R.J. UNDERWOOD

The attached paper on overcutting in the jarrah and karri forest is provided, through your initial request, as background material and as a discussion base.

I have not been successful in reducing it to a simple explicit summary. The subject is very technical or conceptual in many aspects and the practice in W.A. has been contradictory; at least since 1970.

You will realize that the final sections are largely my personal comments, although I have had good discussions within the Inventory Section. These are purely intended as thought starters as I believe our recent approaches to allowable cuts has not offered all the options and stated the consequence of decisions that are required.

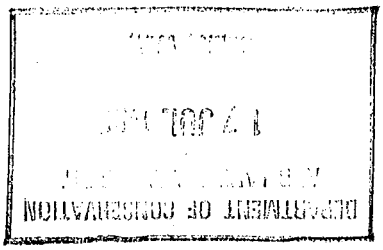
The second paper on Jarrah Forest Policy arose from a previous comment that a policy was required before we could design a suitable inventory for the jarrah forest. You suggested that Jan van Noort and I could provide a useful draft policy. This we have done following inputs from Messrs. Bradshaw, Peet, Spriggins, Keen, Lejeune and Batini.

E.R. HOPKINS
MANAGER, INVENTORY, MAPPING & COMPUTING

ERH:EM
November 7, 1985.

Z 82783. Mem

COPY ON 326/77



DR HOPKINS
INVENTORY, MAPPING
AND COMPUTING BRANCH
COMO

Dear Eric

Can you please summarise for me the position re "overcutting" in the jarrah and karri forests.

For example:

- Historical relationship between cut and growth of sawlogs.
- Likely trend.
- Effects of changes in log standards, inclusion of "salvage" logs in both parts of the equation.
- The overall position for sawlogs and chipwood in the karri.

R.J. Underwood
GENERAL MANAGER

RJU:KC

16 July 1985

24/7/85

① Dr Hopkins ERAF.

OVERCUTTING IN JARRAH AND KARRI FORESTS

SUMMARY

The term overcutting in forestry relates to an excess over an allowable cut set to meet a management objective. This objective concerns the supply of a specific product or the creation of a specific forest condition, a specified time period to achieve the objective, an average rate of cut and a defined resource base. Overcutting is adverse to the management objective and it is essential that the forest condition required of a cut is prescribed, if the yield is to be regulated. Yields from overcutting cannot be regulated from the amount of product removed.

In Western Australia, the objective of the cut as set by Working Plans for the forest has primarily been to support the general purpose sawmill industry, its infrastructure and related social benefit. In recent years a secondary objective has been to maintain a high level of cut until the State can be made self sufficient in sawlogs through softwood plantations.

Over the period of setting the allowable cut there has been great variation in both log quality standards and the forest area available for wood production. Information on inventory and growth has generally been inadequate. This is probably unimportant with respect to the objectives set and great changes in the resource base.

The current cutting satisfies the objectives to prevent timber imports while waiting for the plantation sources to produce the major future log supply. Resource information is, however, now adequate to show that the jarrah forest is being grossly overcut with respect to providing a reasonable sustainable yield. This requirement has, however, never been stated as a major objective in planning the cut and has always been subservient to current economic needs.

It is probable that a reasonable and realistic yield of wood will be sustained from the hardwood forests. This yield will focus on resources previously considered as not suitable for general purpose sawmilling. Woodchips and salvage saw logs are already having a very significant role in the economies of forest use and promise future benefits from the effective silvicultural treatment which they can promote.

It is expected that the economy of Western Australia is now becoming sufficiently mature to cater for sustained yield management of the forests.

INTRODUCTION

The term overcutting in forestry relates to an excess over an allowable cut set to meet a management objective. This objective concerns the supply of a specific product or the creation of a specific forest condition, a specified time period to achieve the objective, an average rate of cut and a defined resource base.

Management Objectives - The objectives of management are variable and derive from a compromise between meeting the needs of the present generation of people and meeting the anticipated needs of future generations. Past foresters in Western Australia, and in all developing countries, had an economic management objective to meet the urgent needs of the current population. The objective was the rapid conversion of natural resources to provide capital for development in industrial and primary sectors.

In societies with more mature economies, where current needs are less urgent, the needs of future generations are taken into account by -

(i) Modifications to silvicultural practices and logging policies to minimise adverse environmental effects.

(ii) Commitments to the principles of continuing growth and sustained yield which imply a stable resource base

(iii) Specifications of what the condition of the forest should be after a cycle of silvicultural and harvesting operations.

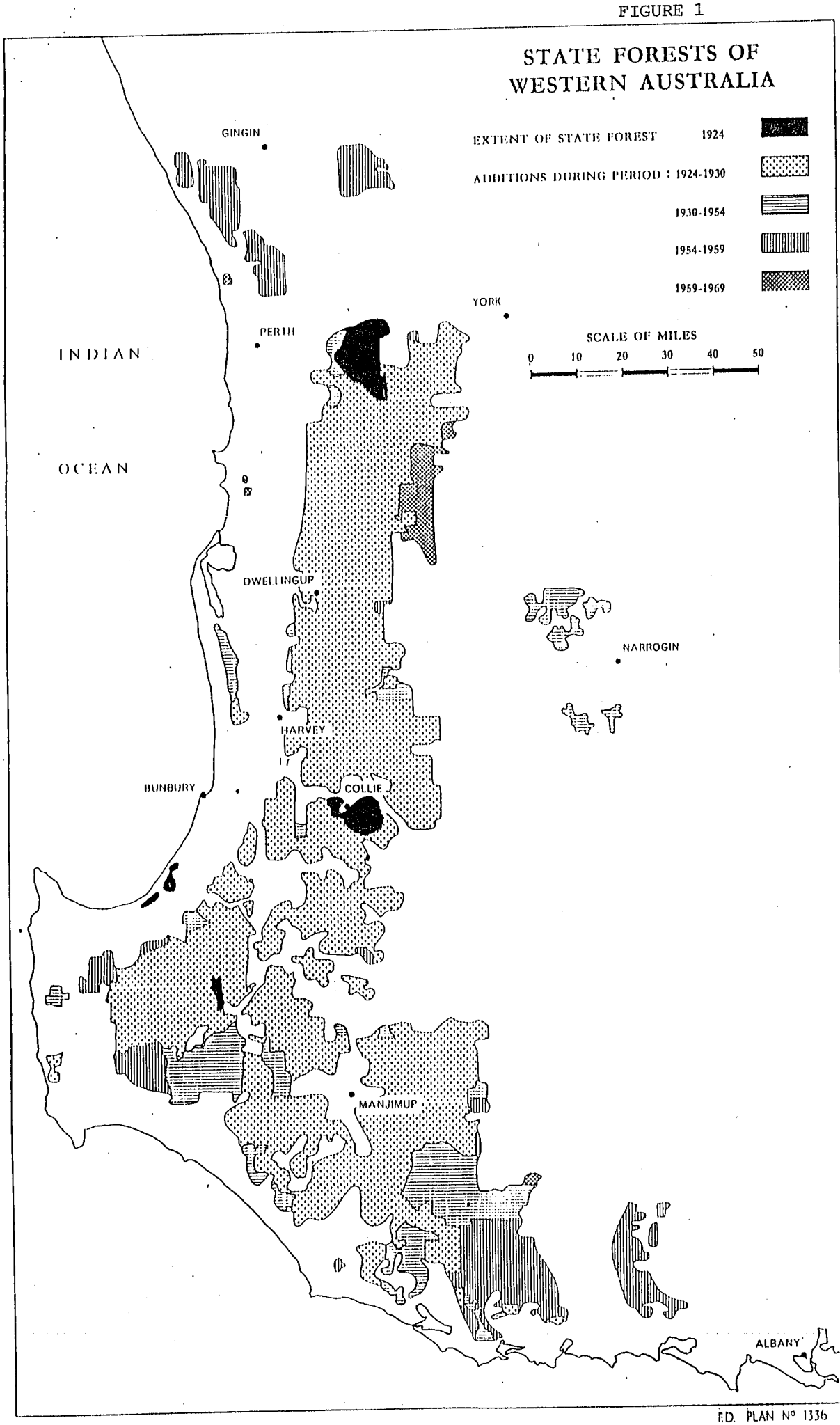
Two important aspects which determine forest condition, are density and structure, (i.e. the distribution of age classes or size classes) and the desirable condition specified for a managed forest may well vary with the particular land use activity allocated to an area. For forest where the primary land use is wood production and the objectives include sustained yield the desirable condition is one which maximises volume increment and therefore maximises the sustainable cut. This is not necessarily the case for other land use categories, e.g. recreation and amenity areas which may favour the expression of the mature and overmature states of the forest.

The biological and aesthetic management objectives for cutting, or forest use, are a factor only in mature societies. They imply a stable resource base, defined silvicultural and utilization objectives, a dynamic forest condition and the means to measure and predict the impact on the forest of a prescribed level of cut.

Yield Regulation - Overcutting applies to situations where the level of cut is so high that its impact on the condition of the forest is adverse to the objectives of management. Effective yield regulation prescribes a level of cut which promotes the objectives of management. The impact on the forest of a prescribed level of cut must therefore be predictable to allow continual monitoring of the operation.

In Western Australia the hardwood yield is regulated on the basis of a series of commitments to industry. In effect, yield control is achieved by regulating the supply of general purpose (G.P.) sawlogs. We require that operations supplying other products be integrated the with GP sawlog operations, which until recent years, provided the major product.

FIGURE 1



F.D. PLAN N° 1336

The specifications for GP sawlogs vary dramatically in time. Economic conditions, scarcity and logging constraints such as hygiene management all influence the acceptance standards for sawlogs. A recent event in the Northern Region provides a good example. An almost overnight change in standards doubled the availability of sawlogs in a jarrah coupe. Consequently the impact on the forest due to meeting that particular commitment was halved. Similar, though less dramatic events are commonplace. They justify the statement that the impact on the forest due to a prescribed level of cut is not predictable under our system of yield regulation.

A logging operation modifies the density and structure of the forest. Its impact must be measured in terms of the total volume and size class of trees removed in comparison to what was there before. Impact cannot be measured in terms of the volume of products supplied and we will not have efficient control and be able to answer such questions as "are we overcutting" until yields are regulated in terms of gross bole volume or biomass.

THE HISTORY OF YIELD CONTROL IN WESTERN AUSTRALIA

1920-1940

The initial regulation implemented for the hardwood cut in Western Australia was in 1927 and 1928 with working plans for karri and jarrah. They were really only concerned with the supply of timber to the general purpose (GP) sawmills.

A rotation of 90 years was specified for jarrah and a cut of logs above a 183cm girth limit was set at 644,000m^3 per annum for an initial cutting cycle of 45 years.. As it was believed that the existing cut was excessive it was reduced by 130,000m^3 per year over the period 1928-1933.

The cut in karri was set to continue at a rate of 212,000m3 per annum for 15 years. These specifications were made with full acknowledgement of the lack of information of the resource base and increment. It was not until 1929-1933 that the major dedications of the karri as State forest were made and the current forest area base was not established until as late as 1954.

1944-1955

In the 1945 Working Plan for jarrah, karri and wandoo a 30 year cutting cycle was set to maintain the general purpose sawmills. The annual cut was proposed as 840,000m^3 per annum, harvesting only mature and overmature trees on a selection basis. The estimates of the cut for the second and third decades of the cycle were only tentative and given as a guide subject to correction at revision of the plan. It was stated that a second cutting cycle could proceed at the end of the first, although probably with a reduced cut.

This cutting to a size limit to remove the oldest tree classes did not impair the regenerative capacity of the forest, it favoured the increase in increment of medium and smaller size classes and was an initial step towards producing a dynamic forest. Management objectives at the time were of an economic nature whilst realizing the possible silvicultural benefit.

1955-1970

The 1956 General Working Plan noted "that it was still necessary to determine the cut using whatever information is available and, if necessary, overcutting in order to open up forest areas to provide finance for their protection and expansion and to remove overmature and damaged trees which are a diminishing asset." This was a clear and commendable objective. It was further recorded that "a discussion followed by a decision, rather than a calculation, must still remain the basis of determining the permissible cut for Western Australia, and prescription must remain elastic in view of the lack of precise data."

In setting these allowable cuts, the estimate of the volume of merchantable (GP) logs above the then merchantable cutting limit was made. It should be noted that the main area of permanent forest resource base was really not fixed (Fig.1) until 1954 and that the merchantable log limit reduced to 300 cm, 254cm, 183cm and 152 cm girth over the period of cutting control. With such a varying resource base, a variable allowable cut must be expected.

On the basis of resource estimates and intuition the cut for a five year period was prescribed at 1,260,000m^3 per annum.

It was also stated in the Plan, which showed the touch of the artist, that "it is necessary to bring imagination and confidence in future management, as well as mathematics to the question of sustained yield." As one of the future managers it is now easy to appreciate that the prognosis for the cut was strong on the former process and weak on the latter.

The objective for the 1956 Plan was clearly stated to remain as previously i.e. to stabilise the Timber Industry; to ensure continuity of operations, regular employment for the men engaged, and long life for the timber trade and the communities and industries dependent on it; and at the same time, to bring the cutting of the forests to a sustained yield basis.

1972-1976

The 1972 General Working Plan contained the first estimates of a sustained yield following definition of the total area available for State forestry purposes and the completion of a comprehensive inventory of the forest resources. The volume of sawlogs that could be cut from State forests and timber reserves on a sustained, long term basis was estimated at between 801,000m^3 and 1,056,000m^3 per year. The Plan allowed for some overcutting until 1990 until softwoods from plantations came onto the market to relieve the demand on the hardwood forest.

Here the management objective was for State self sufficiency in sawlogs of pine and hardwood.

The total long term hardwood sawlog yield from the forest was considered unlikely to exceed 840,000m^3 per annum.

In 1972, for the first time, rotation lengths were set for jarrah and karri. It was considered that the minimum log size required to overcome sawing and seasoning problems and provide a log of acceptable recovery in a reasonable time was 183cm girth breast height (g.b.h.) for jarrah and 300cm g.b.h. for karri; which should be attained in 150 years and 90 years respectively. Clear-felling with regeneration was promoted for karri to bring about the age class structure required for a more normal forest and sustained yield production.

1977-1981

The 1977 General Working Plan for Hardwood Forests and Pine Plantations was the first comprehensive multiple use plan prepared for Western Australia. It embraced a whole range of land use objectives, together with policies and management strategies designed to achieve them. It again emphasized that the hardwood forests were being overcut and allowed for a long term reduction, specified to coincide with increasing softwood plantation yields.

The objective to provide for self sufficiency in sawlogs by the year 2000 was continued. The annual hardwood cut was to be reduced by some 137,000m^3 over the proposed five year period of the plan.

The plan failed to emphasize the fact that although overcutting in sawlogs was critical, improved utilization to include wood chip and salvage log products would virtually double the use of log material from the forest. This increase, particularly for the karri forest, brought the useable harvest much closer to estimates of the actual increment of cellulose (including unmerchantable tree sizes) which must be considered for sustained yield.

By 1977 the general purpose minimum sawlog size was accepted as low as 50 cm diameter (152cm girth) due to improved utilization and increasing market demand on the forest.

FIGURE 2

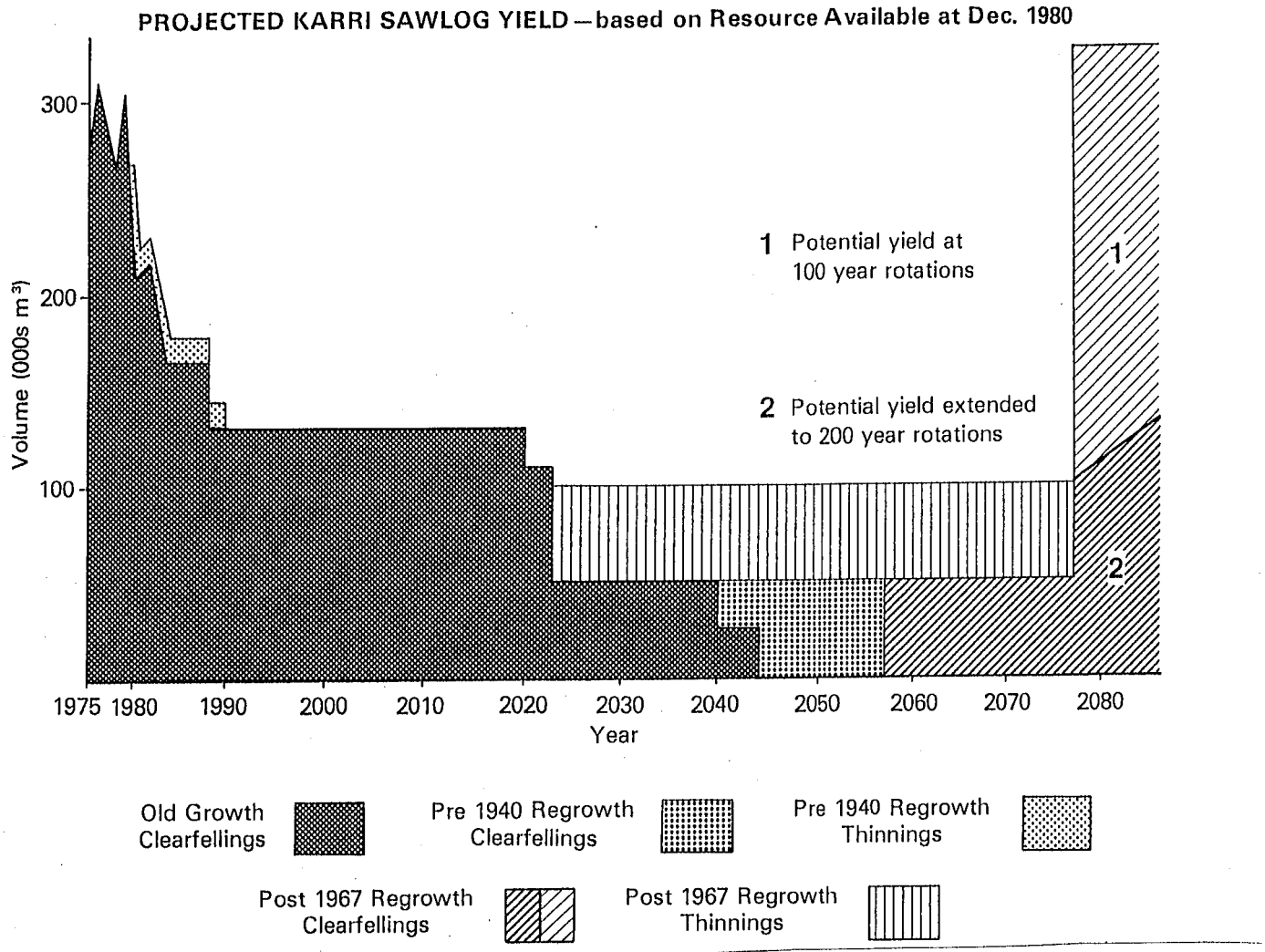
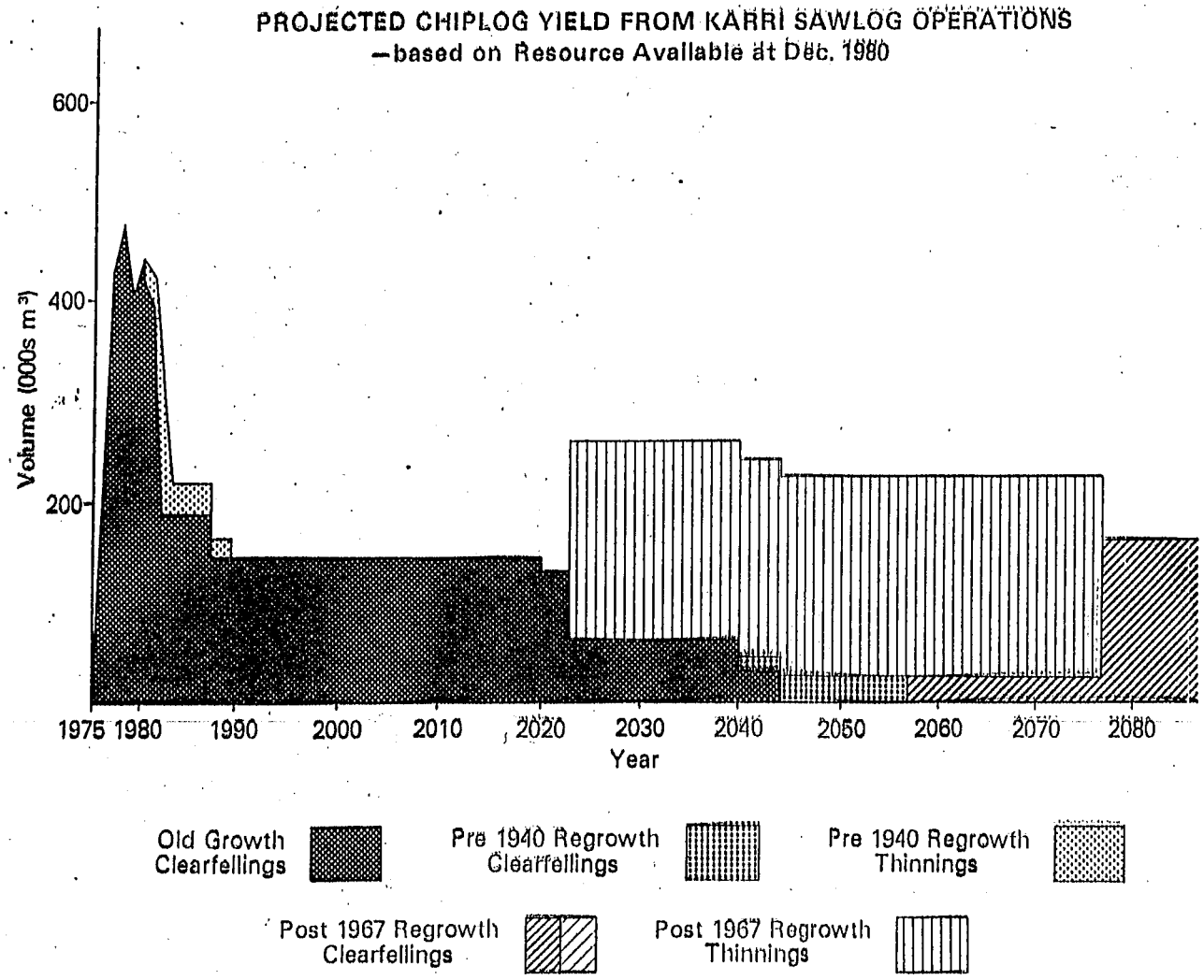


FIGURE 3



The 1977 plan was written with adequate knowledge of increment, area and resource structure and a long term yield study to prescribe a long term cut, sustainable over a 100 year rotation period, for karri. Examples of the long term yield prognosis were published in part in Conservation of the Karri Forest in 1981 to show the varying stand structures and log classes required to bridge the "non-regeneration gap" to meet more normal forest conditions by the year 2070.(Figs. 2 and 3).

In failing to focus onto the total product (log volume) which resulted from the cut the document did not reveal that the future allowable cut from the karri forest would approximately remain at that of the 1975-1980 GP cut, i.e. 300,000m^3 per year. The GP cut was playing a lessened role in enabling forest management to cut towards a normal forest structure and supporting the forest dependent economy.

1982-1985

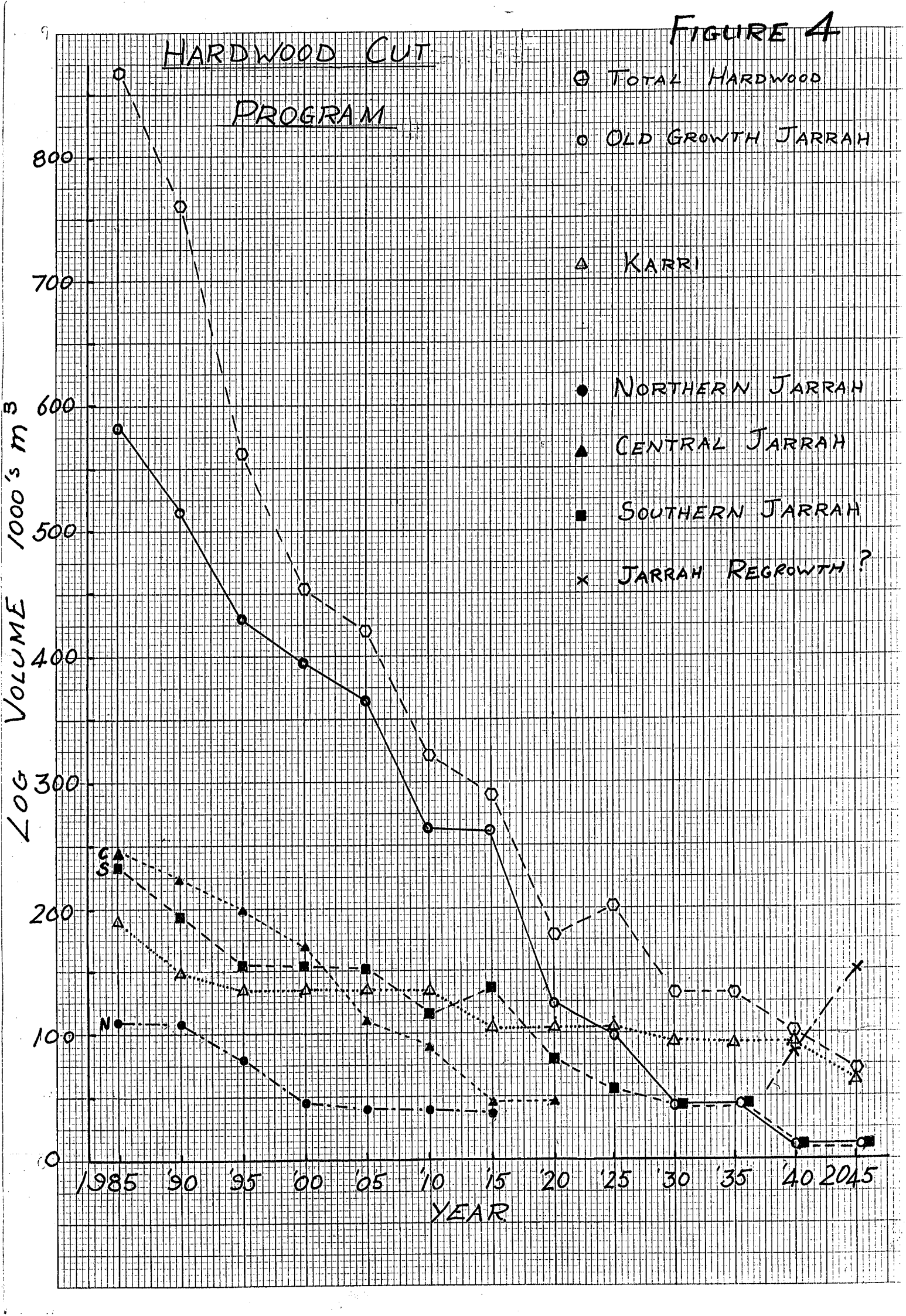
The 1982 General Working Plan for State Forests in Western Australia set the objectives for the allowable cut as -

1. To ensure that the estimated local demand for sawn timber and other wood products is met as far as possible from local supplies.

2. To gradually adjust the cut from the forest to a level consistent with the long term productive capacities of each species, having due regard for employment in the timber industry and the associated economic stability.

It noted (as in the 1977 Plan) that under ideal circumstances the allowable sawlog cut should equal the total annual growth of the forest in sawlog size classes and a consistent amount of growing stock should be maintained after the cut to allow the growth of small trees into marketable sizes. For this situation to apply it was seen as essential to have -

FIGURE 4


HARDWOOD CUT PROGRAM
TOTAL HARDWOOD
OLD GROWTH JARRAH
KARRI
NORTHERN JARRAH
CENTRAL JARRAH
SOUTHERN JARRAH
JARRAH REGROWTH ?
LOG VOLUME 1000's m3
YEAR
0
100
200
300
400
500
600
700
800
1985
'90
'95
'00
'05
'10
'15
'20
'25
'30
'35
40
2045
C
S
N

1. An area of forest securely dedicated to wood production.

2. Stable, long term markets, completely aligned with the types and quantities of products becoming available each year.

3. Roughly constant quantities of sawlog and other products becoming available each year.

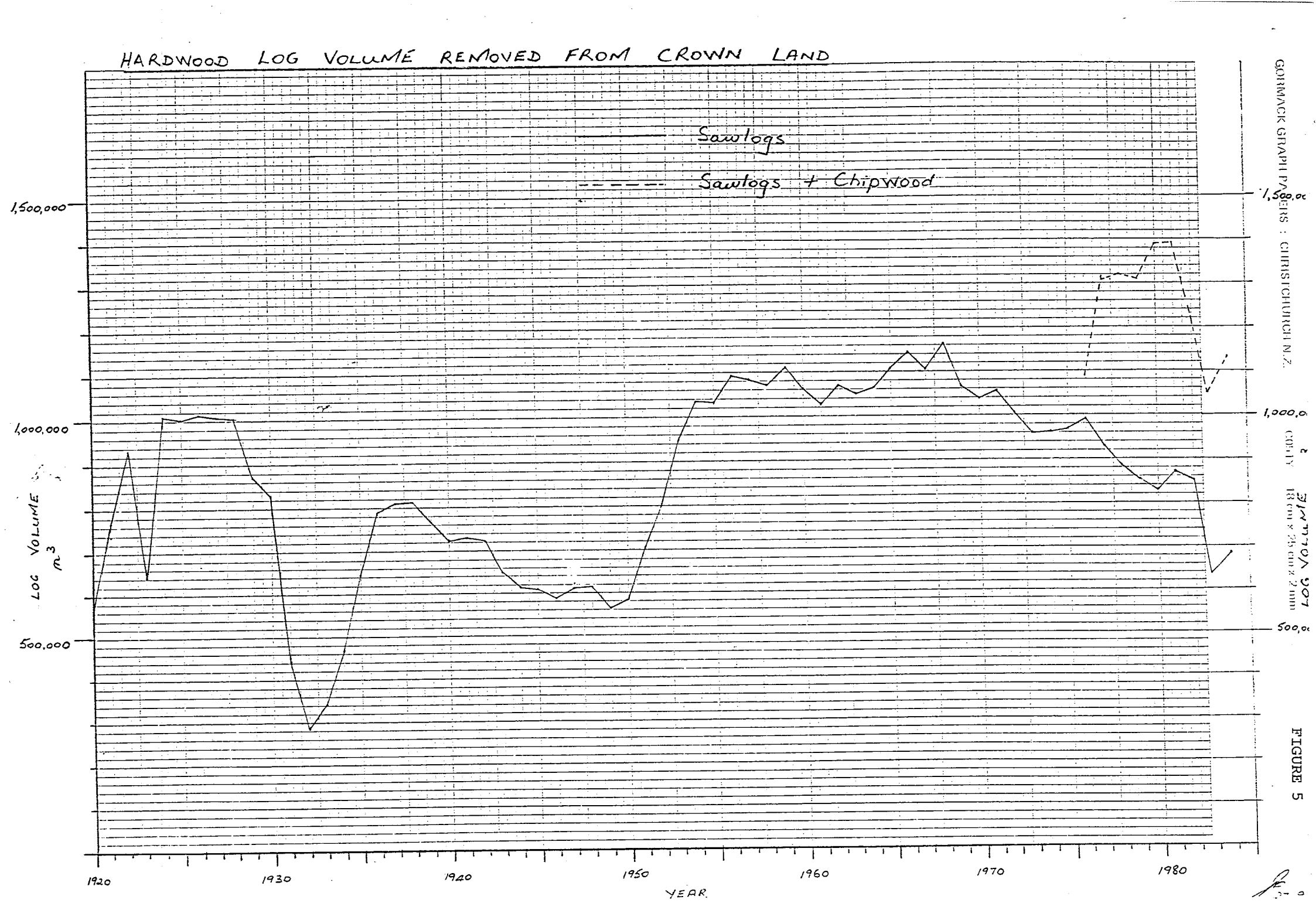
4. A forest made up of a complete range of age classes with equal productive potential.

It was stated however, that the concept of sustained yield could not be applied as there was not a complete range of age classes because of past cutting for markets restricted to a limited range of products i.e. for only the largest and best quality trees.

The plan considered it necessary to reduce the hardwood cut and recorded "For present purposes the allowable sawlog cut must be based on management decisions associated with social and economic welfare in the south-west but will be directed to areas that provide the maximum silvicultural benefits (i.e. favour the conversion of the forest towards the normal age and size distributions required.)"

The allowable hardwood cut had reduced by 24 percent to 823,000m^3 since the 1977 General Working Plan. The plan noted that the regeneration resulting from cutting since the 1880's would not provide any substantial quantities of sawlogs of economic size until well into the next century. It failed to point out that many of these stands (i.e. Inglehope, Big Brook, Treen Brook) were already providing other forest benefits required of them (aesthetics, recreation, catchment protection, forest preservation).

The Plan suggested that the rate of reduction of the cut, forecast in the previous working plan to 150,000-200,000m^3 in 50 years, did not need adjustment. This would give the general purpose sawlog supply situation as summarized in Figure 4.


HARDWOOD LOG VOLUME REMOVED FROM CROWN LAND
Sawlogs
Sawlogs + Chipwood
1,500,000
1,000,000
500,000
LOG VOLUME m³
1920
1930
1940
1950
1960
1970
1980
YEAR
GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z.
FIGURE 5

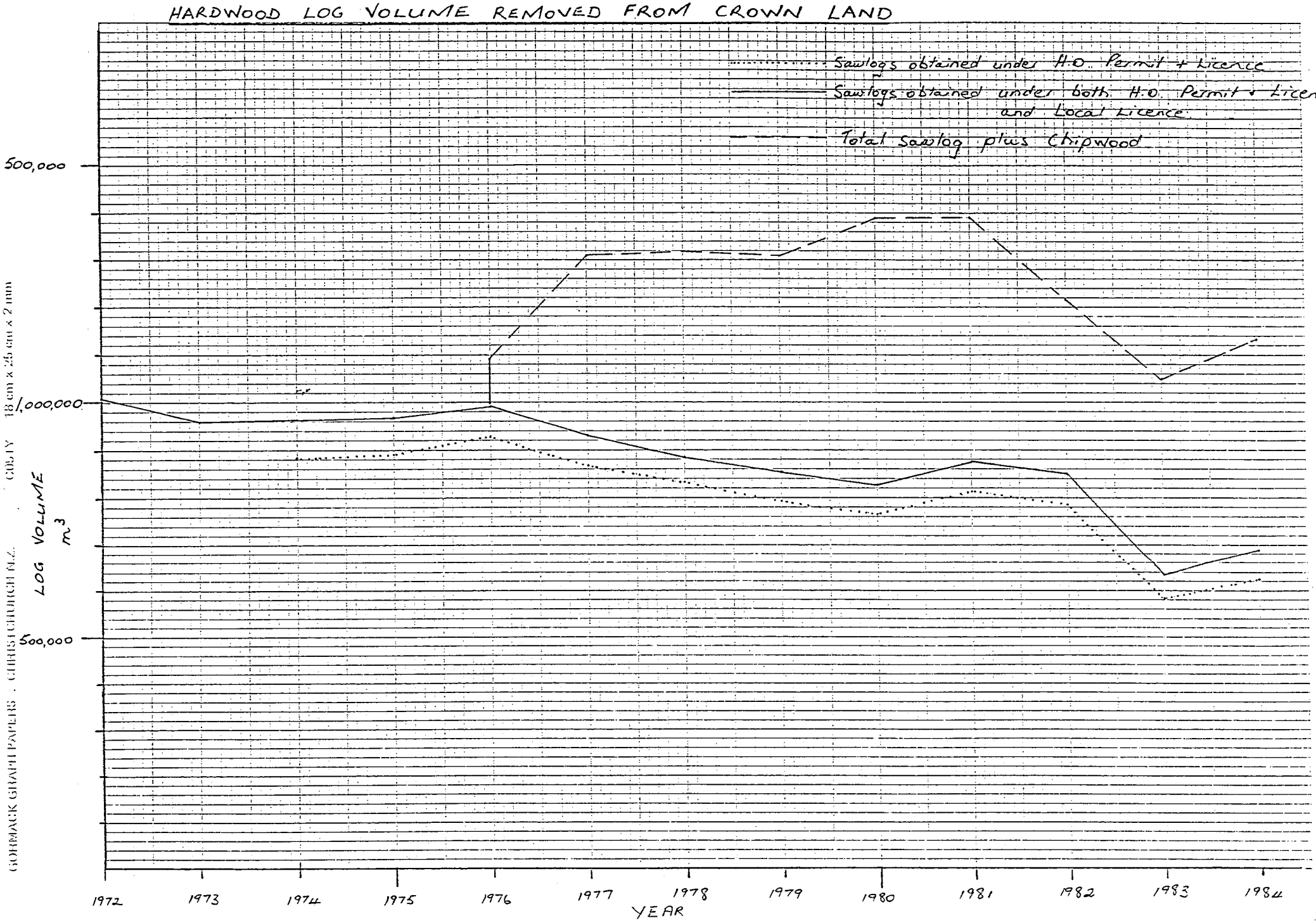

HARDWOOD LOG VOLUME REMOVED FROM CROWN LAND
Sawlogs obtained under H.O. Permit + Licence
Sawlogs obtained under both H.O. Permit + Licence and Local Licence
Total Sawlog plus Chipwood
500,000
1,000,000
500,000
LOG VOLUME m³
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
YEAR
GOLDMACK GRAPH PAPERS : CHRISTCHURCH N.Z. 18 cm x 25 cm x 2 mm

FIGURE 6

The GP hardwood cut was to be reduced to 762,000m^3 during the five year plan period. This cut is made up of 184,000m_3 of karri and 553,000m^3 of jarrah. The karri cut was to be further reduced by 27,000m^3 in 1988. The statement for non GP logs, which were becoming as significant as the GP material, is unclear.

THE VARYING CUT

The preceeding brief summary from major Working Plans serves to indicate that since forest management was provided for in 1918, the objectives for cutting the forest area considered, the product quality and quantity required and information on resource availability have varied in many aspects.

The prime objective has always been to supply the general purpose mills and maintain local employment and revenues in the forest region. Since 1970 there has also been an intense interest in sustainability of the product from the karri forest. There has never been any continuing effort for long term sustainable yield from the jarrah forest although a detailed proposal for intensive management units was also promoted in the early 1970's.

Since the 1970's the support for the general purpose sawmills and associated industry has been allied with a need for future self sufficiency in sawlogs. The answer to this is seen as a concentration on growing exotic softwood plantations locally, to make up predicted deficits. This current, new objective appears to condone excessive overcutting of the jarrah forest over a period of 50 years, meeting local sawlog demands until plantation sources can be developed.

During the past period of managing the cut the log resource specifications have varied (reduced) enormously with improved technology and demand. A concentration on general purpose supplies has also masked the fact that the current log sales from the State forest area (Figure 5) are the greatest in the history of the State. The role of the wood chipping industry and

salvage (low quality) sawlog operations in assisting the general purpose industry in providing work, economic welfare and sound silvicultural practice has been grossly underestimated.

The forest area available for wood production has also varied greatly. It should be noted that in early Plans, as sparse as resource estimates must have been in those times, only the karri and prime jarrah forest areas were considered suitable to general purpose mill operation. Most other areas (i.e. eastern jarrah) were considered to be a "one cut" sleeper operation and not relevant to the sawmill industry.

Since mid 1970's the dedicated forest area available for future yield of wood products and a resource base for industry has been reduced by 35 percent to meet conservation demands. This and growth losses due to dieback disease and bauxite mining have not been adequately compensated for in planning the ongoing cut.

The review of the Working Plans highlights the paucity of inventory and growth data available for making the Plans. Possibly this lack is unimportant as it would always have been incidental to the major variations in resource availability related to changing log standards and market demand for the sawn product. Inventory has generally been no more adequate than to specify the supply of general purpose mill logs available over a decade period. Predictions of the volume available through ingrowth have only been made since 1970 for karri and the intensive management areas proposed for the jarrah forest.

We now have an interesting dilemma in that we are still not overcutting the jarrah forest as far as the major objective of maintaining the general purpose mills and their infra structure is concerned. We can however, measure resource sufficiently accurately to know that we are grossly overcutting as far as any concept of a continuing yield is concerned. This sustained yield objective has always been minor in nature and conditional on the first.

THE CURRENT SITUATION

Past cutting plans for the Western Australian hardwood forests reveal a positive and continuing economic theme. This was directed towards the best interests of the State with the objectives which were achievable with forestry resources and public attitudes of the day.

It is important to note that at no time did forestry, in planning these targets, pretend greater knowledge of the resource than it possessed. It is also essential to realize that this lack of knowledge was never used as an excuse for target setting. The requirements for the holy grail of "sustained yield management" and its ethereal motive had been clearly appreciated and kept in perspective.

The historical development has been predominantly a progressive step by step procedure to achieve sound hardwood forestry in the State. Only in recent years has the reality of this final solution had to be faced directly.

Significant points in this progression of "allowable cuts" are highlighted as follows.

1. The predominant objective has always been to keep the general purpose mills and the dependent rural economy intact.

2. It was always realized that inventory and growth data were inadequate other than to plan an economic objective over a reasonable cutting cycle of 30 to 45 years.

3. To allow for improved resource data and forestry control the requirement for periodic revision at 10 year and, later, 5 year intervals was stressed.

4. The original plan to cut to a girth limit, removing the largest sizes, would promote positive increment in the forest and meet the log standards of the G.P. mills.

5. It was realized, prior to 1928 and in subsequent plan revisions, that regeneration and the areas of the smaller (emerging) size classes were deficient in both cut over and virgin forest.

6. Although it was expected that the volumes of subsequent allowable cuts would decrease, this did not occur due to great reductions in G.P. standards which allowed significant reduction in cutting limits and log quality.

7. Since approximately 1970, with the advent of wood chips and salvage log possibilities, the stated "G.P. cut" has ceased to be a realistic indicator of the production value and potential of the allowable cut and the forest area. This may not be so obvious for dollar values but is certainly the case for forest conditions and extractable wood volumes.

8. An excellent approach towards a realistic long term yield programme was made for the karri forest in the early 1970's. This was associated with a decision to effectively guarantee essential age class distributions and regeneration through clear felling procedures.

9. A long term yield plan for the jarrah forest proposed in the early 1970's (Intensive Management Units) was not supported by forestry. To date, no realistic long term plan has been accepted for the jarrah forest cut.

10. The current State procedure for achieving the objective of self sufficiency in sawlogs, by the year 2000, is detrimental to the consideration of realistic long term yields for the hardwood forests.

11. Current overcutting proposals for the karri forests, to adjust for reductions of the resource base to satisfy public demands for conservation and environmental management, are contrary to the forestry principles propounded since 1970 for a long term yield for the forest.

There is little doubt that currently, on the best information available, the jarrah and karri forests are being heavily overcut. This overcutting has been justified on the basis of continuing industrial and social welfare (dependent on the G.P. sawmills) in the south west. This situation requires careful review in planning the cut for future working plans. The following points are suggested as relevant to this review.

FUTURE REQUIREMENTS FOR THE ALLOWABLE CUT

The allowable cut is primarily controlled by economics and political objectives. Within a maturing society however, it can be expected that conservational and biological requirements for forest use will achieve greater prominence in decision making. The following points are offered as a basis for review of the allowable cut for the hardwood forests in Western Australia.

1. The current policy in which existing mills will "cut out and get out" (Figure 4), to achieve a reduction in cut over a 50 year period, is made with insufficient consideration of the options available.

2. Timber to make up any current and future deficits until major softwood sources come on line, can be imported. The current cut is not essential to State requirements.

3. The 50 year period of reduction planned is quite unrealistic with respect to capitalization in the industry. Major mills concerned could be rebuilt and paid for at least twice in that period.

4. Subsidy of the rural economy at the expense of the beleagured hardwood forest has continued too long. Reasonable notice has been provided of the outcome to allow for restructuring of the rural economy.

5. The demands of the future and present are incorrectly focussed onto the G.P. situation. This should be replaced by the woodchip and salvage log economy which is essential to practicing effective long term silviculture.

6. The remaining GP log (quality log) portion of the cut should now only be parcelled out as an incentive to chase lower quality logs and provide the impetus for silviculture in the forest.

7. All cutting in future must be directed towards applications which can provide the most benefit silviculturally.

8. To work towards an acceptable long term yield based on rotations of 100 and 150 years minimum for karri and jarrah great improvements are required in -

   (i) Silvicultural services and development
   (ii) Working Plan options and decision making
   (iii) Inventory and control systems.

9. The major priority is to reduce the cut in the jarrah forest to 250,000m^3 of GP (top) quality logs by 1995 and to maintain this level until 2045; when regrowth material can be brought onto stream.

10. The second priority is to use this cut to increase the lower quality log production from the jarrah forest to provide a continuing saw log intake for the State of the order of 400,000m^3 total, until regrowth quality material comes available in the year 2045.

11. We should endeavour to have a non saw log market for jarrah of at least 200,000m^3 per annum from the year 1995 onwards.

12. It is urgent that a sophisticated inventory to provide information on forest condition (structure, stocking, quality, health) and gross bole volumes is developed for silvicultural and utilization planning.

13. It is essential to place priorities on the aspects of silvicultural objectives which can be achieved by forest treatment in the course of utilization processes.

14. A detailed study of the practicalities of the group selection system in the jarrah forest is required.

15. Current work considering the options and techniques associated with jarrah utilization must be continued and upgraded.

16. An early objective is to integrate areas 12 to 15 above to produce a uselful planning model for the jarrah forest and to guide forestry into the 21st Century.

E.R. HOPKINS
MANAGER, INVENTORY MAPPING COMPUTING

NOVEMBER 4, 1985
ERH.EM.