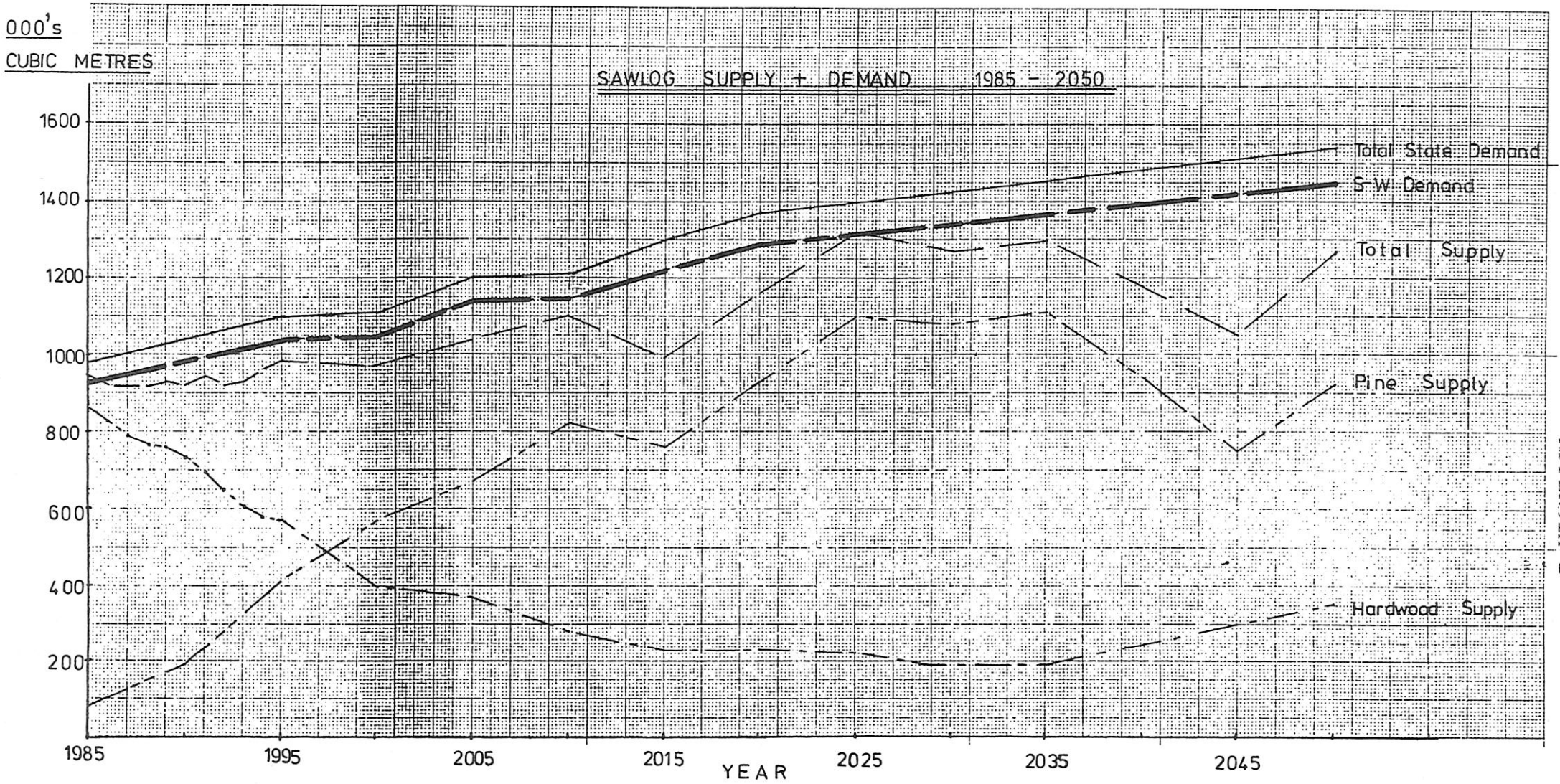
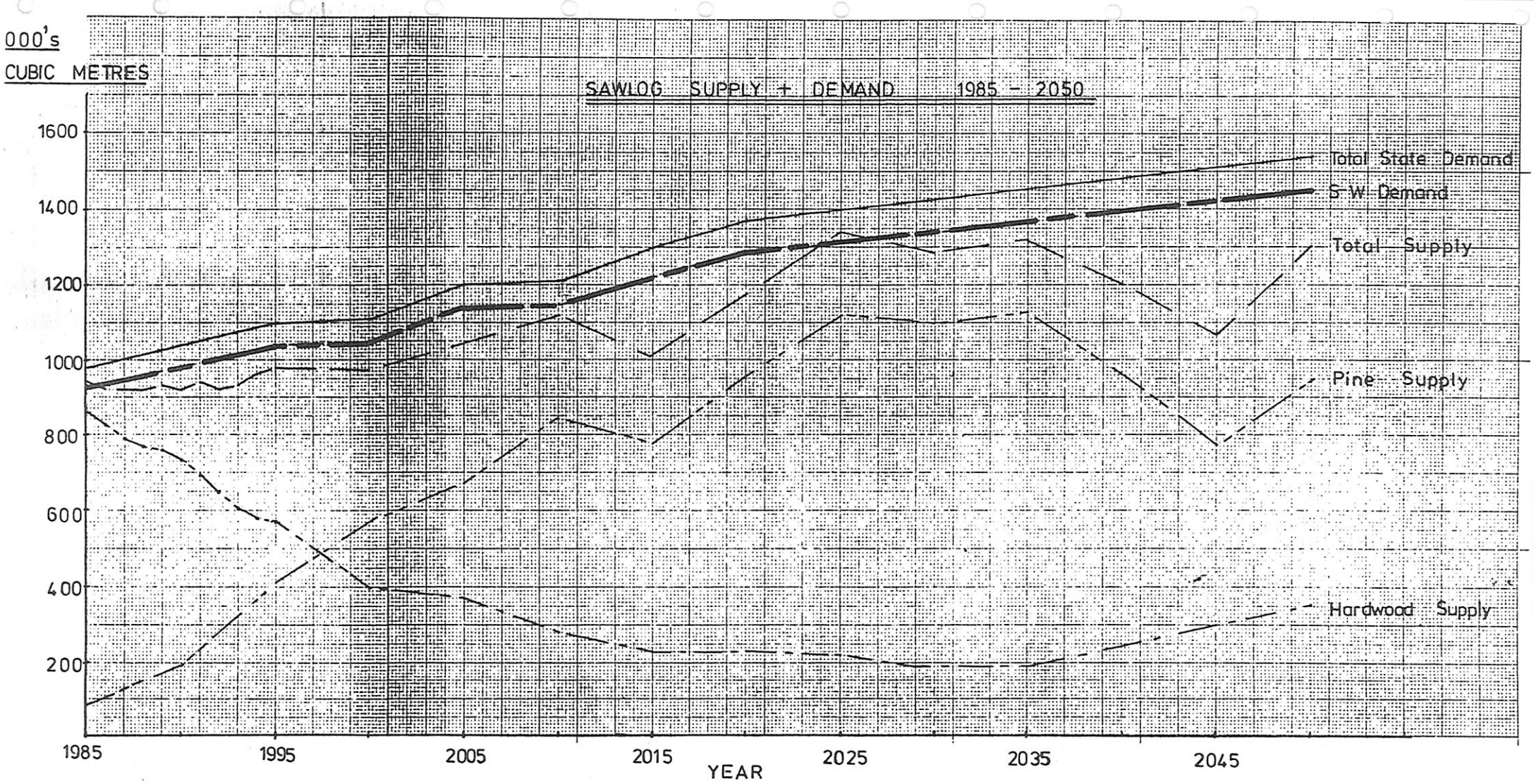


NOTES:

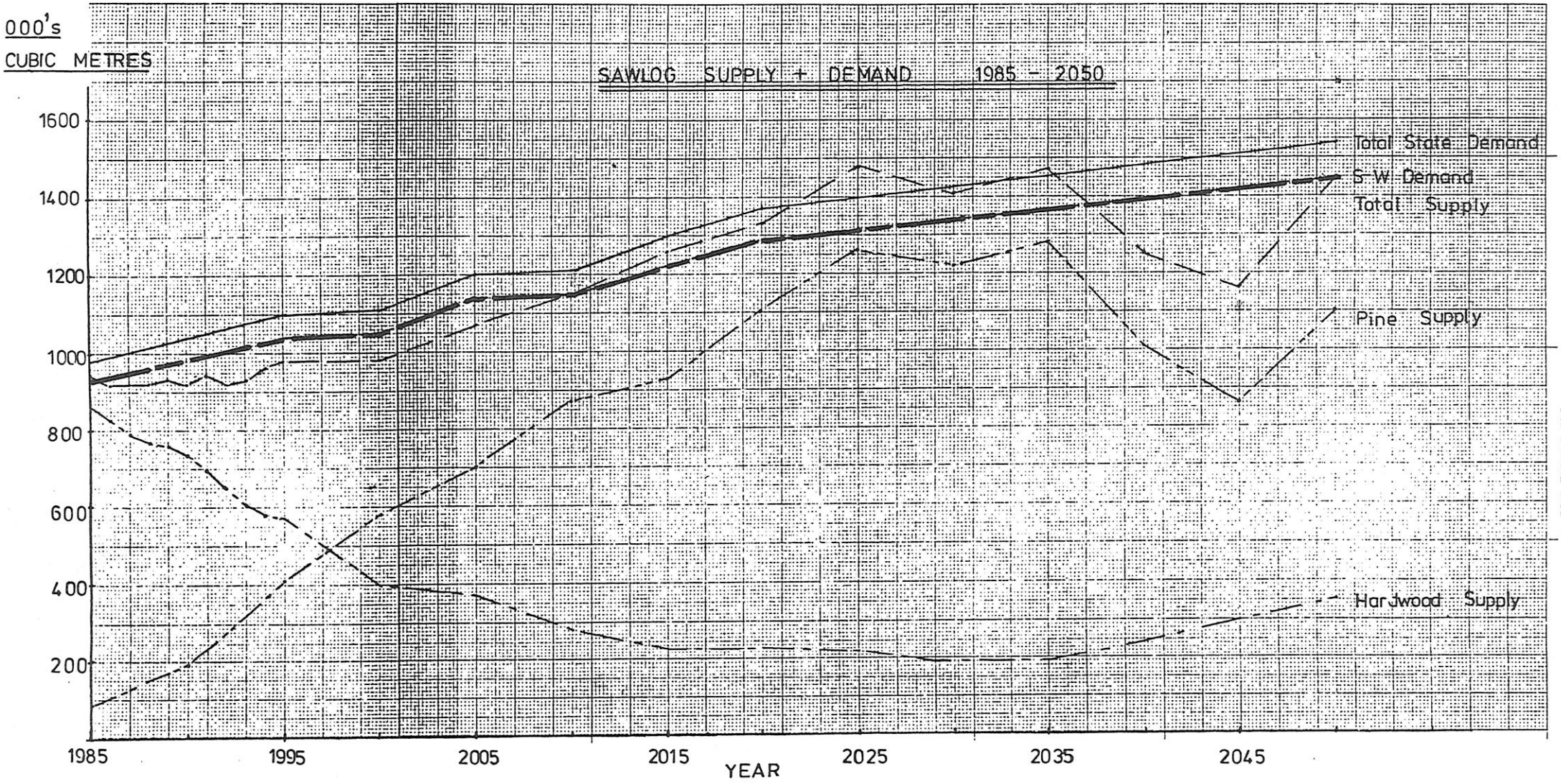
1. Pine Supply
   - 1.1 Is based on an annual rate of 2 800 ha/year until the year 2008, made up of F.D. planting: 1 800 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.
2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.



NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 3 000 ha/year until the year 2008, made up of F.D. planting: 2 000 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

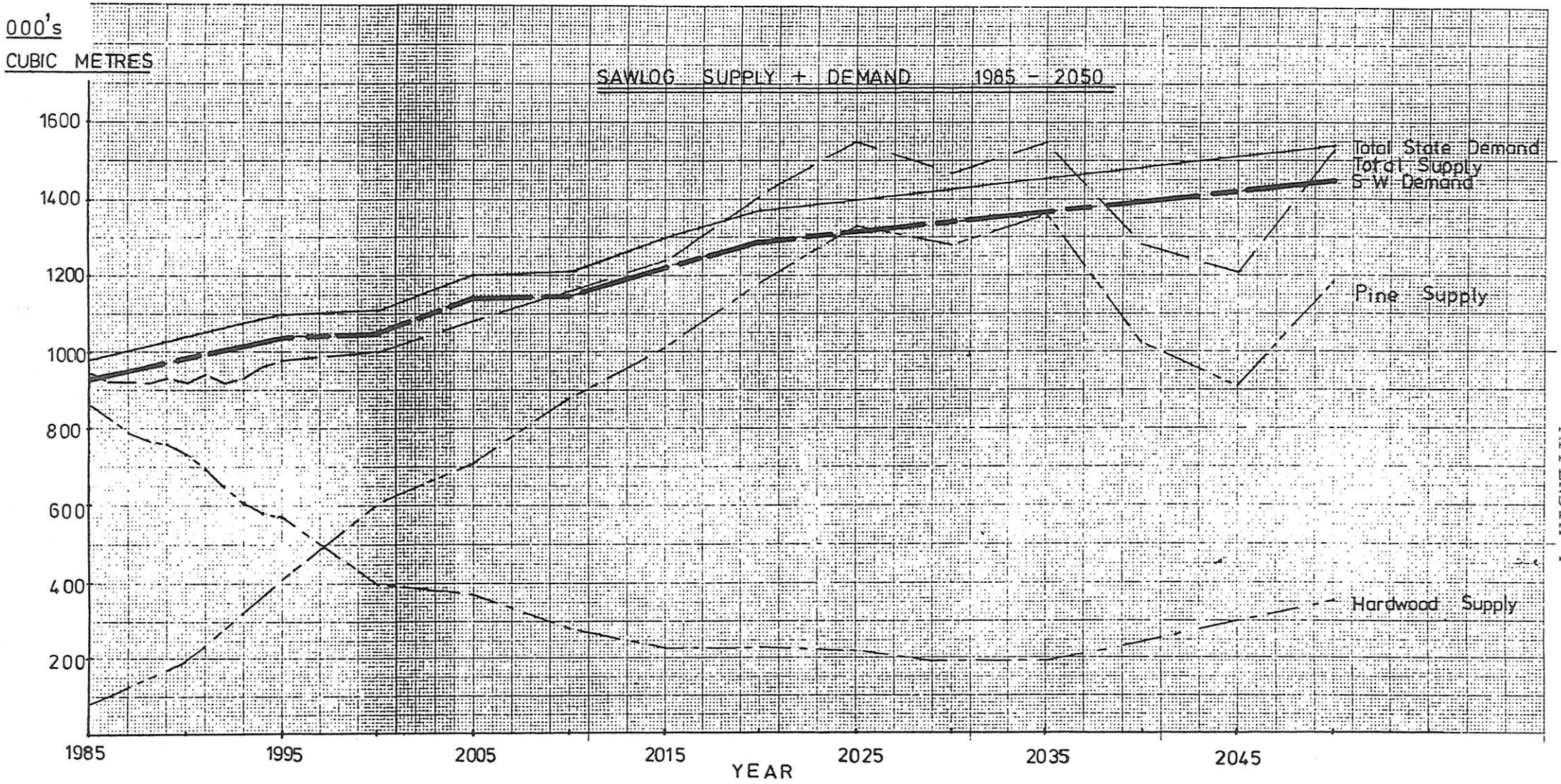
2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 Excludes the resource on the Shannon basin, and the proposed northern jarrah reserve.
   - 2.4 Allows for sawlogs from jarrah regeneration after the year 2018.
   - 2.5 Assumes 100 000m³ sawlogs from private property until 1990, reducing to zero at 1995.



APPENDIX 3

NOTES:

1. **Pine Supply**
   - 1.1 Is based on an annual rate of 3500 ha/year until the year 2008, made up of F.D. planting: 2 500 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.
2. **Hardwood supply**
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.

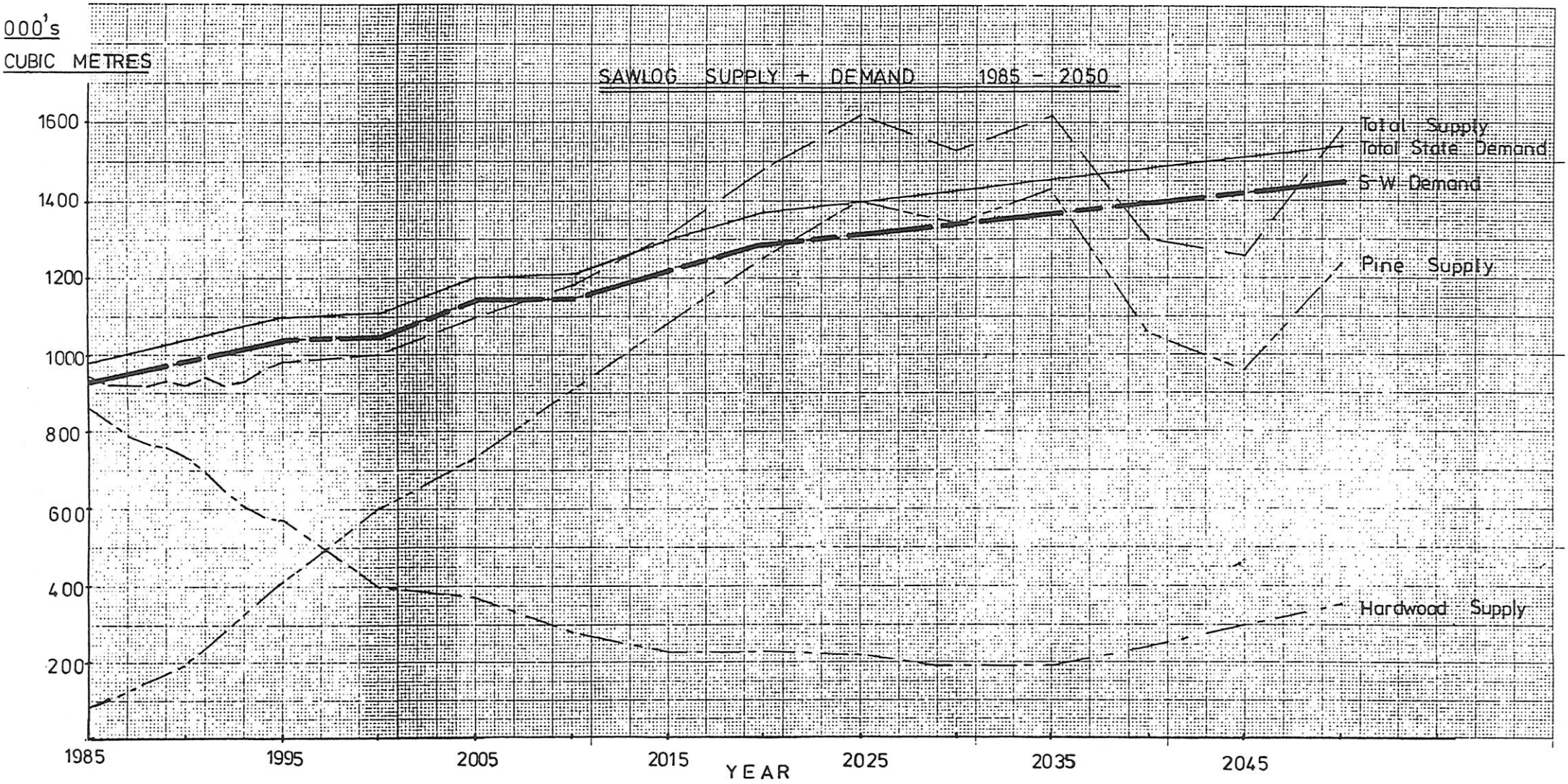


APPENDIX 4

NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 3 750 ha/year until the year 2008, made up of F.D. planting: 2 750 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

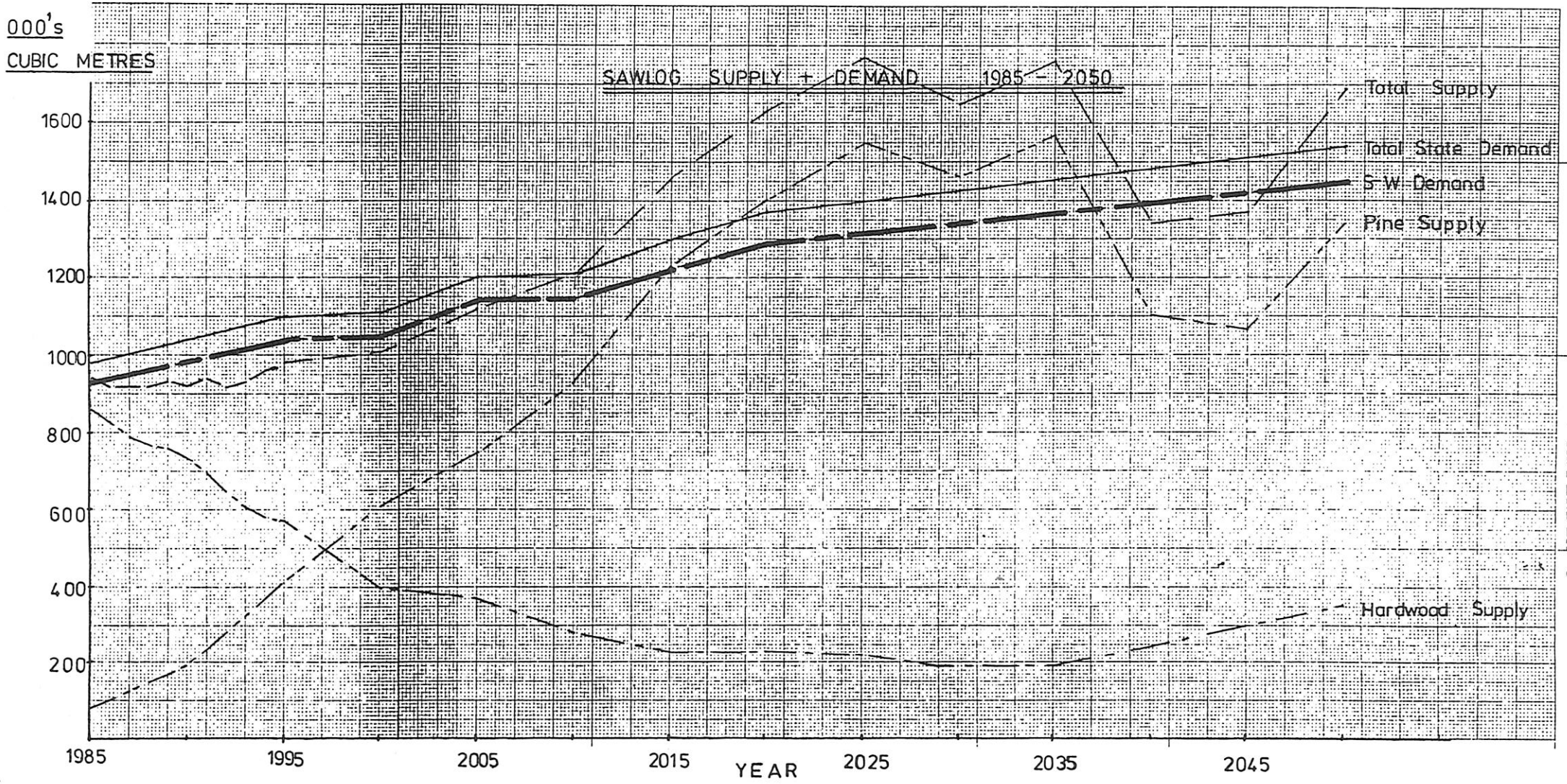
2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 Excludes the resource on the Shannon basin, and the proposed northern jarrah reserve.
   - 2.4 Allows for sawlogs from jarrah regeneration after the year 2018.
   - 2.5 Assumes 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.



NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 4 000 ha/year until the year 2008, made up of F.D. planting: 3 000 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.



APPENDIX G

NOTES:

1. Pine Supply
   - 1.1 Is based on an annual rate of 4 500 ha/year until the year 2008, made up of F.D. planting: 3 500 ha/yr radiata; 500 ha/yr pinaster: Private Planting: 500 ha/yr radiata.
   - 1.2 A 10% reduction in yield has been made to allow for losses due to fire, wind, insect, disease.

2. Hardwood supply
   - 2.1 Assumes no change in hardwood markets, log standards, or processing technology.
   - 2.2 Is based on levels of cut prescribed in GWP 87, but
   - 2.3 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 100 000m^3 sawlogs from private property until 1990, reducing to zero at 1995.

APPENDIX 7: LONG TERM YIELD

TOTAL THINNING YIELD ESTIMATE

151:MR29P, MR30R

RADIATA AND PINASTER - WHOLE REGION

PLANTING IS TO THE YEAR 2008 NO PLANTING THEREAFTER

THINNING YIELD (CUBIC METRES) AND FOREST AREA STATEMENT

BOTH VOLUME AND AREA ARE 5 YEAR AVERAGES

REGENERATION PERIOD OF 2 YEARS

THINNING YIELD (CU.M.) AND FOREST AREA STATEMENT FOR THE 50 YEAR PERIOD STATED

	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025
CHIPWOOD YIELD CU.M.	316462	372443	450034	508824	537120	725922	813057	743189	701382	645949
SAWLOG YIELD CU.M.	47586	84982	210698	367194	496372	742687	919863	1048281	1204986	1287776
TOTAL YIELD CU.M.	364049	457427	660733	876019	1033493	1468611	1732921	1791470	1906369	1933725
HECTARES ESTABLISHED	2543	3250	3250	3250	3250	3250	650			
HECTARES REGENERATED	334	72	553	994	1193	2573	4331	3210	3567	4176
TOTAL FOREST AREA	49865	64483	80733	96983	113233	129483	139233	139233	139233	139233

THINNING YIELD (CU.M.) AND FOREST AREA STATEMENT FOR THE 50 YEAR PERIOD STATED

	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075
CHIPWOOD YIELD CU.M.	557616	712024	833159	734659	754096	659898	578877	634530	772713	800125
SAWLOG YIELD CU.M.	1266024	1436237	1089600	944698	1125352	1290288	1264131	1350855	1278100	931774
TOTAL YIELD CU.M.	1823641	2148262	1922760	1679357	1879449	1950186	1843009	1985386	2050814	1731900
HECTARES ESTABLISHED										
HECTARES REGENERATED	4224	5230	5435	3881	3393	3920	4241	4582	6227	4382
TOTAL FOREST AREA	139233	139233	139233	139233	139233	139233	139233	139233	139233	139233

EACH FIGURE IS SUBJECT TO TRUNCATION AT THE OUTPUT STAGE.