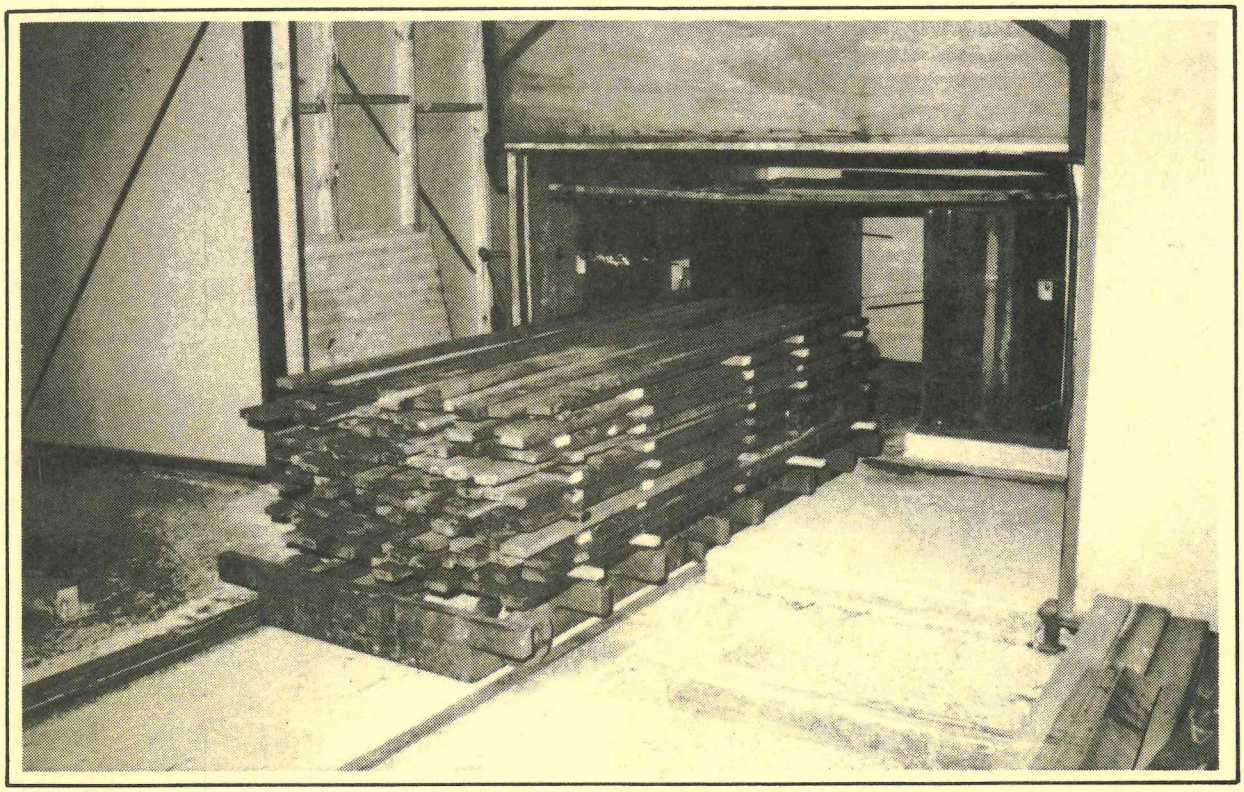
The Wood Utilisation Research Centre



Harvey
Western Australia

DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

W.A.

JUNE 1986 EDITION

THE WOOD UTILISATION RESEARCH CENTRE

HARVEY

WESTERN AUSTRALIA

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AIMS AND OBJECTIVES

Available sawlogs of mature jarrah and karri will be depleted in about 50 years. During this run down period, hardwood supplies increasingly will need to come from the new generation forests. The Department of Conservation and Land Management (CALM) can best contribute to the efficient use of Western Australia's timber resource by:

- Adapting forest management and silvicultural techniques to meeting changing markets.

- Co-ordinating joint utilisation research projects between different sectors of the forest-based industry.

- Researching new methods of sawn timber production, seasoning and marketing not presently covered by other research institutions or private companies.

Departmental involvement in research into the use and production of sawn timber products should provide a clear understanding of consumer needs, and in turn a more acceptable series of timber products.

HISTORY

The Early Years

Since the first settlement of Western Australia in 1829 sawmillers, builders, furniture manufacturers - the entire timber industry - have had access to a steady supply of large, high quality logs taken from a mature native hardwood forest. These native hardwoods, such as jarrah and karri, take between two and four hundred years to reach maturity.

Western Australian timbers were first marketed nationally and internationally in the latter years of the nineteenth century, and the type of timber sold was taken exclusively from the mature forest.

As a result techniques for seasoning were developed only for mature timber, and markets were established which expected only the type of product and qualities of timber available from mature hardwood sawlogs. Sawmills also became geared to processing the large logs available, and equipment installed could not handle logs beneath certain diameters and lengths.

Between 1829 and 1918 timber cutting in the native forests was virtually unrestricted, and large areas of the best and most accessible forest were cut over by the mills. These areas were not brought under any form of management until the 1920s, and many needed extensive programs of thinning, or needed regeneration, before they could become capable of again producing high quality timber.

The Advent of Managed Forest

The Forests Act was passed in 1918, and remaining native hardwood forests were brought under the management of trained foresters.

Part of the task facing the newly formed Forests Department was to create a long-term balance between the amount of timber removed from the forest annually and the amount it could grow. Under a management system designed to achieve this "sustained yield" the area of forest would not be reduced by logging, felled areas would be regenerated and a steady and continuous supply of timber could be guaranteed.

With the forest maintained intact, uses other than timber production were also viable options for the future.

As part of the system, areas of forest were designated to be grown as crops for timber production. Jarrah and karri crops need to be grown on a cycle between 100 and 200 years in length, and in the course of their growth they may be thinned out several times to improve the growth rate and quality of the final crop. At the end of the rotation the crop is felled to make way for the next generation.

The problem is the time span needed to produce a mature crop. A steady supply of timber needs to be provided to supply industry and meet demand while the crop is growing. Unless there are large areas of mature forest that can be drawn upon sequentially over the 100-200 year cycle the demand must be met from elsewhere.

Native Forests in the Eighties

The area of forest managed for timber production has gradually decreased over the past forty years as other demands by society on the forest resource have increased in importance.

Forested land is needed to maintain the quality of water in catchment areas; recreation areas for camping, bushwalking, fishing, picnicking and sightseeing are in high demand; reserves for scientific study and conservation are needed; parts of the forest are under mining leases, parts held in quarantine to prevent the spread of plant diseases.

Large areas of forest, cut over before the turn of the century, no longer contain enough mature trees to be economically logged. These areas that do remain are not supplying enough high quality timber to meet the demand.

The demand for locally produced timber is also expected to increase over the next fifty years as hardwood forests elsewhere in the world are cut out, and the State's population increases.

The availability of mature trees from Western Australia's hardwood forest is reducing. By 2020, timber from mature native hardwood will be virtually unavailable for most purposes. Even the forest thinned in the 1920s will not be ready for cropping until 2050. After that, new crop areas will come regularly on-stream for production.

In the meantime we have a shortage.

A New Kind of Timber

To meet the increased demand and the shortfall in supply, new timbers, new products, new seasoning methods, milling techniques and manufacturing styles need to be pioneered.

A large proportion of the shortfall will be met with softwood timbers from radiata pine in the Blackwood Valley and pinaster pine plantations on the Swan coastal plain. Other softwood supplies are expected from private plantation growers and farmers practicing agroforestry.

The limited supply of mature hardwood will need to be supplemented, and the answer lies in the 50-100 year old thinnings from the young crop forests.

Young jarrah and karri are a new product of the Western Australian forests. They have significantly different characteristics from the older timber (e.g. lighter in colour).

The challenge facing foresters and the rest of the forest-based industry is to develop products acceptable to the market from these timbers.

New Generation Jarrah

The new generation timbers from the regrowth forests differ in many ways from their predecessors. They have the potential to supercede mature hardwood for many purposes and outclass many timbers available on the world market.

Certain physical characteristics between the new jarrah and karri and the old may well initially affect market acceptance of the end product. They will also demand radical changes in the methods currently used to process sawlogs into timber.

- The logs are smaller: mills will have to re-equip or modify existing equipment to handle the new sizes.

- The reaction of the young timber to seasoning is different: new techniques need to be developed to evolve a satisfactory end product.

- Resistance to decay and insect attack may be lower in the new timber: methods of treating the timber may need to be modified.

- Mechanical strength may be different from that of more mature timber: new products using the qualities of the new timber need to be evolved.

- A greater proportion of sapwood in the smaller sawlogs means a lower yield of heartwood timber from each log: mills will have to be prepared to process both heartwood and sapwood into marketable products. In mature trees the proportion of sapwood is very small, and traditionally it has either been

discarded or regarded as an inferior product. Using modern seasoning and treatment techniques, acceptable products can be produced from what was previously regarded as waste.

- The colour of the sawn product will be different from that of the mature timber.

The Harvey Centre

The Forests Department Softwood Mill at Harvey closed in June 1982 due to reduced commercial viability and depressed markets. This made a pine high temperature kiln available for research and provided the opportunity for a joint jarrah seasoning project with Millars (Aust) Ltd. After Millars changed hands, Bunning Bros Pty Ltd continued with and expanded the joint seasoning program. It was apparent that the combined experience of production and research personnel from the Department together with a closer liaison with the industry was needed if worthwhile applied utilisation research was to develop.

The appointment in 1983 of the WA Timber Utilisation and Marketing Task Force improved communications between foresters, timber processors and wood products manufacturers, and highlighted the urgent need for research.

During the 1983-84 financial year, a start was made to develop a research complex in the old softwood mill at Harvey.

Restructuring the Harvey mill to handle small regrowth hardwood logs as well as pine logs started in December 1983: an experimental tunnel kiln was built and construction of a laboratory scale high temperature kiln commenced.

RESEARCH PROGRAMS

The Harvey Wood Utilisation Research Centre (WURC) was officially opened on 30 November 1984 by the Hon. Dave Evans, Minister Assisting the Minister for Forests.

The Research Centre has been established by the Department of Conservation and Land Management (CALM) to develop and examine new techniques for sawmilling, seasoning and marketing timber from Western Australia's regrowth and mature hardwood forests and softwood plantations.

Timber utilisation research is conducted in four programs:

Program 1: New Generation Hardwood Processing (program leader Mr P. Shedley)

Funding for this program is provided under an agreement between the Commonwealth (Industrial Research and Development Incentives Act) and the State of Western Australia. Support from all sectors of forest-based industry will be encouraged. The program of utilisation covers timber from the regrowth of a range of commercial Australian hardwoods and is divided into the following projects:

Project 1.1		Log measurement and protective storage
Project 1.2		Sawmill conversion
Project 1.3		Seasoning
	1.3.1	Seasoning from green to fibre saturation point.
	1.3.2	Seasoning from fibre saturation point to equilibrium moisture content.
Project 1.4		Grading
Project 1.5		Timber quality
Project 1.6		Product development and marketing
Project 1.7		Residue utilisation

The program emphasis is to optimise the yield of furniture quality and other high value products.

Program 2: Mature Hardwood Utilisation (program leader Dr G. Siemon)

This program contains projects funded by CALM with or without assistance from other organisations. It also covers WURC contributions to outside research projects.

Project 2.1	Conversion of short jarrah logs to standard furniture panels.
Project 2.2	Durability testing
Project 2.3	Strength testing
Project 2.4	Accelerated weathering
Project 2.5	Westrail two-piece sleepers
Project 2.6	Marri seasoning

In this program the emphasis is on improved utilisation of the remaining mature hardwood resources. A detailed inventory of available resources has commenced.

Program 3: Softwood Research (program leader Dr G. Siemon)

This program covers all softwood projects independent of funding sources.

Project 3.1	Conversion, wood preparation and marketing of timber from agroforestry and other sources of fast grown pines.
Project 3.2	Effect of moisture content variation on pine sawlog processing.
Project 3.3	Log processing to evaluate the "pedigree" pinaster breeding programme.
Project 3.4	Wood quality of WA grown pine timber.

This program concentrates on specific problems of Western Australian softwood producers.

Program 4: Commercial Development (program leader Mr D. Donnelly)

This program must be financially self supporting.

Project 4.1	High temperature kiln conversion to wood fuel.

STAFF

The Wood Utilisation Research Centre draws staff and resources from a number of branches of the Department.

A policy panel will include ex officio, the Chairman of the Industry Wood Research Panel. The Departmental members of the policy panel are:

Mr P.N. Hewett, BA, BSc (Adel) Dip For (Canb)
Director of Forests - Chairman

Dr P. Christensen, For Cert (Kenya), BSc (Hons) (Rhodes), PhD (UWA)
representing the Research Divisional Manager

Mr D.J. Keene, BSc (For), Dip For (Canb)
representing the Forest Resources Divisional Manager.

Dr Christensen is responsible for the scientific and intellectual standards of the research operations.

Mr Keene is responsible for the administration and finance of the Centre.

The operation and management is the responsibility of a Co-ordinator and Management Committee comprising:

Mr Phil Shedley, BSc (For), Dip For (Canb)
Co-ordinator and Public Interest Project Manager - Chairman

Dr Graeme Siemon, BSc (For) (Hons), PhD

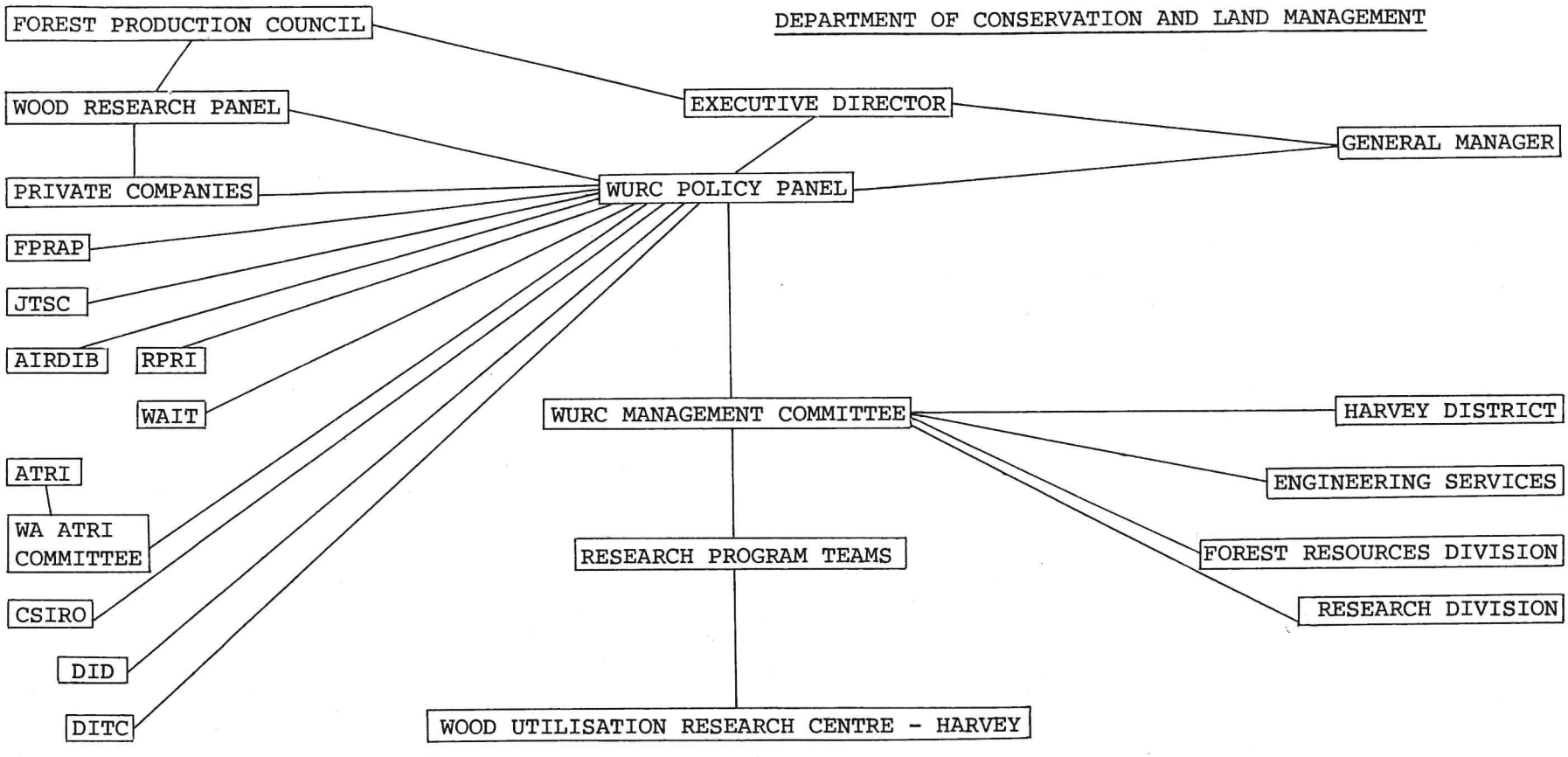
Mr Des Donnelly
Senior Utilisation Forester

Mr Vic Combs, AASA, CPA, APPA
Secretary/Treasurer

Other staff directly involved with research and administration are:

Mr Greg Beange, AIT Mech Eng., Engineering Services
Mr Jack Bradshaw, BSc (For,) Hardwood Silviculture
Mr Gary Brennan, BSc (For), Project Officer
Mr Don Challis, BA, Administration and Marketing
Mr John Dorlandt, Research Administration
Mr John Kaye, BSc (For), Softwood Silviculture
Mr Lex Mathews, Harvey Manager
Mr Trevor McDonald, B App Sc (Mech. Eng.), Project Officer
Mr Alan Thomson, BSc (For), Project Officer
Mr Kevin White, Construction

WOOD UTILISATION RESEARCH CENTRE - STRUCTURE CHART



ABBREVIATIONS

WURC - WOOD UTILISATION RESEARCH CENTRE
FPRAP - FOREST PRODUCTS RESEARCH ADVISORY PANEL
AIRDIB - AUSTRALIAN INDUSTRIAL RESEARCH AND DEVELOPMENT INCENTIVES BOARD
RPRI - RADIATA PINE RESEARCH INSTITUTE
WAIT - WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY
ATRI - AUSTRALIAN TIMBER RESEARCH INSTITUTE
CSIRO - COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
DID - WA DEPARTMENT OF INDUSTRIAL DEVELOPMENT
DITC - COMMONWEALTH DEPARTMENT OF INDUSTRY, TECHNOLOGY AND COMMERCE

EQUIPMENT

Log Storage

A water spray log yard equipped for programmed metering and water recovery can handle 5 000 m^3 of logs under a range of storage schedules.

Sawmilling

The Wood Utilisation Research Centre mill has an overhead beam feed twin breaking down unit and a band resaw. It is designed to handle either softwood or hardwood logs from 15 cm in diameter at the small end to 40 cm at the large end. Log lengths from 1.2 m to 6.0 m can be sawn.

The chipper is compatible with the research requirements of this mill. Its features are:

- Flexibility in chip size: a range of chip sizes from 8-35 mm with 2 or 4 knife disk in either hardwoods or softwoods can be produced.

- Capacity of up to 10 tonnes per hour.

- All mill waste including sawdust and jarrah bark are effectively converted.

Kiln Seasoning

Two research tunnel kilns have been built at Harvey. They are designed for high humidity seasoning without heat input. Each has a fan blowing ambient air from the 'dry' end of the kiln to the 'green' end, and one has an overhead ducting system to re-circulate cool moist air from the 'green' end to the 'dry' end.

A laboratory high temperature kiln was commissioned in April 1985 and is designed to be compatible with the tunnel kilns. It will accommodate up to 1 m^3 of timber at temperatures up to 180°C. It is automatic to pre-programmed schedules.

A commercial high temperature kiln and reconditioning chamber with a capacity to 20 m^3 is also available.

Processing and Grading

The Centre has square dressing facilities followed by a mechanical proof grader, visual grading tables and covered storage.