

# **ECONOMIC & SOCIAL ASSESSMENT FOR THE BRIGALOW BELT SOUTH**

**NSW WESTERN REGIONAL ASSESSMENTS**

JUNE 2000

Brigalow Belt  
South

Resource and Conservation  
Assessment Council



# **ECONOMIC & SOCIAL ASSESSMENT**

**BRIGALOW BELT SOUTH**

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A project undertaken for  
the Resource and Conservation Assessment Council  
NSW Western Regional Assessments  
project number WRA11 / RACD

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ISBN 1 74029 149 2

This project has been funded and managed by the Resource and Conservation Division, Department of Urban Affairs and Planning

The project was also overseen and developed through the Resource and Conservation Assessment Council.

Thanks go out to Tourism NSW, State Forests NSW, National Parks and Wildlife Association, Department of Mineral Resources and NSW Agriculture for providing information towards this report.

Thanks are also extended to Greg Roberts and the NSW Apiarists Association and Doug Summerville, NSW Agriculture as well as all the others who have helped along the way with their greatly appreciated expertise and assistance.

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# PROJECT SUMMARY

This paper provides economic, social and non-indigenous cultural heritage profiling and assessment information to assist in the current management and future monitoring and management of the forests within the South Brigalow assessment region. These analyses contribute to the overall Western region Comprehensive Regional Assessment process, as undertaken by the New South Wales State Government.

## **Project objective/s**

This paper has the objective of providing relevant profiling information to assist in the current management and future monitoring and management of the forests within the South Brigalow assessment region. The aims are to:

- to prepare a profile of the native crown timber industry in the assessment region
- to prepare an economic profile of the South Brigalow assessment region
- to prepare a social profile of the South Brigalow assessment region
- undertake a desktop analysis of existing non-indigenous cultural heritage studies of the Southern Brigalow assessment region; and
- to help facilitate future monitoring and management of the South Brigalow assessment region

## **Methods**

A number of economic methodologies, as relevant to the focus of each chapter, was applied in compiling this report. These methodologies are discussed in detail in each chapter.

## **Key results and products**

In addition to the use the South Brigalow assessment region's forest for timber production, there are a number of other activities which utilise the region's forests. These include, but are not limited to apiary, grazing and tourism and recreation.

In 1999, there were 12 native crown timber mills sourcing timber from the South Brigalow assessment region, providing direct employment for 201 people. Of these 12 mills, 10 were located within the assessment region, directly employing approximately 173 people. In addition, 22 people were employed as contractors in the region's forests. The region's five mobile mills and one private property mill provided employment for an additional 16 people.

In 1999, 62,830m<sup>3</sup> of High Quality Large and High Quality Small Cypress timber was supplied to the region's native timber industry from State Forests within the assessment region. In addition, 10,810m<sup>3</sup> of High Quality Large and High Quality Small Hardwood and 10,250 tonnes of Hardwood firewood was supplied to the native timber industry from the region's State forests.

Gross Regional Product for the South Brigalow assessment region was estimated to be approximately \$1980m, including \$925m paid to households as wages and salaries, in 1999. Employment totalled 34,970 people and the average wage and salary earned was \$26,452 per person.

It is estimated that the gross value of honey and wax generated on State Forests and National Parks was approximately \$10m in 1999.

It is further estimated that the potential maximum annual gross value of grazing on State Forest grazing permit areas for cattle is between \$49,796 and \$74,692.

There are a number of visitor attractions in the assessment region, ranging from large scale operations, such as the Dubbo Plains Zoo, to small scale family operations. It is estimated that in 1996/97, there were approximately 1,252,000 visits to the assessment region, with approximately 66,250 visits to National Parks and 15,000 visits to State Forests in 1998/99.

In 1999, production of construction materials in the South Brigalow assessment region totalled approximately 2.3 Mt and was valued at around \$12.2m. Recorded minerals production on State Forest lands accounted for approximately 40,000 tonnes of this figure and were valued at approximately \$70,000.

Information relating to the region's indigenous and wider communities is presented in Chapter's 4 and 5.

Information relating to the Non-Indigenous Cultural Heritage Profiling component of this study is presented in a separate report entitled Non-Indigenous Cultural Heritage Profiling for the South Brigalow assessment region.

# 1. THE SOUTH BRIGALOW REGION

## 1.1 AIMS OF THE STUDY

This project report provides profiling and economic analysis of both timber and non-timber uses of the forests of the South Brigalow assessment region. This report also provides social profiling information on the indigenous and wider communities encompassed by the South Brigalow assessment region.

A desk top review of Non-Indigenous Cultural Heritage within the assessment region has also been undertaken as part of this project and appears as a separate report for ease of reference.

The study provides detailed information regarding the native timber industry in the South Brigalow region, including a historical perspective, current state of the industry and reliance on Crown and private property resources.

The study also provides an in-depth profile of the South Brigalow regional economy, to assist in gaining an overview of the principal economic activities and industries of the region, to provide information on the current levels of economic activity and an understanding of other aspects of the local economies. The profile also assists in placing the timber industry, as well as other industries reliant on the region's forests, in the context of the regional economy.

Information on the historical usage, extent and reliance of apiary, grazing and tourism and recreation in the South Brigalow assessment region is also provided to assist in assessing forest uses and management regimes.

Detailed social catchment modelling of both Indigenous communities and the wider community are included to provide the context for consideration of the potential impact on the region's towns and communities of any changes in forest management regime or practices.

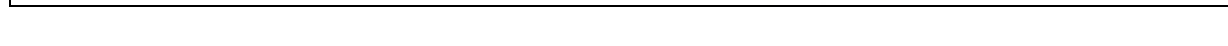
## 1.2 THE SOUTH BRIGALOW STUDY REGION

For the purposes of economic and social analysis, this study focuses on a larger area than the Pilliga and Goonoo forests alone. It is taken that the Local Government Areas (LGAs) containing these forests and the mills which directly utilise these forests form the basis of the South Brigalow assessment region.

For the purposes of this study, the South Brigalow assessment region comprises the Local Government Areas of Narrabri, Coonabarabran, Gilgandra, Dubbo, Coolah, Merriwa, Quirindi and Gunnedah. These local government areas are named and illustrated by light black lines in the map below.

When reference is made in this report to "the South Brigalow assessment region" it is taken that this encompasses the LGAs listed above.

The map below provides a comparison between the South Brigalow assessment region, as defined for the purposes of this study and the South Brigalow Bio-region, as defined in the various biophysical projects



# 2. THE SOUTH BRIGALOW NATIVE TIMBER INDUSTRY

## 2.1 INTRODUCTION

The native crown timber industry in the South Brigalow assessment region predominantly utilises two tree types. These are the Narrowleaf Ironbark, which dominate the forest areas in the East Pilliga State forests and the White Cypress, which dominate the forest areas in the West Pilliga and Goonoo State forests.

State Forests operations cover three Forest Management Areas within the South Brigalow assessment region. These are the Pilliga, Gunnedah and Dubbo / Gilgandra Management Areas. These management areas are illustrated and discussed in the previous chapter.

There are 12 native crown timber mills utilising crown timber from the forest areas in the South Brigalow assessment region. Of these 12 mills, two mills are located outside the assessment region, with 9 of the mills operating in the region processing Cypress and the other mill processing Ironbark. In addition to the 10 stationary mills operating in the assessment region, there were 5 mobile mills and one private property mill utilising timber from and operating in the region for at least part of 1999.

The 10 permanent mills operating in the assessment region directly employed approximately 173 people in 1999. In addition, 22 people were employed as contractors working in the region's forests. The region's mobile mills employed approximately 14 people on a part time basis during this period, with the region's private property mill providing employment for two people.

In 1998/9, total commitments for Cypress timber from State forests within the assessment region were 62,830m<sup>3</sup>. Total commitments for Hardwood timber were 10,810m<sup>3</sup> of sawlog grade wood and 10,250 tonnes of firewood. The total annual harvest of Cypress in the assessment region from State forests and crown timbered lands was 61,400m<sup>3</sup>. Approximately 9,000m<sup>3</sup> of Hardwood was also harvested in the region in 1998/99. The full quota of Hardwood firewood was harvested.

The following is based on information supplied by State Forests NSW and is taken from historical and current records, accounts of logging activities and local Officer's knowledge.

## 2.2 AN HISTORICAL OVERVIEW OF LOGGING IN THE REGION

### 2.2.1 A Brief Historical Perspective

Concentrated timber harvesting in the South Brigalow assessment region dates back to the mid 1800s, when the region was first settled by European settlers. The early settlers predominantly utilised the region's Cypress and Ironbark timbers in the building and construction of local homes, fences and other necessary infrastructure.

Commercial timber harvesting in the region dates back over 100 years, with the focus of logging over this period occurring in the Pilliga, Dubbo / Gilgandra and Gunnedah management areas. Records of forest management activities and timber sales from the region's forests date back to the early 1920s.

Whilst White Cypress (*Callitris glaucophylla*) and Narrowleaf Ironbark (*Eucalyptus crebra*) have principally been the focus of commercial harvesting activities over the last 100 years, Broadleaf Ironbark (*Eucalyptus fibrosa*), Bull Oak (*Allocasurina luehmannii*), the western box's (*E. melliodora*, *E. pilligarensis*, *Eucalyptus microcarpa*, *Eucalyptus populnea*) and Black Cypress (*Callitris endlicheri*) have been harvested for a number of uses over the past 80-100 years.

The sections below provide detailed information on the historical level of logging that has occurred in the regions' forests during the last century. This information is presented in terms of harvesting of both commercial Cypress and commercial Hardwood harvesting during the last century.

### 2.2.2 History of Commercial Cypress Harvesting in the region

The first records of Cypress sawmilling in the assessment region date from the early 1880's, with the establishment of number of small bush mills producing timber for early settlement needs. The first record of a stationary mill operating in the region was in 1883, between Narrabri and Wee Waa. Harvesting operations remained relatively constant into the early 1900s. Due to the predominantly hardwood nature of the Goonoo forests, there was little Cypress harvesting in the Goonoo forests over the last 100 years.

Due to increased clearing for agricultural purposes, forest surveys to measure the extent of remaining forests were carried out between 1911 and 1916. Information gathered during this time contributed to the *Forestry Act 1916*, which saw the proclamation of approximately 357,000 hectares of State forests within the assessment region. These forest areas were proclaimed as State forests to assist in planning where further agricultural clearing could or could not be undertaken and to ensure the provision of a resource base for the local communities into the future.

Under the *Forestry Act 1916*, the Forestry Commission of NSW issued 15 Cypress sawmilling licences between 1917- and 1930. The number of Cypress sawmills reached a peak during the 1950s post World War 2 housing boom, with 17 mill licences issued for logs to be sourced from the assessment region.

The average annual cut of Cypress sawlogs from the assessment region since 1929 is summarised in the following table.

**TABLE 1: AVERAGE ANNUAL CYPRESS HARVEST SINCE 1929**

Period	Management Area - Average m <sup>3</sup> /year		
	Pilliga	Gunnedah	Dubbo / Gilgandra
1929/30 - 1985/86	32,912	3,341	948
1986/87 - 1996	33,752	6073	593
1997-1999	50,786	6350	884

*State Forests NSW 2000*

Cypress sawlog harvesting in the region has fluctuated over the last 100 years. In 1940/41, Cypress sawlog harvesting almost doubled from previous levels, reaching a peak of 66,500m<sup>3</sup> in 1941/42. Annual cuts returned to pre-war levels in the late 1950s. During the 1960s through to the late 1980s, harvesting fluctuated at around 40,000m<sup>3</sup> per annum.

State Forests inventories kept since the commencement of logging in the Pilliga forests show that the standing stock of Cypress has increased significantly over the past 100 years. Cypress has risen in prominence due to the removal of competing Hardwood species and the silvicultural treatment of natural Cypress regrowth in most State forest areas within the assessment region..

Historically, the Cypress Industry has been highly diverse in terms of the level of sophistication of sawmilling equipment and profitability. In the past, the industry was characterised by a large number of small milling enterprises cutting green sawn products predominantly for the local regional markets. In

more recent times, the introduction of more efficient harvesting, haulage and sawmilling techniques has resulted in the rationalisation of many of the region's smaller mills, with accompanying quota allocations being amalgamated and bought by the region's larger sawmilling enterprises.

With the release of the Strategic Plan for the NSW Cypress Industry in 1996, there has been a significant change in the profile of the industry. Many of the region's remaining smaller mills exited the industry and those remaining undertook significant capital investment in high recovery sawmilling equipment, value adding infrastructure and low impact harvesting equipment, estimated to be around \$7,500,000 since 1996. (State Forests NSW, 2000)

### 2.2.3 History of Commercial Hardwood Harvesting in the region

Harvesting of hardwood timber, in particular Ironbark from the region's forests, commenced in the mid 1800s and was a result of the expansion of European settlement in the region. Hardwood timbers were used by the settlers to provide timber for road and rail bridges, building construction, stockyards, fencing and fuelwood.

Harvesting of Ironbark for sleepers, poles and other heavy hardwood timber for railway track and bridge construction commenced in the region in the late 1800s. Demand for these products was fuelled by the further development and expansion of the railway system throughout New South Wales from the early 1900s onwards. It has been estimated that, between 1929 and 1997, approximately 6,000,000 railway sleepers were cut in the Pilliga area alone. (SFNSW 2000)

Peak sleeper production occurred during the late 1960's when about 85 sleeper cutters<sup>1</sup>, cutting the equivalent of 25,000m<sup>3</sup> (gross) annually operated in the forests of the study area. Between 1970 and 1985 the number of sleeper cutters fell to around 40 harvesting about 6,000m<sup>3</sup> (gross) per annum..

From 1978 until the early 1990s, the annual Ironbark sawlog cuts increased to around 20,000m<sup>3</sup> per annum. Encouraged by the establishment of the Insultimber (Aust) Pty Ltd sawmill at Baradine, integrated Ironbark harvesting operations have been occurring since the early 1980s.

Sleeper cutting ceased in the Pilliga and Dubbo/Gilgandra forests in the mid 1990s. Since that time, Ironbark sawlogs supplied from the Dubbo/Gilgandra and Gunnedah forests have remained relatively constant, at a total of around 10,000m<sup>3</sup> per annum.

The development of the mining industry in the Gunnedah area in the late 1800s also increased the demand for timber from the region's forests. Demand for timber for use by the mining industry continued up until the early 1990s. The main species harvested were White Box and Ironbark, which were generally used as pit props.

During World War II, the State forests in the Gilgandra (Biddon, Linchon Eura and Breelong SF) and Dubbo (Goonoo SF) areas the Ironbarks and other hardwood species, including Bull Oak, were also harvested to assist in the production of charcoal to fuel automotive "gas produces". These operations ceased following the end of World War II.

**TABLE 2: SUMMARY OF HISTORICAL YIELDS OF HARDWOOD BY MANAGEMENT AREAS**

PERIOD	MANAGEMENT AREA m <sup>3</sup> /year (gross)		
	Pilliga	Gunnedah	Dubbo / Gilgandra
1940/41-1996 Historical	20,430	2,032	7,961
1996-1999		7,500	1,650

*State Forests NSW 2000*

### 2.2.4 The Changing Role of Forest Management

During the last two hundred years, the structure of forests within the study area have been continually changing. This has been due to both natural events such as drought and fire, as well as the significant

<sup>1</sup> In this context "Sleeper Cutter" refers to individual forest workers employed by NSW State Railways for the primary purpose of harvesting railway sleepers.

influence of European settlement and development. Changing fire regimes, early grazing pressures, the rabbit plague of early last century, timber harvesting and forest management have all contributed to the denser, primarily regrowth forests present in the region today.

The management of the State forests of the Brigalow South region has shifted over time to focus on maintaining and enhancing the range of forest values including flora, fauna, cultural and aboriginal heritage, timber and other economic products. Today, the primary management interventions include harvesting, grazing and fire management. These activities are managed in a way that seeks to compliment and protect the other values of the forest. This may be done by exclusion of harvesting from specified areas to protect values, for example sites of aboriginal cultural heritage significance. It may also involve the management and modification of harvesting through space and time to protect values at a landscape level, for example some elements of fauna habitat.

The forests are currently managed utilising a number of different forest zone classifications. These include a range of no-harvest, modified harvest and routine harvest areas distributed across the forest landscape to help manage the multiple uses of any one area. Silviculture at the landscape levels involves spreading harvesting activities in space and time. In addition to no harvest zones, areas of the forest are identified for specific habitat resources (such as wetlands, caves, rocky outcrops and Koala high use areas) and conservation requirements.

The preferred management intentions include:

**TABLE 3: FOREST TYPE AND CURRENT MANAGEMENT INTENT**

TYPE OF FOREST	MANAGEMENT INTENT	IMPACTS
Cypress	Non commercial thin, Thin, Release of regeneration	No change in species composition, mosaics of structure in the landscape, promotes larger trees in addition to the retained trees.
Hardwood	Single Tree Selection	
Mixed (Cypress & Hardwood)	Non commercial thin, thin, release of regeneration, Single tree selection reflecting the species mix present.	

*State Forests NSW 2000*

On average, approximately 2.5% of the forest estate is harvested annually. Cutting cycles, averaging around 25-30 years for Hardwood and 30-35 years for Cypress forest types are typically employed. Forest structure is maintained by retaining trees during logging, release of regeneration from competing advanced growth and recruitment from seedlings and lignotubers. Generally, trees over 55cm in diameter are retained.

### 2.2.5 Sustainable Yield

Forest inventory surveys have been undertaken by State Forests since early 1920's. These surveys form part of State Forests ongoing forest management operations. The current strategic inventory of both Cypress and Hardwood forest types in the assessment region is one of the suite of assessment projects being undertaken as part of the Comprehensive Regional Assessment (CRA) process. The last inventory survey for Cypress forest types in the Pilliga management area was carried out in 1985 and for the Gunnedah management area in 1994. Based on these inventories, the sustainable yield for Cypress



sawlogs from the study area was set at 60,400m<sup>3</sup>. Assessments of the Hardwood resource, in particular Ironbark species have been recently completed.

Details of sustainable yield from management areas within the South Brigalow Region are summarised below.

**TABLE 4: SUSTAINABLE YEILD BY MANAGEMENT AREA**

	High Quality Cypress logs (m3/yr)	Hardwood sawlogs (m3/yr)	Low quality hardwood logs (m3/yr)
<b>Pilliga MA</b>	51 000	12 500	40 900
<i>Annual Forest Growth</i>	51 000	7 000	100
Current commitments*	0	5 500	40 800
Potential additional contract volumes*			
<b>Dubbo &amp; Gilgandra MA (includes Goonoo)</b>			
Annual forest growth			
Current commitments*	3 100	1 800	19 000
Potential additional contract volumes*	3 100	1 100	700
	0	900	19 200
<b>Gunnedah MA</b>			
Annual forest growth	6 400	Data not yet available	TBA
Current commitments	6 400		500
Potential additional contract volumes*	0		TBA

\* Changes in Conservation Protocols or logging exclusion areas may affect volumes reported  
SFNSW 2000

## 2.3 THE REGION'S TIMBER INDUSTRY

### 2.3.1 The Region's Mills

There are currently 12 fixed sawmills sourcing timber from crown lands within the South Brigalow assessment region. In addition, there are 5 small mobile mills sourcing timber from crown lands in the region and one private property mill sourcing timber exclusively from private land.

Of the 12 fixed mills sourcing timber from the region's forests, two of these mills lie outside the assessment region. One of these mills processes predominantly Hardwood and the other processes predominantly Cypress. These two mills utilise timber from both within and outside the assessment region.

In previous years, the region has also supported an additional fixed mill. This mill burnt down in February 1999 and is currently being rebuilt. In February 2000, the New South Wales State Government provided a long term supply commitment to provide certainty of timber supply prior to the redevelopment of this mill.

Of the 10 mills operating in the region, 9 mills process Cypress, with the other mill processing Hardwood (predominantly Ironbark). These mills source their timber almost exclusively from the forests within the assessment region.

The region's Cypress mills produce a range of both green sawn and kiln dried value added products. The region's Hardwood mill purchases Ironbark from the Pilliga management area for processing into electric fence droppers for overseas and domestic markets. The small mobile mills cut predominantly Ironbark from the Dubbo/Gilgandra and Gunnedah forests for fencing, landscape and green sawn markets in regional and metropolitan NSW.

In 1999, State Forests NSW supplied approximately 61,400m<sup>3</sup> of Cypress and approximately 9,000m<sup>3</sup> of Hardwood from the assessment region's forests. Of this, approximately 1,500m<sup>3</sup> of Cypress was provided

to mills outside the region. Timber from the regions forests is committed to the timber industry under wood supply agreements, long standing timber supply arrangements, or short term parcel sales usually allocated by tendering process on the open market. The following sections provide further details.

The region's Cypress mills range in size from small mills taking around 1000m<sup>3</sup> per annum of timber to mills taking up to 21,600m<sup>3</sup> of timber per annum. In 1999, the average level of Cypress supplied by State Forests to a mill was 6,800m<sup>3</sup>, with a range of between 1,000m<sup>3</sup> to 21,600m<sup>3</sup> to any one mill. The following table provides an overview of the number of mills classified as small, medium and large utilising crown resource and operating in the assessment region.

**TABLE 5: NUMBER OF FIXED MILLS BY MILL SIZE OPERATING IN THE REGION**

Mill Classification	Throughput (m <sup>3</sup> )	Number of mills
Small	0 - 5,000	3
Medium	5,000 - 10,000	5
Large	10,000 & above	2
Total		10

*State Forests NSW 2000*

The region's mobile mills each receive less than 1,000m<sup>3</sup> per annum from crown land.

Appendix 1, Timber Commitments and Supply by Management Area, provides a detailed overview of the level of timber committed and supplied, by Forest Management Area, species and product type, of wood supplied from the region's State forests in 1999.

### **The Cypress Sawmilling Sector**

The NSW Cypress sector accounts for 14 percent of the total native timber sales in NSW, with the Cypress sector the second largest processor of any individual native timber species in the State. In 1998/99, 101,682m<sup>3</sup> of Cypress was harvested from State forests and crown lands throughout NSW, with 61,400m<sup>3</sup> of this timber harvested in the South Brigalow assessment region.

State Forests currently manage around 269,000 hectares of crown land in the assessment region for the purpose of Cypress timber production. Some of this land is jointly managed for the purpose of Hardwood timber production.

Approximately 50% of the Cypress timber harvested in the assessment region is currently allocated to mills under long term wood supply agreements. The majority of this timber is covered by quota allocation arrangements that have been in existence for up to 60 years. The remainder of the timber harvested is tendered on the open market.

In 1996, State Forests, in conjunction with the Forest Products Association (FPA), released the Strategic Plan for the NSW Cypress Industry. The Plan has helped encourage a number of changes in the structure of the industry, including the introduction of Quality and Safety Audit requirements, the development of the Australian Cypress Quality Accreditation Program and participation in the review of the Australian Softwood Milled Products Standards.

The industry has also moved towards greater value adding and now produces approximately 60% of its sawn output as kiln dried value added products, such as flooring and panelling. (State Forests NSW 2000) The industry has expanded its markets for sawn timber both within Australia and overseas and a number of the larger and medium sized mills are negotiating contracts for the supply of sawmill waste to NSW power generators.

The 10 Cypress sawmills drawing sawlogs from the forests of the study area employ approximately 174 people.

**The Hardwood Sawmilling Sector**

In 1998/99, Ironbark accounted for just under 2% or 21,000m<sup>3</sup> of native hardwood sales from NSW State forests and crown timber lands. Total Ironbark harvesting in the South Brigalow assessment region accounted for approximately 38%, 9,000 m<sup>3</sup> of this total.

State Forests currently manage around 335,500 hectares of crown land in the assessment region for the purpose of Hardwood timber production. Some of this land is jointly managed for the purpose of Cypress timber production.

Ironbark purchases by the region's hardwood sawmill and small mobile mills operating from the Dubbo/Gilgandra and Gunnedah of forests total 9,000m<sup>3</sup>.

The region's hardwood mill, Insultimber (Aust) Pty Ltd, received 7,000m<sup>3</sup> of Ironbark timber from State Forests in 1999. The mill was originally established in 1978 by Gallagher's (NZ) to produce a range of fencing post droppers and pegs to market in conjunction with their agricultural electric fencing systems. The mill was established in the region to take advantage of the non-conductive properties of Ironbark and to dove-tail with the sleeper cutting operations occurring at the time. The Insultimber mill now operates as a stand alone sawmilling enterprise.

The region's mobile sawmills are generally based around Dubbo and Gilgandra and concentrate their harvesting operations in the Goonoo State Forests and other forests in the Dubbo and Gilgandra management areas. These mills account for the remainder of the hardwood harvested in region.

In addition to the above, State Forests has supply commitments of 1000m<sup>3</sup> per annum of hardwood sawlogs from the Warung management area to Clarence Hardwood Pty Ltd at Lithgow.

The fixed mill directly employs 24 people and has 4 contractors associated with its operations. The mobile mills provide employment for an additional 14 full people.

**2.3.2 Employment**

The following employment estimates are based upon State Forests records, local knowledge and discussions with the region's mills.

In 1999, there were approximately 201 people directly employed by mills utilising the region's timber resources. Of this total, 173 people were directly employed by mills utilising timber from the region and located within the region, with the additional 27 people employed by mills utilising timber from the region but located outside the region.

It should be noted that not all employment at mills processing timber from the region but located outside the region is directly attributable to timber harvested from within the region as mills located outside the assessment region source and process timber from a number of different forest areas.

In 1999, contracted harvesting operations, as managed by State Forests, provided employment for 22 people. This employment was all based within the region.

Of the 173 people directly employed by mills located and processing timber within the region, 8 of these people were employed to work in the forests (as opposed to working at the mills themselves). This employment in the region's forests is in addition to the employment of the 22 people discussed above.

There were 5 mobile mills operating in the region in 1999. These mills provided employment for approximately 14 people. It should be noted that, as not all of these mobile mills operated on a full time, year round basis, this employment should be treated as indicative rather than as a true full time equivalent.

The region's forests also support one private property mill, which processes wood supplied exclusively from private lands. This mill provided employment for 2 people in 1999.

When considering the above, it is important to view employment within the context of the local community. Employment of twenty people in any one industry will be relatively more important to a town of 600 people where there are a few alternate employment opportunities than to a town of 6000 people with many alternate employment opportunities. For further details relating to the social conditions of communities within the region, please refer to Chapters 4 and 5.

### 2.3.3 Recent Investment Trends

Since 1995, a number of Cypress mills in the region have up-graded their facilities. Up-grades have included the installation of kilns to increase drying capabilities and assist in the production of higher value end products, the establishment of new distribution facilities to assist in broadening markets for the products produced and mill equipment up-grades to improve the efficiency of resource utilisation.

Of the 12 mills taking timber from the Pilliga and Goonoo State forests, 11 of these mills have undertaken some form of up-grade to their facilities since 1995.

This recent investment is linked to a desire to take advantage of the increasing demand for Cypress flooring produced by the region's mills. For further information regarding potential future initiatives and development of Cypress milling in New South Wales, refer to "Australian Cypress Strategic Plan for the New South Wales Industry" produced by State Forests NSW in conjunction with the Forest Products Association.

### 2.3.4 Main Timber Species Harvested

The two main species harvested from the forests in the South Brigalow assessment region are White Cypress (*Callitris Glaucophylla*) and Narrowleaf Ironbark (*Eucalyptus Crebra*).

The following definitions are taken from Forest Trees of Australia and provide general information regarding White Cypress (*Callitris Glaucophylla*) and Narrowleaf Ironbark (*Eucalyptus Crebra*). This information is not specific to the assessment region, rather the information is intended to provide the reader with an overview of each species. The figures reported below may differ slightly from results for actual species within the assessment region.

Narrow Leaved Ironbark (*Eucalyptus crebra*) is mostly a medium sized tree, often attaining 25 m in height and 0.7m dbh. Under the most favourable conditions it can attain 35 m in height and 1.5 dbh, with a trunk of good form and up to two thirds of the trunk height. *E.crebra* commonly occurs on country of low relief on undulating plains and low plateaux. It grows on a variety of soils including sands, sandy loams and clay loams. *E.crebra* has the widest north-south distribution of any iron bark and extends over more than 20° of latitude from Cape York Peninsula to south of Sydney.

The wood of *E.crebra* is dark red, fine textured, hard strong and extremely durable and is generally used for heavy engineering construction, poles, railway sleepers and crossarms.

White Cypress Pine (*Callitris glauca*) is a small to medium tree, usually growing to about 18 m with a diameter of 0.45 m but occasionally reaching 30 m by 0.9 m. The species grows on relatively infertile, often sandy or rocky sites with undulating topography. It is the only species of its genus that is suitable for timber production. Today, *C. glauca* only forms extensive forests in the Tambo-Dalby-Inglewood region of Southern Queensland and the Baradine-Narrabri and Cobar districts of NSW although its natural occurrence extends from Central Queensland to Victoria, in western NSW and some pockets in South Australia.

The wood of the *C. glauca* is light yellow to dark brown with frequent dark brown knots. *C. glauca* is the most important timber species of the area in terms of the local timber industry, with large quantities sawn for both local use and sold to metropolitan markets. The timber is fine textured and very durable, resisting decay and attack by termites and marine borers. It is widely used for flooring and lining boards, scantling, poles and posts.

There are also a number of other tree species harvested to a lesser extent in the South Brigalow assessment region. These species include Broadleaf Ironbark (*Eucalyptus fibrosa*), Bull Oak (*Allocasurina Crebra*), the Western Boxes (*Eucalyptus Melliadora*, *Eucalyptus Pilligarensis*, *Eucalyptus*

*Microcarpa* and *Eucalyptus Populnea*) and Black Cypress (*Callitris Endlicheri*). These species have historically been harvested for the supply of fencing timbers, firewood and charcoal.

### **2.3.5 Wood Products Produced**

Ironbark is sold by State Forests classified as three grades, based on log size and quality, with only one fixed mill in the region purchasing Ironbark timber. The Ironbark purchased by this mill is primarily processed into electric fence posts and fence droppers and is exported to a number of markets overseas. Ironbark is uniquely suited to this application due to the non conductivity of the heartwood.

As noted earlier, Ironbark was historically used to produce railway sleepers, however, with the shift in demand to concrete and steel sleepers, Ironbark from the study region has not been utilised for this purpose since the mid 1990s.

Ironbark purchased by mobile mills generally undergoes little value adding and is harvested to produce landscaping material, fencing timbers, poles and bridge girders. Specific trees may at times be purchased for the purposes of producing “bush” furniture.

Cypress currently rates as the main timber species harvested and sold in the South Brigalow region. The final products produced with this resource are mainly kiln dried products, supplemented by weather boards, panelling, pickets and green sawn framing and structural timber. Other products produced by the Cypress industry include vineyard posts, fencing timber and other timber products.

### **2.3.6 End Markets**

Final markets for sawn Cypress primarily include flooring, boards, framing and paneling in Sydney, Melbourne and, increasingly, in Japan. There is also strong demand for Cypress framing and weatherboards west of the Great Divide due to the woods inherent termite resistance nature.

The majority of Ironbark processed in the region is exported as electrical fence posts to a number of overseas markets.

## **2.4 PRIVATE PROPERTY RESOURCE**

An inventory of the extent of timber supply from private property was not available for the region. The following information has been derived from State Forests records, discussions with State Forests regional managers as well as other local Government agency representatives and community members. Information collected by the Department of Land and Water Conservation for the purpose of Regional Vegetation Management was also utilised.

### **2.4.1 Levels of Private Property Harvesting**

During the last century, significant volumes of both Cypress and Hardwood (mainly Ironbark) were harvested from private property in the South Brigalow assessment region. Over the past 15 years however, this volume has been in decline, with harvesting of Ironbark from private property ceasing entirely in the mid 1980s.

Currently, private property timber harvested and processed by the region’s crown mills is minimal. As discussed in the previous section, there is only one mill within the South Brigalow region processing timber sourced exclusively from private property. This mill is classified as a small mill and provides total employment for two people.

The region’s five mobile mills utilise timber sourced from both State forests and private property. As discussed above, not all of these mobile mills operate on a year round basis. These mills generally utilise specific purpose timber sold by State Forests to fill local orders. These mobile mills add little value to the timber harvested before on-selling the wood.

Mills utilising the regions crown resources generally take only minimal, if any timber from private property. In 1999, only three of the 12 mills sourcing timber from the region bought additional timber from private property. Of these three mills, the largest total amount of wood taken from private property in that year was approximately 1,000m<sup>3</sup>.

The following table provides estimates of private property resource harvested from the State Forests Pilliga management area. These figures provide some indication of the level of private property harvesting for the region as a whole.

**TABLE 6: TIMBER HARVESTED FROM PRIVATE PROPERTY IN THE PILLIGA MANAGEMENT AREA 1994/5-98/9**

---

<b>Year</b>	<b>Hardwood (including Ironbark)</b>	<b>Cypress</b>
1994/5	160	656
1995/6	138	1613
1996/7	-	1681
1997/8	-	1444
1998/9	31	949

*State Forests NSW*

# 3. ECONOMIC PROFILE OF THE SOUTH BRIGALOW REGION

## 3.1 INTRODUCTION

The economy of the Southern Brigalow region is described in this section. This will provide a context for consideration of the forestry industry including information on the relative importance of the forestry industry to the region. An analysis of trends in the economy provides a perspective on its growth performance and an indication of the capacity of the region to absorb changes in the structure and operation of particular industries without major economic and social disruption.

The analysis in this section is based on an input-output table for the region and shift-share analysis of employment data for the region. The input-output table was compiled using conventional procedures and data as outlined in Attachment 1. The industry/sector classification outlined in Attachment 2 shows the 107-sector system used in compiling the table (it is identical to that used by the ABS in compiling the Australian National input-output table). A 52-sector system is also defined in Attachment 2 and is used in the presentation of a selection of the results in this report. The shift-share analysis has been carried out for 107 sectors with the detailed data shown in Attachment 3.

## 3.2 OVERVIEW OF THE SOUTH BRIGALOW REGIONAL ECONOMY

The input-output table has been compiled using the most recent available data relating to 1996-97. By 1996-97, the NSW economy was well on the way to recovery from the early 1990s recession..

The base table is shown in Table 3-A in a highly aggregated form. More detailed sectoral structure charts based on 52 sectors are used to describe the economic structure of the Southern Brigalow region.

TABLE 3-A: AGGREGATED INPUT-OUTPUT TABLE - SOUTHERN BRIGALOW 1996-97 (\$'000)

	Ag Forestry Fishing	Mining	Manufacturing	Utilities	Building	Services	TOTAL	H-hold Exp	O.F.D	Exports	Total
Ag/Forest/Fish	281078	66	39060	2	72	779	321056	2393	12062	728337	1063848
Mining	531	3662	6301	6104	1181	1998	19777	0	978	51878	72633
Manufacturing	6290	1532	54715	1072	20621	51910	136140	77433	18787	101127	333486
Utilities	13277	1085	2824	4610	467	35292	57554	25487	1344	5428	89813
Building	4364	193	55	70	91	43989	48763	0	108830	6666	164259
Services	122486	5782	39865	4442	19885	260405	452865	849560	331415	174491	1808332
TOTAL	428025	12319	142820	16300	42317	394373	1036155	954872	473417	1067926	3532371
H-hold Income	175086	16897	66436	15230	61148	590234	925030	0	0		925030
O.V.A.	286530	31032	42305	49652	17833	500458	927810	103547	23964		1055322
Imports	174207	12385	81926	8631	42961	323267	643376	421268	198728		1263371
TOTAL	1063848	72633	333486	89813	164259	1808332	3532371	1479687	696109	1067926	6776093
Employment	6862	305	2546	399	1974	22884	34970				

The rows of the input-output table (Table 3-A) indicate how the output of an industry is allocated as sales to other industries, to households, to exports and other final demands (OFD, which includes stock changes, capital expenditure and government expenditure). The corresponding column shows the sources of inputs to produce that output. These include purchases of intermediate inputs from other industries, the use of labour (household income), the returns to capital or Other Value Added (OVA, which includes gross operating surplus, depreciation and net indirect taxes and subsidies) and goods and services imported from outside the region. The number of people employed in each industry is also indicated in the final row. Forestry is included in the agriculture/forestry/fishing sector while wood processing is part of manufacturing.

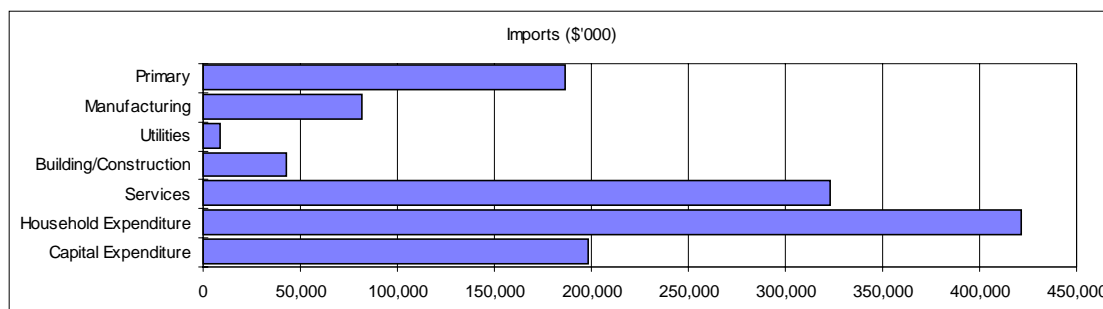
Gross Regional Product was \$1980m that included \$925m paid to households as wages and salaries (including imputed payments to self-employed persons and employers).

Employment totalled 34,970 people and the average wage and salary earned was \$26,452 per person. This is lower than the NSW average of \$30,868.

The trade in goods and services between the Southern Brigalow region and the rest of the world favoured imports. Imports totalled \$1263m; that was 1.2 times the level of exports at \$1068m. The destination of imports into the local region from all sources is shown by major category in Figure 3-A and in detail by industry in Figure 3-I. In most regions the largest import items are goods for consumption by local households. This is also the case in the Southern Brigalow region where 33 per cent of total imports to the local region were household consumables. Expenditure on capital items represented 16 per cent of imports. This region is a relatively high importer of services which comprise 26 per cent of all imports.

A further feature of the Southern Brigalow region is the high level of household expenditure estimated to be \$1480m. This is a large part of the GRP of \$1980m and considerably above the estimated level of wages and salaries earned by households of \$925m. Households have a number of other sources of income that can support expenditure. These include social welfare receipts, earnings from investments and retirement incomes. In addition, there may be some residents of the region that work outside the region.

FIGURE 3-A: DISTRIBUTION OF IMPORTS BY DESTINATION SECTOR



The Department of Social Security (DSS) has made estimates for 1996 of some of these variables (Bray and Mudd 1998). Southern Brigalow residents made income tax payments of \$192m and received DSS payments of \$181m. The relatively weak household income position of the Southern Brigalow region is indicated by the income tax paid/DSS benefits ratio that is 1.1 and can be compared with 1.6 for NSW as a whole.

The economic structure of the Southern Brigalow region may also be compared with that for NSW through a comparison of Figure 3-B and Figure 3-C. This reveals that in the Southern Brigalow region, the agriculture/forestry/fishing industry is much more important than in NSW highlighting the high dependence on primary industries. The share of the mining, utilities and building industries is similar to those prevailing in NSW. Both the manufacturing and service industries are less important than in NSW, especially in terms of the contribution to export earnings. The primary industries contribute over 70 per cent to region exports in the Southern Brigalow. This is the case in a year of modest commodity prices but serves to highlight the sensitivity of the regional economy to world trends in commodity markets.



The identification of key industries in the Southern Brigalow economy can be made with reference to Figure 3-D through Figure 3-I. The importance does vary in terms of the measures used but the following sectors stand out as among the most important to the economy.

- Sheep, grains and beef
- Other agriculture
- Agricultural services
- Education
- Health
- Public administration
- Retail trade
- Wholesale trade

FIGURE 3-B: SUMMARY OF AGGREGATED SECTORS: SOUTHERN BRIGALOW 1996-97

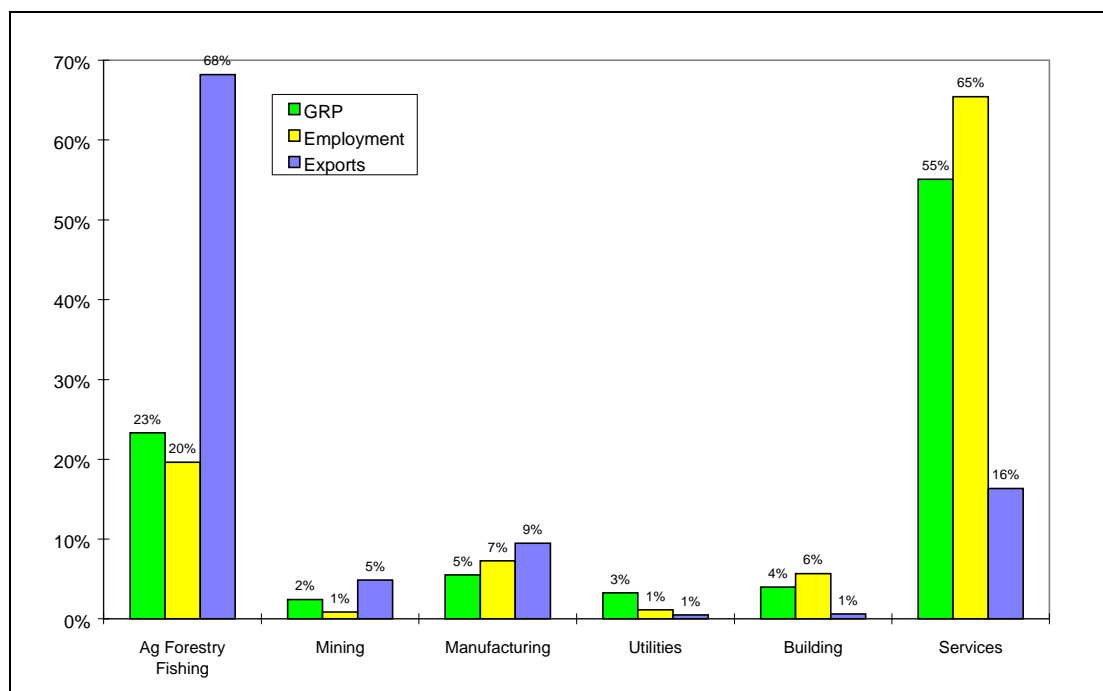
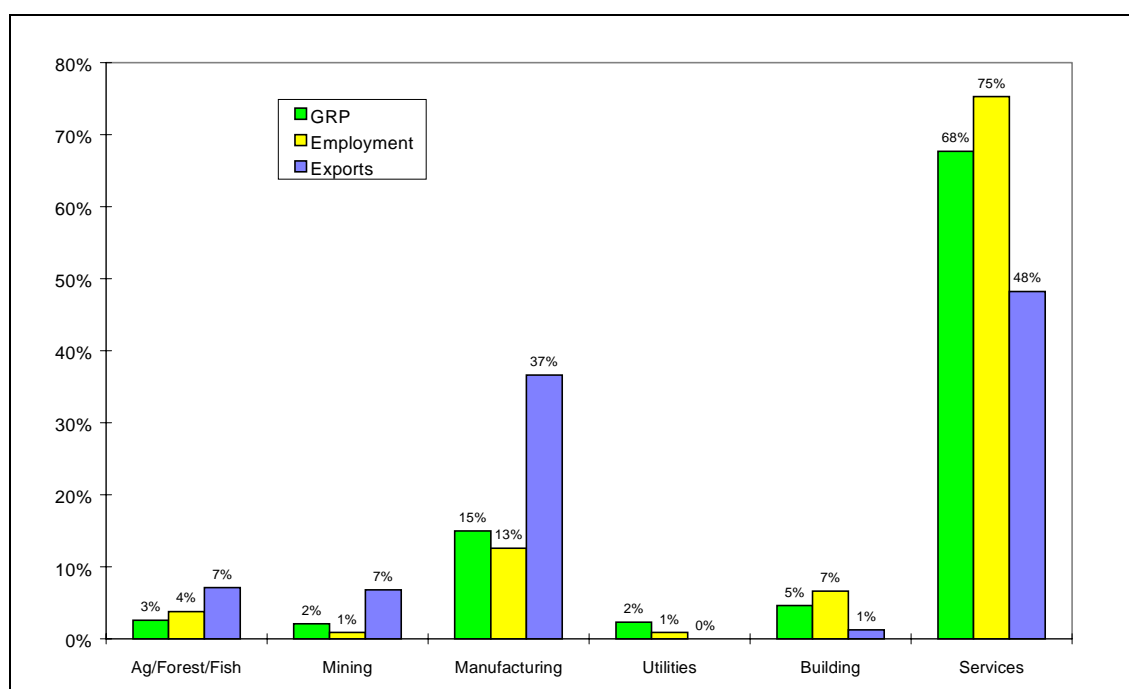


FIGURE 3-C: SUMMARY OF AGGREGATED SECTORS: NSW (1995-96)



The charts indicate that there is a high concentration on primary industry and related services with most of the remainder of the economy servicing the needs of the residents. Even though Dubbo has a significant manufacturing sector, within this larger region it is not a large share of the economy (less than 10 per cent) with food manufacturing being the largest component, further highlighting the reliance on agriculture.

FIGURE 3-D: SECTORAL DISTRIBUTION OF GROSS OUTPUT: SOUTHERN BRIGALOW 1996-97  
(\$'000)

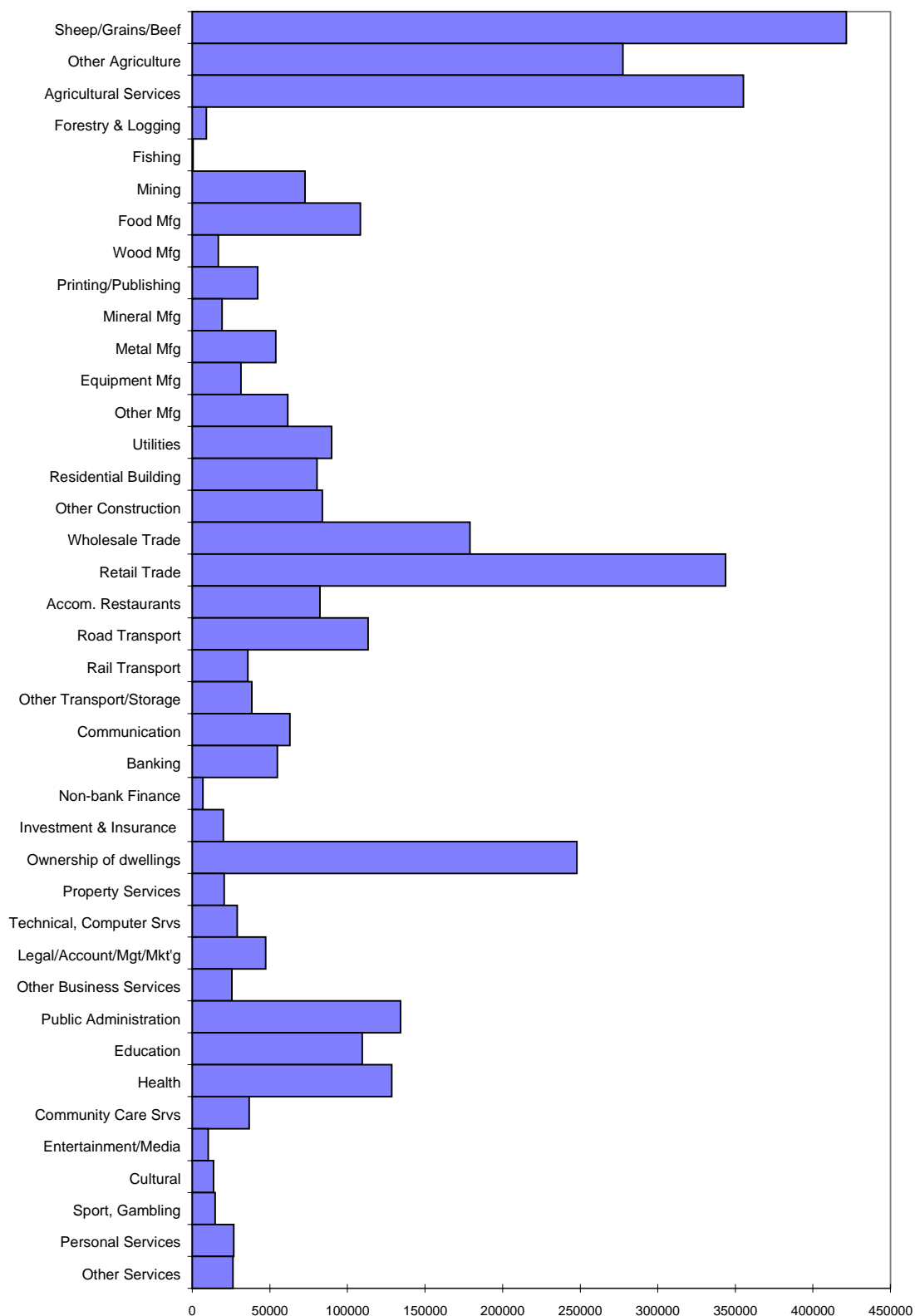
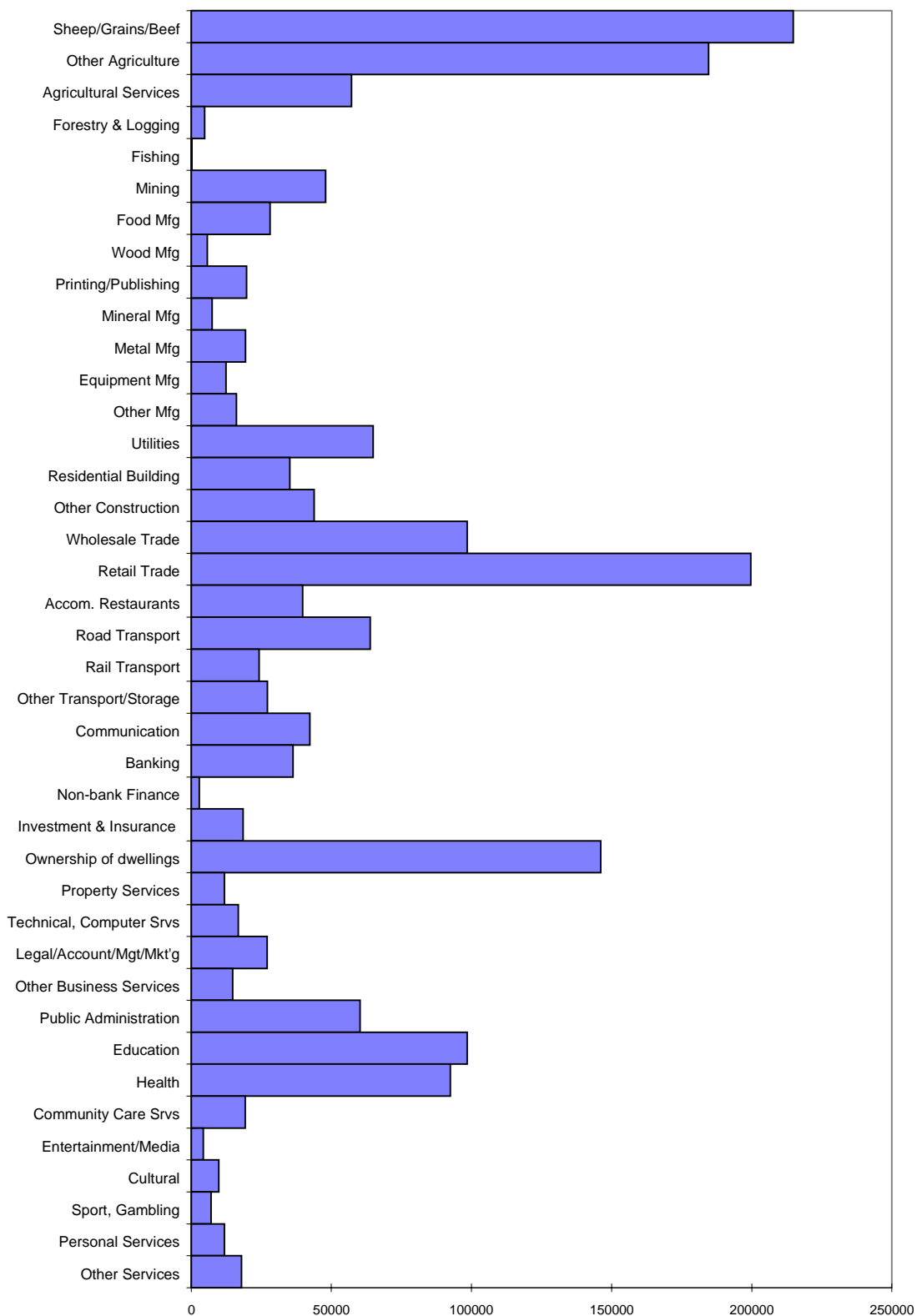


FIGURE 3-E: SECTORAL DISTRIBUTION OF GRP (VALUE-ADDED): SOUTHERN BRIGALOW  
1996-97 (\$'000)



**FIGURE 3-F: SECTORAL DISTRIBUTION OF HOUSEHOLD INCOME: SOUTHERN BRIGALOW  
1996-97 (\$'000)**

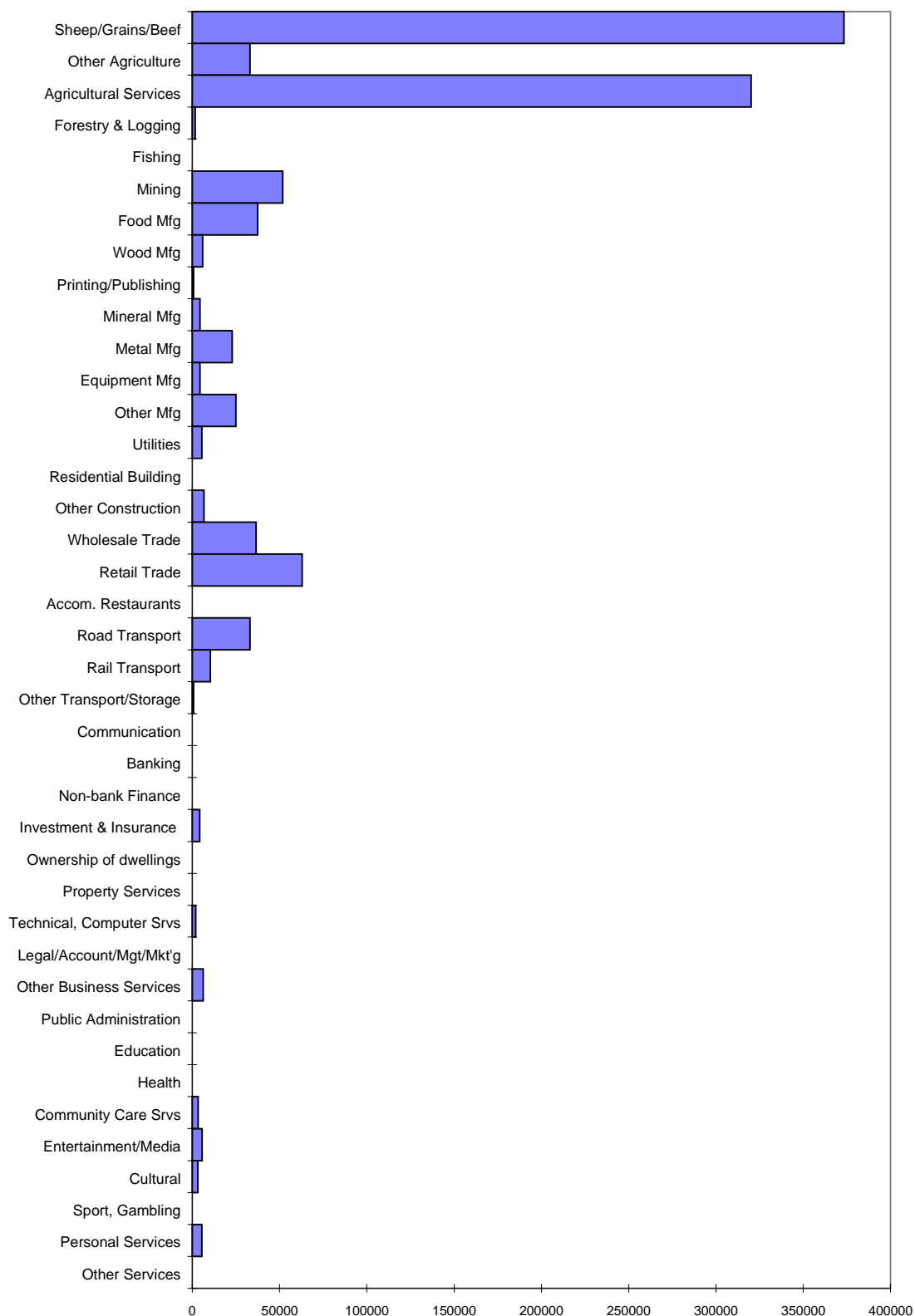


FIGURE 3-G: SECTORAL DISTRIBUTION OF EMPLOYMENT: SOUTHERN BRIGALOW 1996-97  
(NUMBER)

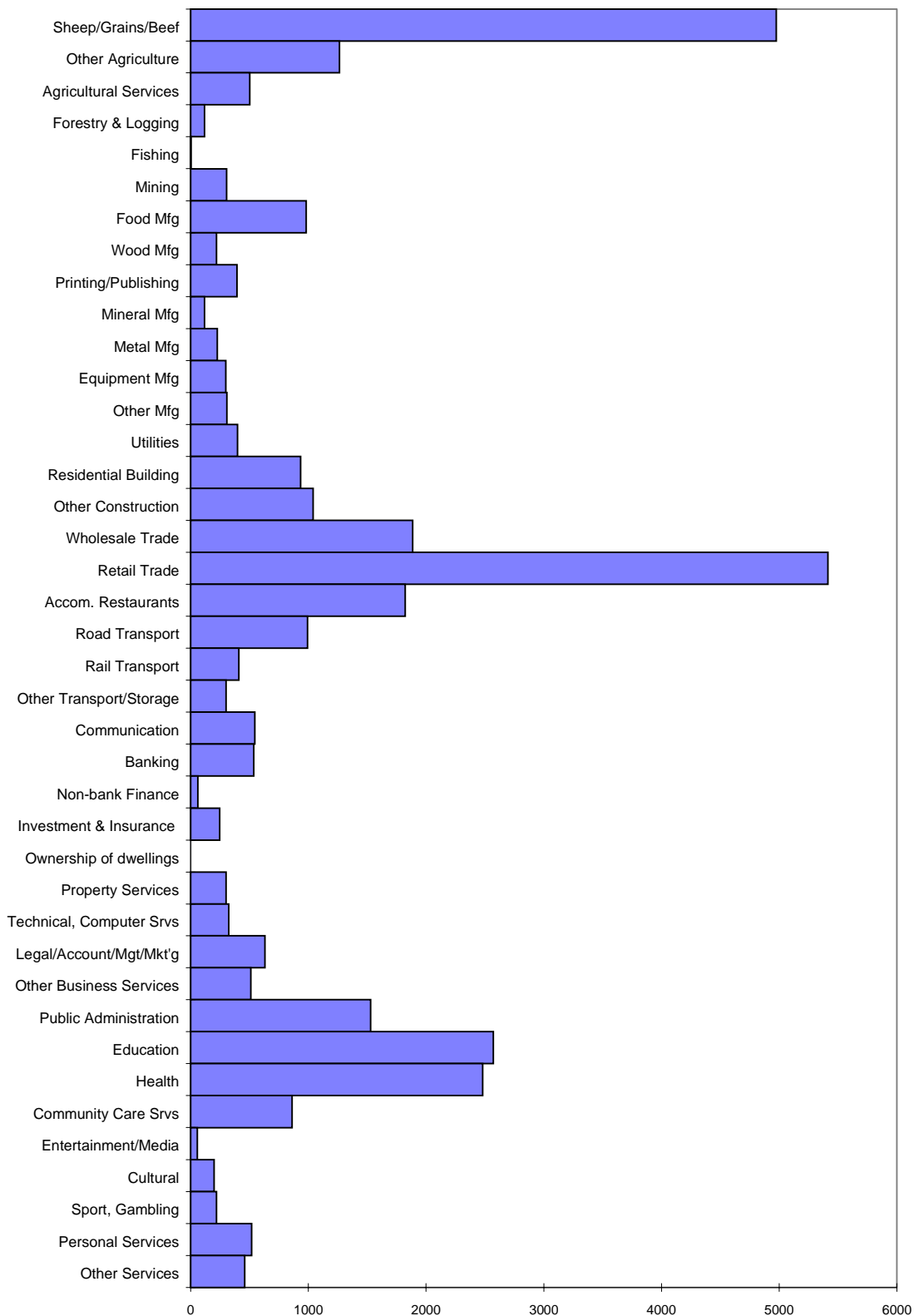


FIGURE 3-H: SECTORAL DISTRIBUTION: EXPORTS, SOUTHERN BRIGALOW 1996-97 (\$'000)

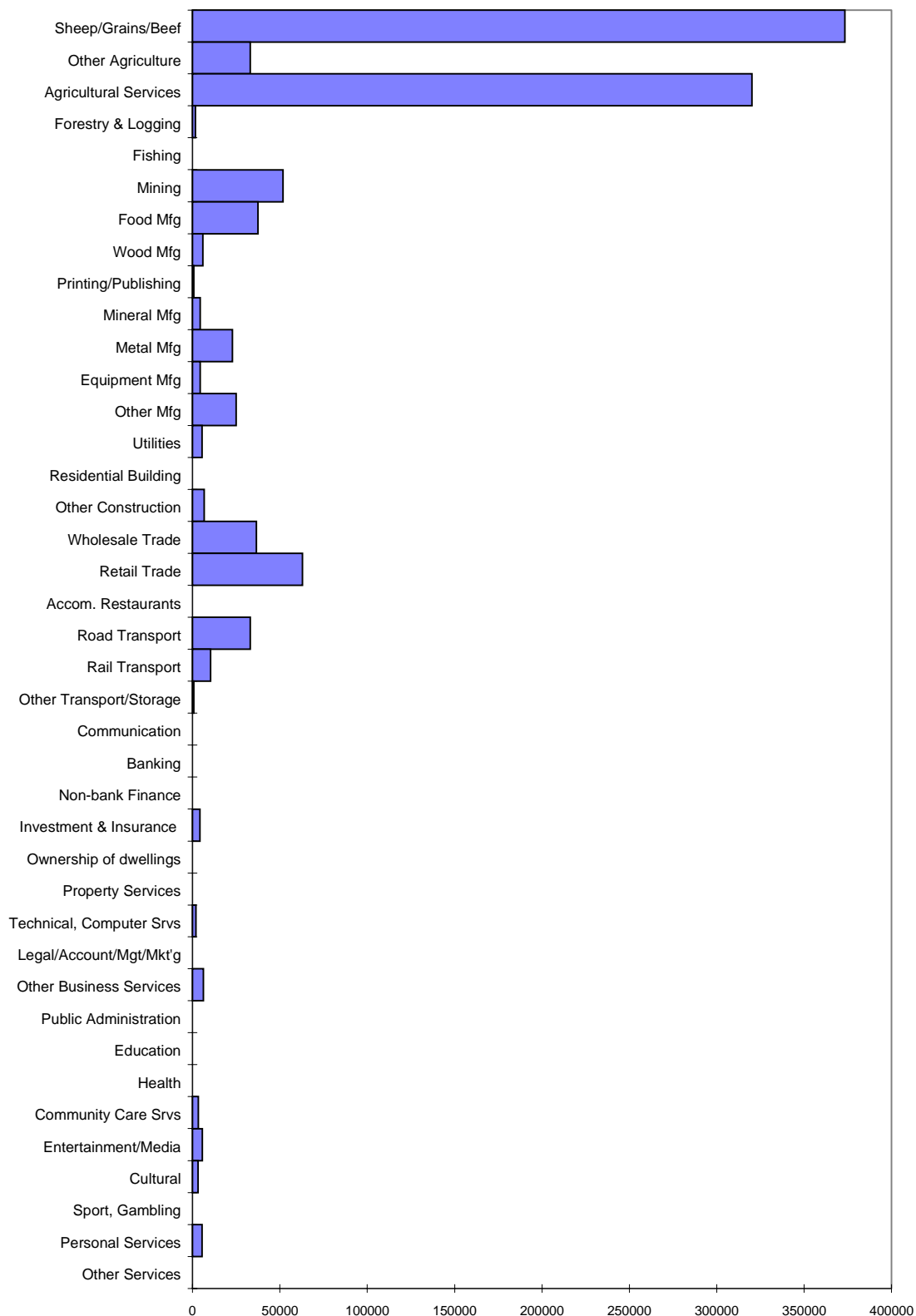
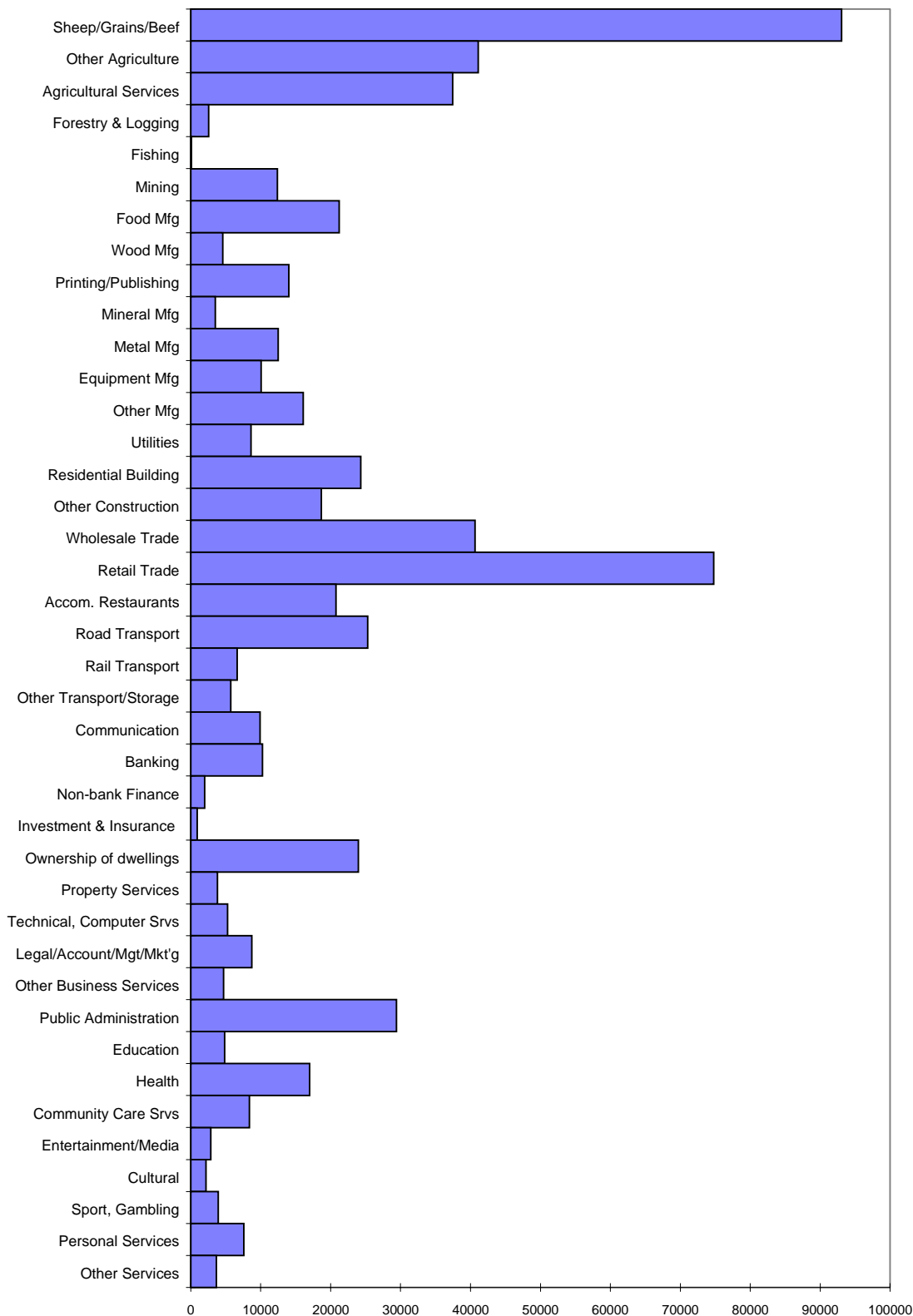


FIGURE 3-I: SECTORAL DISTRIBUTION: IMPORTS, SOUTHERN BRIGALOW 1996-97 (\$'000)



In 1996-97, the forest industry and wood processing contribute \$10m (0.5 per cent) to the value added of the region and generated 337 jobs (1.0 per cent of regional employment). In the Southern Brigalow, forestry and related processing is a relatively small part of the economy but will be more important in some of the local areas.



### 3.3 TRENDS IN THE REGIONAL ECONOMY

The previous section provided a snapshot of the Southern Brigalow region for 1996-97. The analysis of the trends in those variables and some updating beyond 1996-97 is provided in this section. This also provides an opportunity to relate Southern Brigalow performance measures to those for NSW.

The analysis is based on detailed employment by industry data obtained from the ABS Population Censuses. These data are the best available for the analysis of industry profiles and trends to provide a context for the analysis of the forest industry in the Southern Brigalow region.

#### 3.3.1 Regional Population and Employment

Data on population employment levels from the ABS Population Census form the basis for this section. The employment data represent workplace based employment estimates. They are expressed as total employment - not full time equivalents and are compared with population changes.

TABLE 3-B: TOTAL EMPLOYMENT AND POPULATION: SOUTHERN BRIGALOW

Census Year	Total Employment	Total Population	Employment Share of Population %	Average Annual Change Between Census Years	
				Employment %	Population %
1976		77,700			
1981	34,805	82,700	42.1		1.26
1986	33,736	84,670	39.8	-0.62	0.47
1991	34,689	86,780	40.0	0.56	0.49
1996	34,970	87,095	40.2	0.16	0.07

Source: ABS (Population Census data)

It is apparent from Table 3-B that the 1976 to 1991 period was a period of high population growth in the Southern Brigalow region. This was driven by the high levels of development within agriculture including the increases in the areas under irrigation. This contrasted with other parts of NSW that experienced lower growth than that of the Southern Brigalow. Since 1981, growth has been much slower with population growth being negligible in the early 1990s under the influence of low commodity prices and poor seasons. Employment growth was negative from 1981 to 1986 and very low in the early 1990s.

The growth has been concentrated in the Dubbo LGA that is the only area to show consistent growth over the 1976 to 1996 period as shown in Table 3-C. All of the other LGAs have shown employment losses since 1981 while population losses have become more common in recent years. This represents a bleak situation for most of these rural regions and the urban centres in them. Over the 1981 to 1996 the proportion of the population in employment has tended to decrease (see Table 3-B). The mix of employment and those not employed is near the level for NSW which, in 1996, was 41.3. Apart from Dubbo, the region would appear to be losing jobs and population at about the same rate.

TABLE 3-C: AVERAGE ANNUAL RATES OF CHANGE BETWEEN CENSUS YEARS

	Population				Employment		
	1976 to 1981	1981 to 1986	1986 to 1991	1991 to 1996	1981 to 1986	1986 to 1991	1991 to 1996
	%	%	%	%	%	%	%
Dubbo LGA	3.83	1.31	1.89	1.53	0.15	2.83	1.87
Coolah	-0.68	0.09	-0.56	-1.37	-0.59	-1.10	-2.29
Coonabarabran	-0.27	-0.14	0.03	-0.98	-2.02	-0.52	-2.28
Gilgandra	0.40	0.12	-0.20	-0.53	-1.46	-0.37	-1.13
Merriwa	0.00	0.33	0.24	-0.97	-2.53	0.25	-1.33
Gunnedah	0.15	0.45	-0.01	-0.68	-0.16	-0.59	-0.88
Quirindi	-0.54	0.29	-0.40	-1.52	-1.16	-0.57	-0.89
Narrabri	0.32	-0.49	-0.86	-0.85	-1.05	-1.48	-0.40
<b>Southern Brigalow</b>	<b>1.26</b>	<b>0.47</b>	<b>0.49</b>	<b>0.07</b>	<b>-0.62</b>	<b>0.56</b>	<b>0.16</b>
<b>NSW</b>	<b>1.09</b>	<b>1.11</b>	<b>1.29</b>	<b>1.02</b>	<b>-0.11</b>	<b>1.63</b>	<b>1.26</b>

Source: ABS (Population censuses)

### 3.3.2 The Labour Force

The following information on the total labour force and unemployment is sourced from the Department of Education, Workplace Relations and Small Business (DEWRSB 1999). The unemployment data refer to the number of people receiving unemployment benefits as well as an estimate of those unemployed who do not receive benefits (eg. married spouses). That value is then expressed as a percentage of the local labour force derived from the ABS Labour Force Survey to provide an unemployment rate. From these values it is possible to estimate the level of employment.

These data do not have the accuracy of the ABS population census data, but the frequency permits the development of annual movements in employment. The resultant trends reflect a combination of macro-economic factors affecting Australia generally and local factors.

The information presented in Table 3-D and Figure 3-J confirm that there has been little growth in employment from the early 1980s through to the mid-1990s. Between 1995 and 1997, almost 10,000 people were added to the workforce and employment. This has been a dramatic increase as a result of several factors but including recovery from the recession, better seasonal conditions and improved commodity prices. The recovery in the level of water available to irrigators was an important part of this recovery. This has brought the rate of unemployment below that for NSW and Australia. These labour force survey data relate to the June Quarter that coincides with the low level of seasonal employment at that time in much of this region.

FIGURE 3-J: TOTAL LABOUR FORCE AND EMPLOYMENT TRENDS - SOUTHERN BRIGALOW

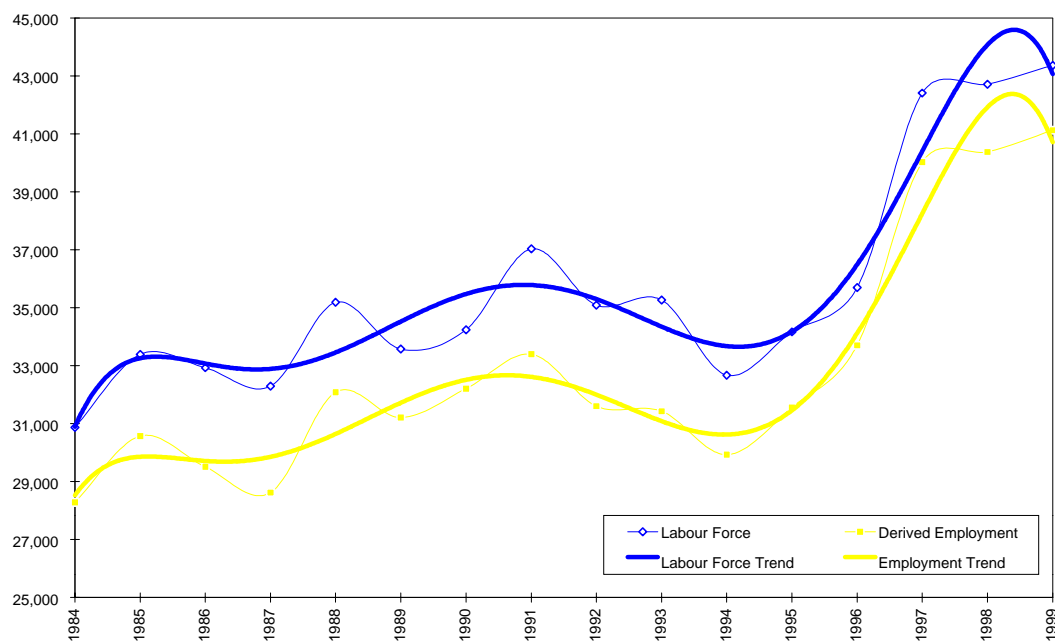


TABLE 3-D: LABOUR FORCE SOUTHERN BRIGALOW

Year	Southern Brigalow				Unemployment	
	Labour Force	Derived Employment	Unemployment		NSW	AUST
	no.	no.	no	%	%	%
1984	30,869	28,283	2,586	8.4	9.5	8.9
1985	33,382	30,572	2,810	8.4	9.0	8.4
1986	32,926	29,508	3,418	10.4	8.2	7.8
1987	32,289	28,618	3,671	11.4	8.8	8.1
1988	35,183	32,086	3,097	8.8	7.6	7.6
1989	33,572	31,208	2,364	7.0	6.4	6.1
1990	34,240	32,202	2,038	6.0	6.2	6.5
1991	37,028	33,394	3,634	9.8	8.2	9.6
1992	35,090	31,599	3,491	9.9	9.8	10.8
1993	35,264	31,426	3,838	10.9	10.6	10.9
1994	32,670	29,923	2,747	8.4	9.7	10.0
1995	34,167	31,556	2,611	7.6	7.5	8.3
1996	35,692	33,704	1,988	5.6	7.8	8.4
1997	42,403	40,022	2,381	5.6	7.8	8.6
1998	42,711	40,376	2,335	5.5	7.2	7.9
1999	43,365	41,123	2,242	5.2	6.5	7.2

Source: DEWRB (1999)

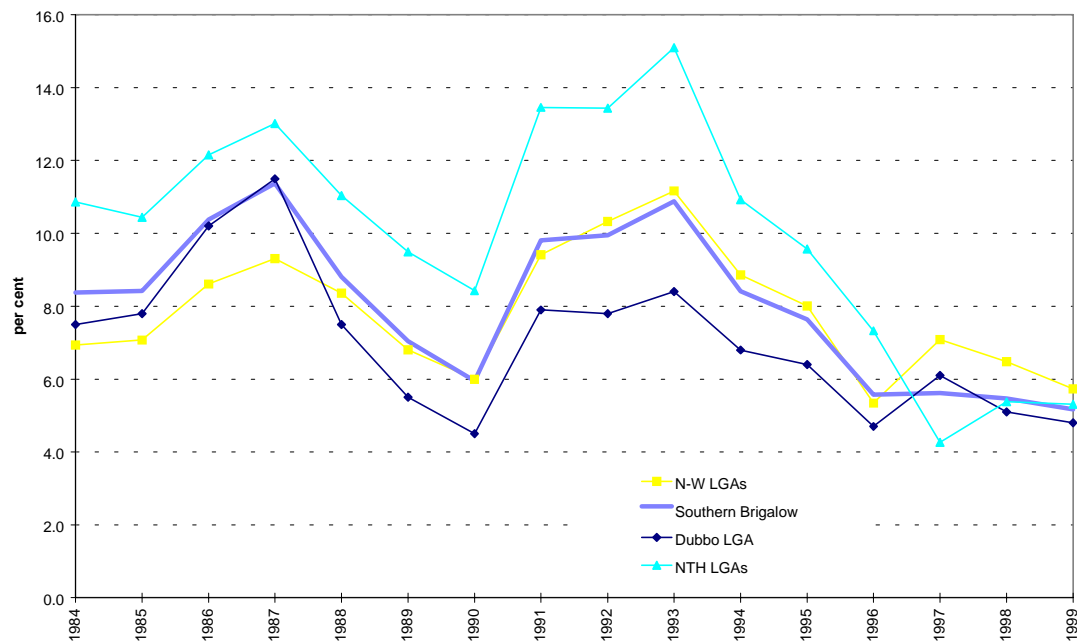
### 3.3.3 Unemployment

The unemployment data for the Southern Brigalow region are shown in Figure 3-K and Figure 3-L. The overall rate of unemployment has been declining during the 1990s from around ten per cent to five per

cent. In the 1980s unemployment was generally higher than in the 1990s but did reach a low level in 1990.

There is also some variation in unemployment rates within the region. The highest rates have tended to be in the Northern SD LGAs, but they have shown a dramatic fall in the 1990s to now be among the lowest rates in the region. Dubbo has mostly had lower unemployment rates than the rest of the region. All of the LGAs have followed the same (national) trend which highlights the fact that it is difficult to achieve an employment outcome in any particular area that is markedly different from the national trend.

FIGURE 3-K: SUMMARY OF UNEMPLOYMENT RATES



The unemployed number and rate from the Population Census is shown in Table 3-E. These rates are comparable with those from the DEWRSB data.

Table 3-E also indicates the trends in employment in the timber industry between the various census years. Overall, timber industry employment has declined by about 80 over the period 1981 to 1996. However, the job loss was about double that number in 1991, but there has been a recovery since then. Most of the job losses have occurred in the Narrabri and Coonabarabran LGAs that include a large portion of the Pilliga Scrub. There has also been a large variation in employment in Gunnedah. This area seems to have been quickly affected by the recession of the early 1990s as the level of building activity declined rapidly.

FIGURE 3-L: UNEMPLOYMENT RATES BY LGA AND SUB-REGION

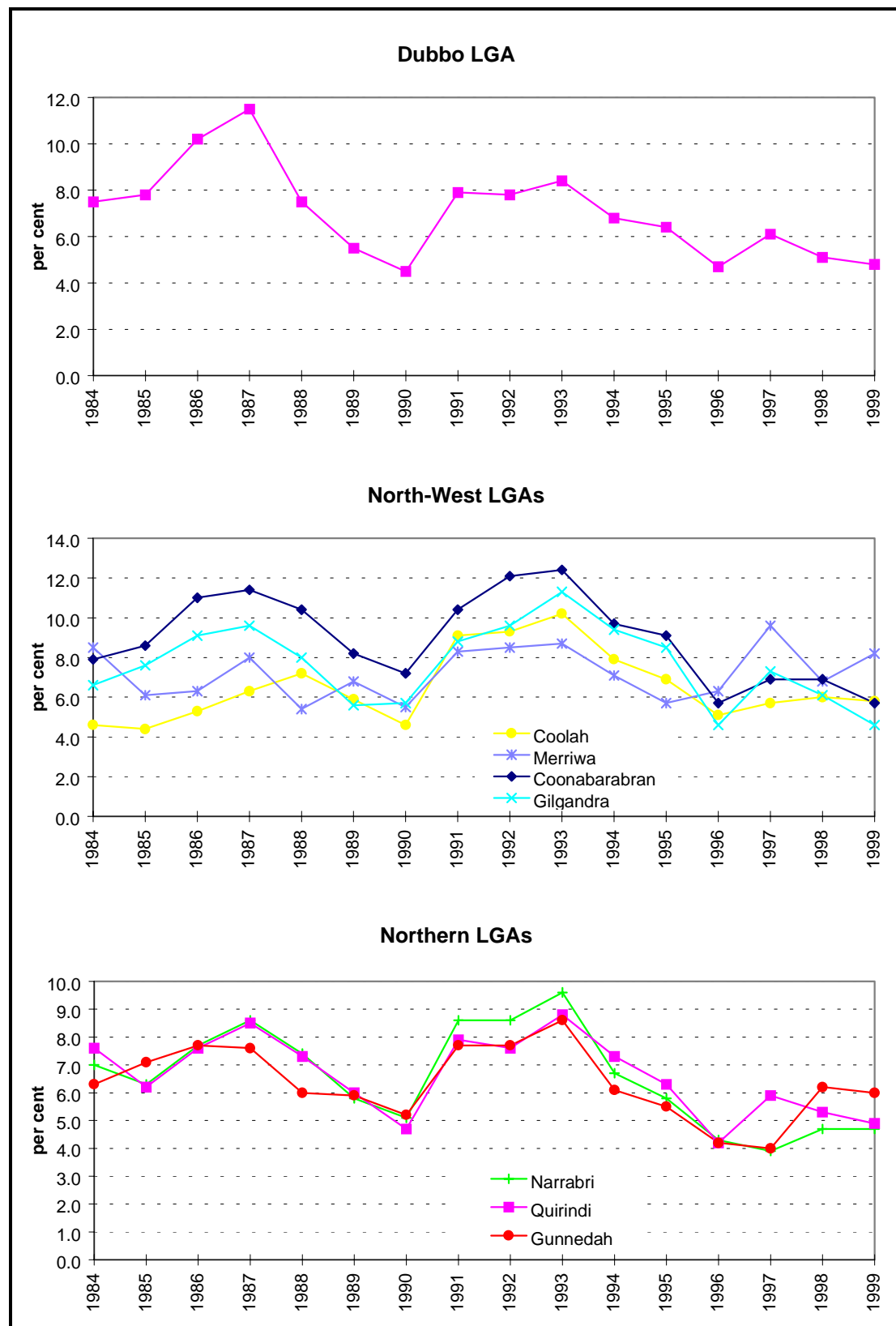


TABLE 3-E: LOCAL AREA UNEMPLOYMENT RATES AND TIMBER INDUSTRY EMPLOYMENT

LGA	Timber Industry Employment				Unemployment: 1996		1999
	1981	1986	1991	1996	Number	Rate	
Dubbo	25	40	37	37	799	4.7	4.8
Coolah	16	18	9	9	99	5.1	5.8
Coonabarabran	116	76	57	70	202	5.7	5.7
Gilgandra	11	12	4	17	115	4.6	4.6
Merriwa	1	3	0	3	70	6.3	8.2
Quirindi	12	11	3	12	110	4.2	4.9
Gunnedah	37	19	11	31	293	4.2	6.0
Narrabri	104	39	40	60	300	4.3	4.7
<b>Southern Brigalow</b>	<b>322</b>	<b>218</b>	<b>161</b>	<b>239</b>	<b>1988</b>	<b>5.6</b>	<b>5.5</b>

Source: DEWRSB & ABS

h

The 1996 level of employment in the timber industry of 239 is equivalent to 0.7 per cent of total employment. In that respect, the timber industry is only a small part of the Southern Brigalow region economy.

### 3.4 ANALYSIS OF INDUSTRY EMPLOYMENT

This section provides details of the industry or sectoral structure of the economy. The analysis of the detailed employment by industry data obtained from the ABS Population Census is presented in this section. This provides an industry context and trends as background to the consideration of change in the timber industries.

The sectoral or industry classification used in this analysis is based on the Australia and New Zealand Standard Industry Classification (ANZSIC). The particular aggregation and description used in this work is shown in Attachment 2.

#### 3.4.1 Sectoral Distribution – 1996

The industry distribution of employment was presented in Figure 3-G. Total employment was 34,970 persons and the main employing industries were (expressed in terms of the share of regional employment):

- The broadacre agriculture (sheep/beef cattle/grains) sector generated 14.2 per cent of total employment.
- The retail trade sector represented 15.5 per cent of total employment and wholesale trade 5.4 per cent.
- The accommodation/restaurants/cafes/pubs/clubs sector employed 5.2 per cent.
- The education and health sectors each employed 7.4 and 7.1 per cent, respectively.
- The total manufacturing sectors employed 7.2 per cent.
- Other agriculture employed 3.6 per cent
- The remaining sectors employed 35 per cent.

These characteristics indicate a regional economy where agriculture is important and it supports food manufacturing. Otherwise service industries are important for the residents and to a lesser extent, tourists. The importance of Dubbo as a retail centre for much of the central west of NSW also helps to establish a high level of employment in retail trade.

The following analyses provide a range of comparative and benchmarking information on the Southern Brigalow economy.

### 3.4.2 Location Quotient Analysis

A location quotient (LQ) is a ratio that shows the relative importance of sectors to the region, compared to that in Australia as a whole, ie:

$$\frac{\% \text{ of } \mathbf{local} \text{ employment in sector } x}{\% \text{ of } \mathbf{national} \text{ employment in sector } x}$$

Where the local share is larger than the national share, the LQ is greater than one and where the local share is smaller, the value is less than one. Where the value is high (greater than 2) it indicates that those industries are likely to be key strengths in the region.

LQs are presented in Table 3-F for those industries that have a 1996 value greater than 1.0 and a selection of some of the essential service sectors. The LQs confirm that the Southern Brigalow region is heavily concentrated on a number of agricultural and related industries and selected services, particularly transport. A significant part of the oilseed processing industry is located in the region along with meat processing and leather production. The forestry and timber processing industry, while small in employment terms is more important to the Southern Brigalow than it is to Australia as a whole.

There is little manufacturing apart from that servicing primary production (machinery) or processing primary products. The LQs for most of the service sectors are about 1.0 that indicates the region is about on average for those services. The high dependence on transport is a reflection of the high freight needs of industries in the region. It is notable that the LQs for many of the services that support business are considerably less than 1.0, eg. other business services, other property services, legal and accounting services and various technical and scientific services.

TABLE 3-F: LOCATION QUOTIENTS: SOUTHERN BRIGALOW

Selected Sectors	LQs				Employment
	1981	1986	1991	1996	1996
Grains	5.9	10.3	8.6	10.9	3320
Oils and fats	7.9	3.8	5.2	10.0	81
Beef cattle	9.2	5.4	9.3	6.5	958
Pigs	5.4	5.4	8.0	6.1	137
Services to agric.; hunting	7.7	9.4	8.3	5.7	502
Sheep	4.1	3.1	5.0	4.6	698
Leather and leather products	3.4	4.6	5.5	3.9	98
Meat and meat products	1.9	1.8	3.4	2.6	543
Rail & other transport	1.6	1.8	1.8	2.4	410
<b>Forestry and logging</b>	<b>1.9</b>	<b>1.6</b>	<b>1.7</b>	<b>2.3</b>	<b>118</b>
Other agriculture	1.7	1.9	2.2	2.0	976
<b>Sawmill products</b>	<b>1.3</b>	<b>1.0</b>	<b>0.9</b>	<b>1.8</b>	<b>130</b>
Poultry	2.2	2.0	1.8	1.6	75
Water, sewerage & drainage	0.5	0.7	0.6	1.6	140
Electricity	1.0	1.0	1.2	1.6	256
Flour and cereal foods	1.9	0.8	1.3	1.5	60
Road transport	3.2	1.3	1.3	1.4	994
Coal; oil and gas	1.8	2.0	2.0	1.4	201
Mechanical repairs	1.3	1.3	1.4	1.4	888
Accom. & restaurants	1.4	1.3	1.1	1.1	1823
Other construction	0.6	0.7	0.6	1.1	1041
Public administration	1.0	1.0	0.9	1.1	1515
Retail trade	1.1	1.0	1.0	1.1	4438
Agricultural, mining etc machinery	0.6	1.1	1.6	1.0	91
Education	0.9	0.9	0.9	1.0	2571
Health services	0.8	0.8	0.9	1.0	2482
Banking	0.8	0.8	0.8	0.8	536
Communication services	1.1	1.0	0.9	0.8	544
Other services	0.5	0.5	0.7	0.7	459
Other business services	0.8	0.7	0.6	0.6	513
Other property services	0.4	0.4	0.6	0.6	302
Legal, accounting srvs	0.7	0.5	0.5	0.5	631
Scientific research etc	0.6	0.5	0.5	0.4	324

### 3.4.3 Industry diversity

A measure of the industry diversity in the economy is the coefficient of specialisation (CS). The CS is calculated as the sum of the differences between the proportions of local and national employment in each sector. The more the local economy emulates the structure of the national economy the lower (or closer to zero) the value of the CS as shown by the low CS for NSW. At the other extreme, the maximum CS is 100 indicating that a region has only one sector.

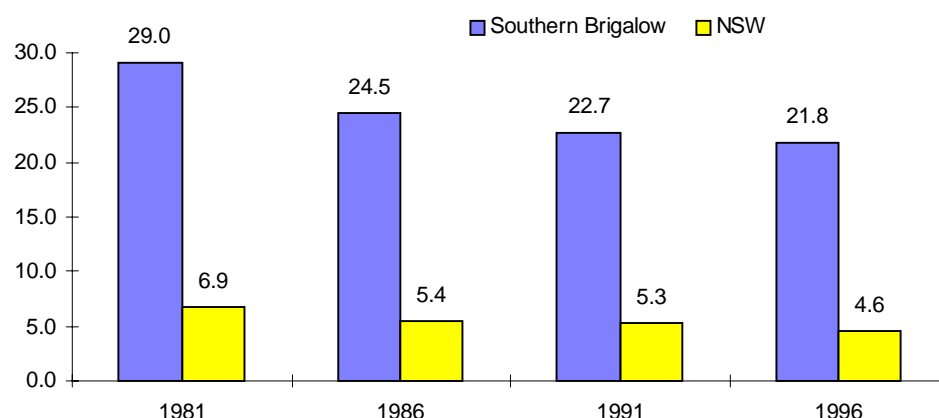
This measure can be used to gauge the extent of specialisation in an economy and how the value may change over time. Most economies tend to become more diversified over time. However, the rate of diversification varies among regions.

The CS for the Southern Brigalow and NSW are shown for four Population Census years in Figure 3-M. These are relatively low values indicating a high level of diversification that has been improving slowly over the period. However, the values tend to reflect the diversity among primary production and processing rather than diversity across the main industry groups.

For comparative purposes, the value for the Southern Brigalow is lower than those estimated for the coastal regions (about 18) and a several points above the estimate for the Hunter region (15).



FIGURE 3-M: COEFFICIENTS OF SPECIALISATION



### 3.4.4 Population Employment Ratios

The servicing capacity of the Southern Bragalow regional economy is shown as Population-Employment Ratios (PER). Here, the servicing capacity is represented by the **number of residents serviced per employee** in a particular sector. This measures the share of the Southern Bragalow region relative to NSW as a whole. The trend over time in the level of service is also measured. In all cases, the lower the PER, the more intensive is the service level that may indicate a higher quality of service. These ratios are only calculated for service sectors.

The information in Table 3-G indicates that the Southern Bragalow region has service levels substantially better than NSW in only road transport (ie. a smaller PER) that reflects the importance of road transport to the region. The region is about the NSW level in retail trade and the key public-funded services of education, health and community care. On the other hand, there are large differences in the level of many of those services that support business activity. It is also notable that the level of service in the key communications and banking sectors has been deteriorating while most other services have been improving over the 1981 to 1996 period.

The level of services provided within the region can also be expressed in the form of job opportunities as shown in Figure 3-N. This indicates the change in employment that would occur in the Southern Bragalow region if the PER were at the same level as for NSW as a whole. There are a few sectors that have service levels above the NSW average such as rail and road transport, electricity, trade, public administration and education sectors. However, those favourable sectors amount to only a few jobs relative to those sectors that are below the NSW level. An important concern is the large deficits that occur in business services and personal services even though Dubbo is included in this region.

TABLE 3-G: POPULATION: EMPLOYMENT RATIOS: SOUTHERN BRIGALOW

Selected Sectors	Southern Brigalow				NSW	
	1996	1991	1986	1981	1996	1991
Retail trade	20	19	19	19	21	20
Health services	35	39	41	46	33	35
Education	34	37	40	41	35	36
Accom. & restaurants	48	51	58	55	47	53
Legal, accounting srvs	138	165	202	173	58	75
Residential building	93	77	96	62	62	70
Other business services	170	231	259	286	91	129
Banking	163	140	139	141	104	97
Community care services	101	152	155	242	108	156
Communication services	160	160	113	103	112	133
Road transport	88	87	93	91	123	108
Other services	190	179	264	281	131	129
Personal services	168	195	250	244	133	160
Other property services	288	269	482	496	163	159
Libraries, museums, arts	439	512	674	1199	330	437

Overall, if these sectors were operating at the NSW level, it would result in 4,554 jobs that is equivalent to 13 per cent of the 1996 employment.

### 3.4.5 Employment Change by Sector

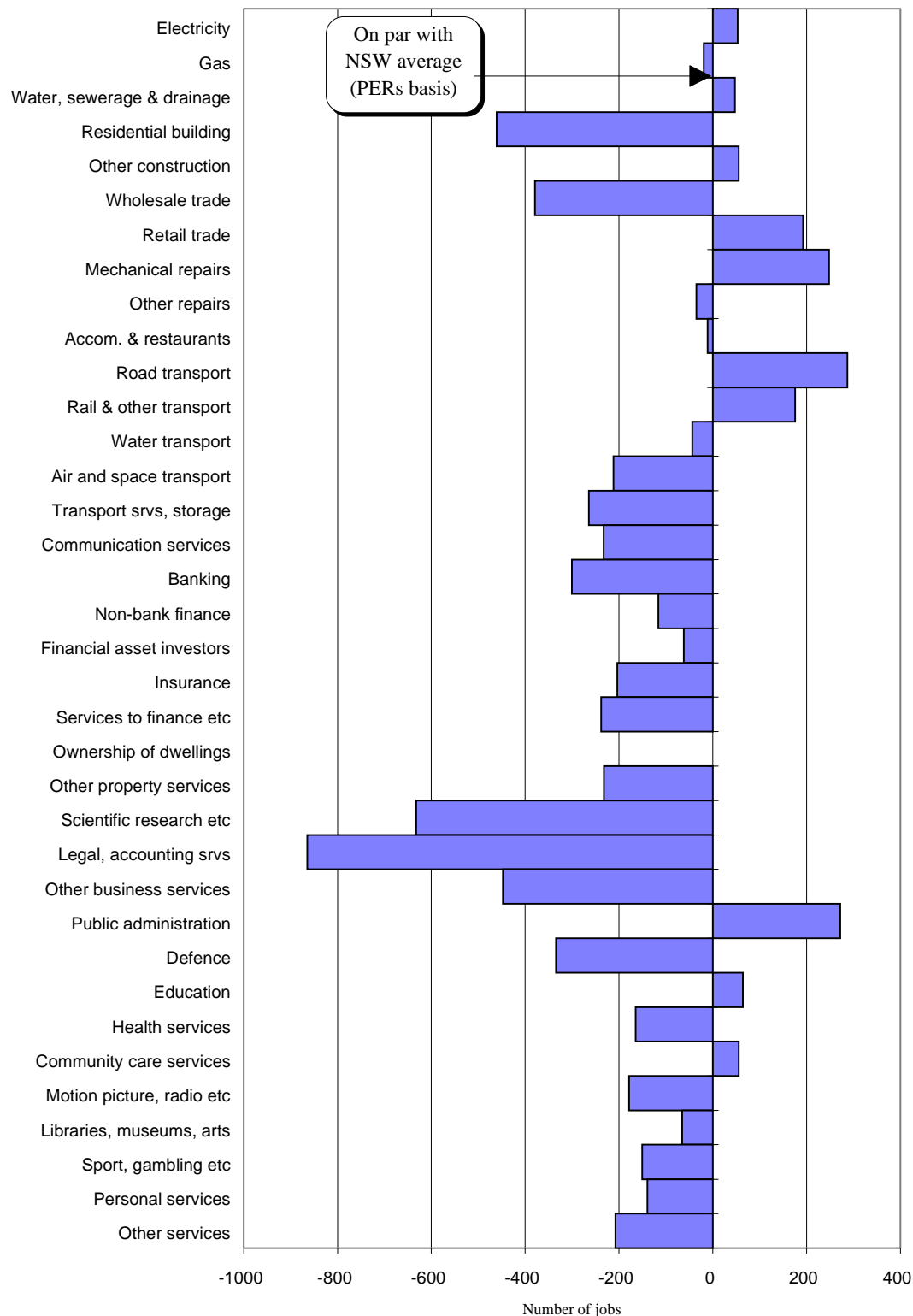
The remainder of this section is focused on identifying industry trends in the Southern Brigalow economy, and in comparing the Southern Brigalow with trends in NSW as a whole. The analysis is based on detailed employment data from recent ABS Population Censuses. While it would be preferable to use output data, these are not available for many industries.

Based on the Population Census data for Southern Brigalow, the following changes in total employment have occurred.

1991	34,689	1996	34,970
1981	34,805	1991	34,689
Diff.	-116		281

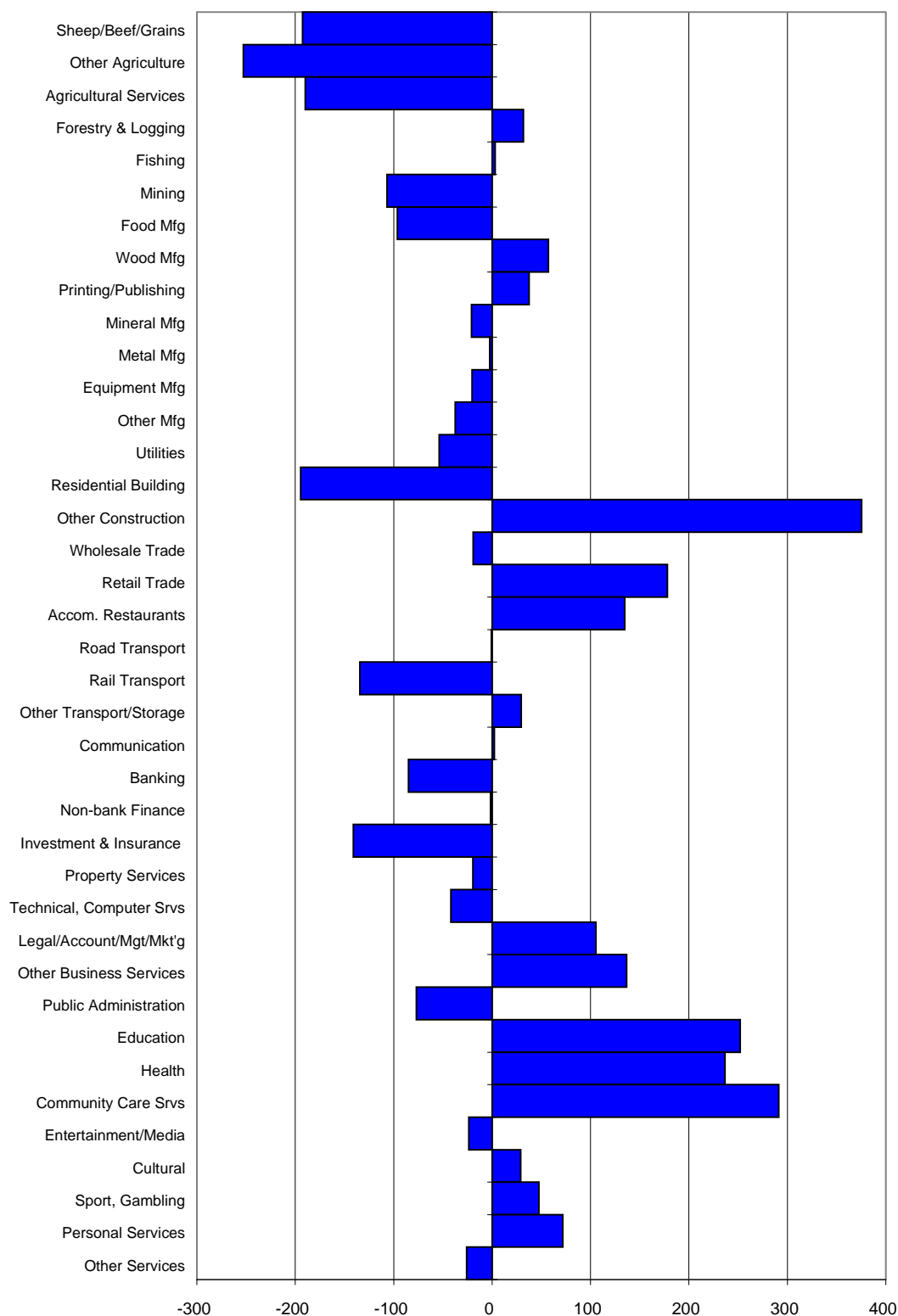
These data (and the data in Table 3-B) indicate that employment grew slightly in the 1990s which was marginally better than the 1980s. The change in total employment between 1991 and 1996 was distributed across the sectors as shown in Figure 3-O.

FIGURE 3-N: JOBS POTENTIAL: SOUTHERN BRIGALOW 1996



While the net position has not changed much, there is evidence of a substantial amount of structural change occurring. This included widespread reductions in employment in agriculture, some manufacturing, residential building and rail transport, some of which was related to the poor seasonal and commodity market conditions at the time. At the same time, there was growth in other construction, retail trade, accommodation etc.,

FIGURE 3-O: CHANGE IN EMPLOYMENT 1991 - 1996: SOUTHERN BRIGALOW



education, health and community services and some business and personal services. Employment in forestry and logging, and wood manufacturing increased slightly in this period.

It is possible to assess these changes in the Southern Brigalow area against the changes that are occurring in NSW as a whole. This can be done using shift share analysis that compares regional growth with growth in the State and the growth in each industry. Not all industries grow at the same rate and the particular mix of industries may favour some regions. As a result, regional growth is apportioned among State growth, industry mix effects and local factors.

The results for the Southern Brigalow region are shown in detail in Attachment 3 and summarised in Table 3-H, for the period 1991 and 1996. If the Southern Brigalow economy performed as well as the NSW economy over that period, then employment would have grown by 2,246 jobs as shown under the State column. The industry mix effect (shown in the Industry column) indicates that the mix of industries in the region was slightly favourable for employment growth. That is, the Southern Brigalow had a slightly higher mix of high growth industries than for NSW as a whole. The industry effect was equivalent to 386 jobs in the region.

TABLE 3-H: SUMMARISED SHIFT-SHARE ANALYSIS

	Component				Total Change
	State	Industry	Total State	Local	
	No.	No.	No.	No.	No.
Positive Effects	2,246	3,859	<b>6,105</b>	<b>1,250</b>	<b>7,355</b>
Negative Effects	-	(3,473)	<b>(3,473)</b>	<b>(3,601)</b>	<b>(7,074)</b>
<b>Total Effects</b>	<b>2,246</b>	<b>386</b>	<b>2,632</b>	<b>(2,351)</b>	<b>281</b>

This analysis establishes a benchmark that measures the performance of the Southern Brigalow against the overall trend in NSW and its industries. If the Southern Brigalow were on this benchmark, then employment would have increased by 2,632 (Table 3-H, Total State column). That benchmark for the Southern Brigalow would have resulted in employment changes for each industry as shown in Figure 3-P. A major part of that statewide change was a reduction in agricultural employment and a rationalisation within many areas of manufacturing, utilities, transport and public administration. Those reductions have been more than offset by widespread increases in employment in broadacre agriculture, some manufacturing, residential building, retail trade, accommodation, etc., many business and personal services and an expansion in the range of public-funded services.

The combined state and industry effects provide a state benchmark of a 2,632 (2,246 + 386) job increase in the Southern Brigalow region over 1991 to 1996. Since jobs actually grew in the local region by 281, the difference between the state benchmark suggests that local factors have been negative to the extent of a growth of 2,351 jobs (2,632 - 281). Those local factors that may impede job growth could include localised seasonal and price conditions; loss of market share due to scale factors; low population growth; low infrastructure investments; and the choices made by members of the community and business sector about where they locate and make purchases. This analysis is not able to apportion the changes to these factors.

FIGURE 3-P: STATE COMPONENT OF CHANGE 1991 - 1996: SOUTHERN BRIGALOW

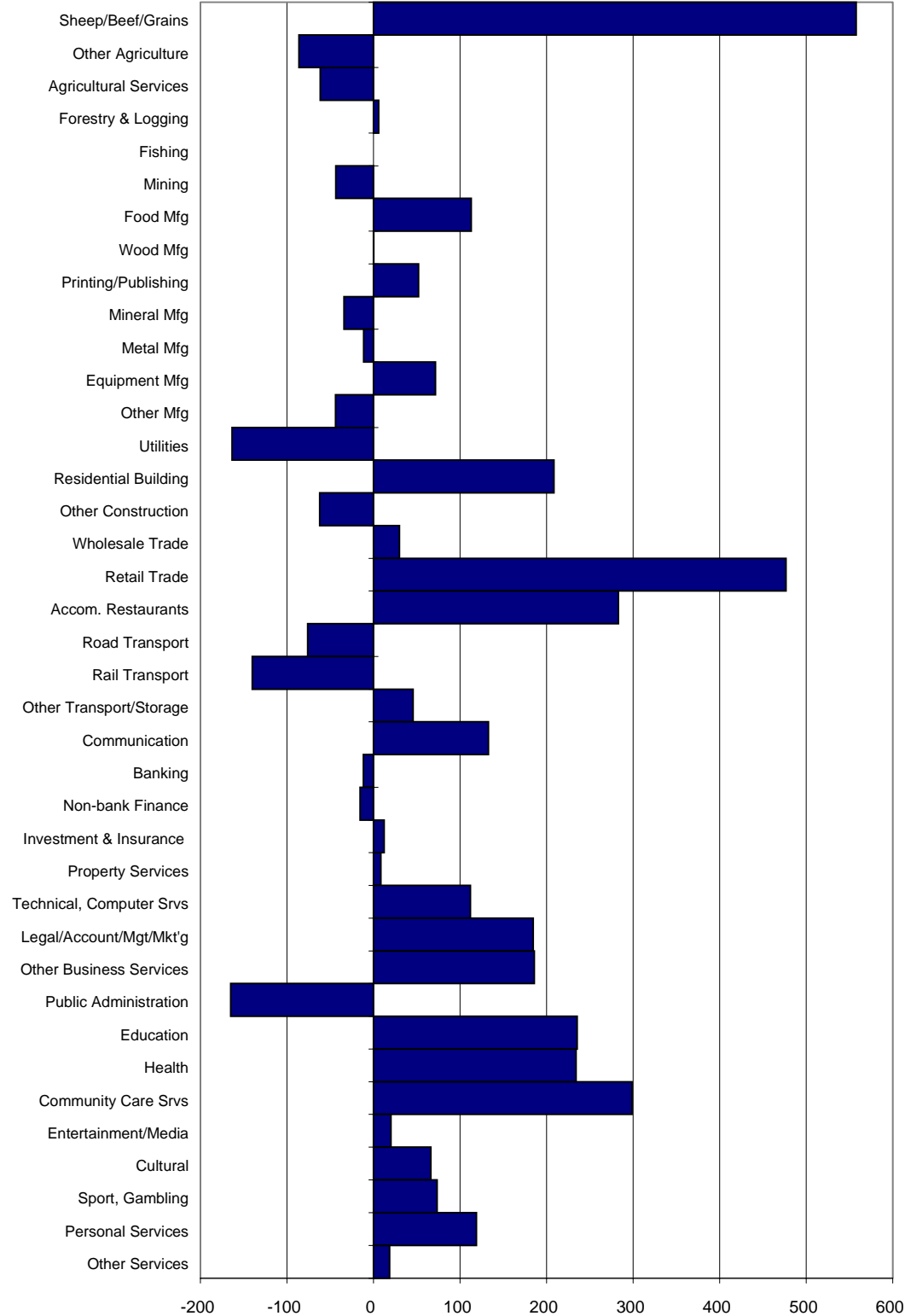
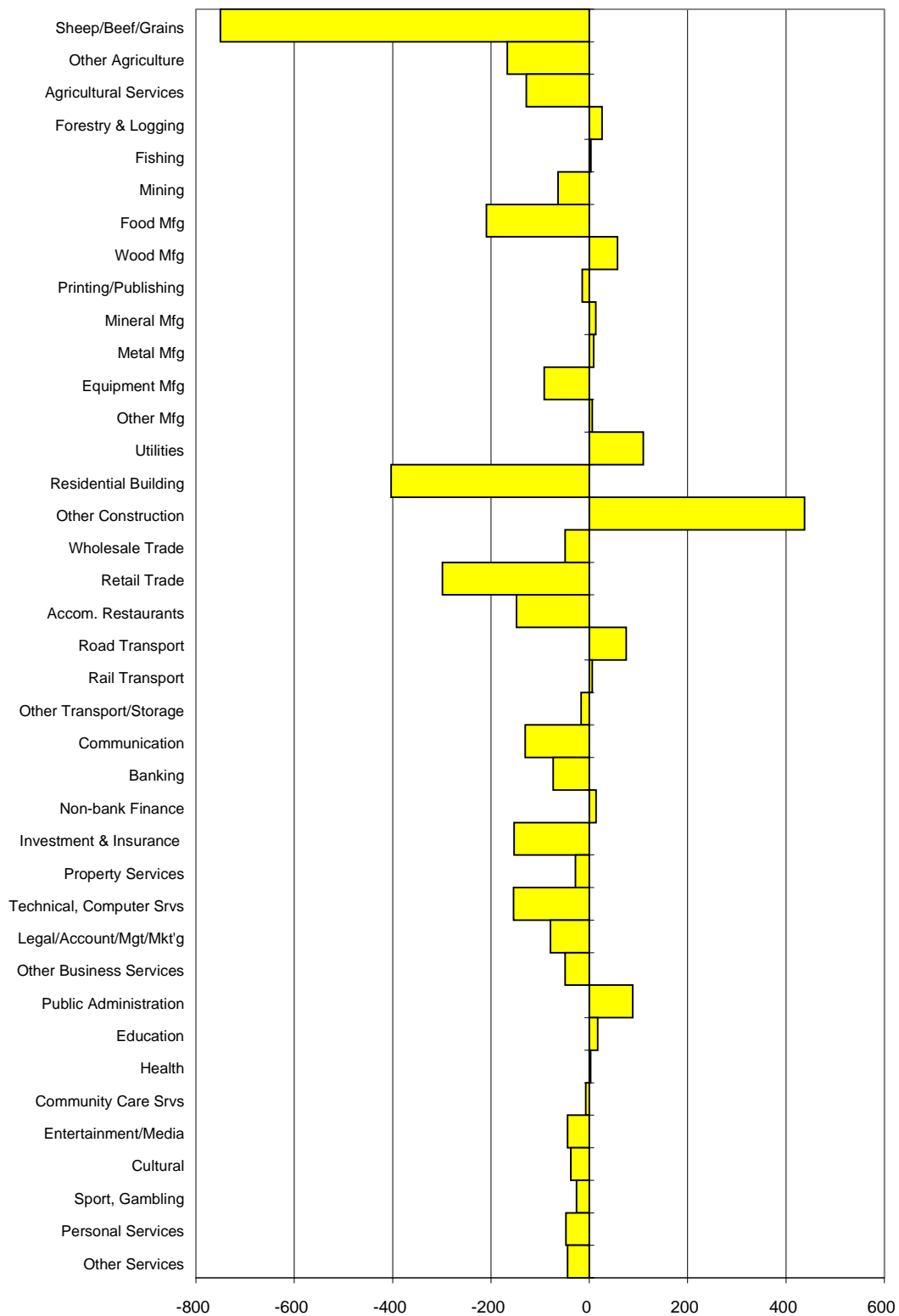


FIGURE 3-Q: LOCAL COMPONENT OF CHANGE 1991 - 1996: SOUTHERN BRIGALOW



The shift-share analysis of employment between 1991 and 1996 indicates that many industries did **not** perform as well at the local level as the state benchmark (Figure 3-Q). Thus, these industries lost some of their NSW market share and included:

- Most of agriculture
- Food manufacturing
- Residential building
- Retail trade
- Accommodation, restaurants, etc.
- Most business services
- Most personal services

Those industries that did well, and increased their share of that industry in NSW will normally equate with those that are competitive and can do well in other markets. Note that this can also result from the local industry declining more slowly than the industry in the state as a whole. Those industries included:

- Wood manufacturing
- Utilities
- Other construction
- Road transport
- Public administration

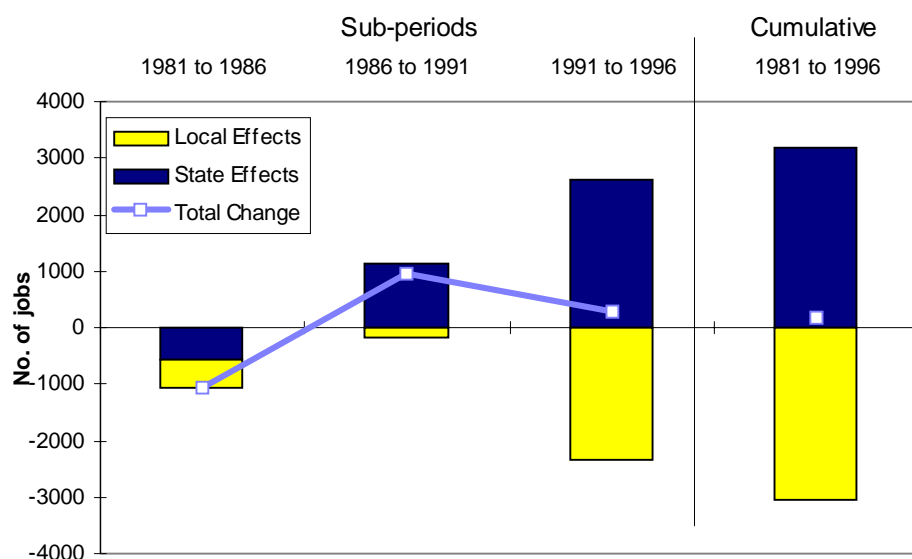
In NSW, both the forestry and wood manufacturing sectors showed a small increase in employment. Within the Southern Brigalow region, local factors were positive for forestry and logging and for wood manufacturing. This result reflects some growth in the use harvesting and milling of cypress pine.

A similar shift-share analysis covering the census periods from 1981 is shown in Figure 3-R. Between 1981 and 1986 there was a small decrease in employment in the Southern Brigalow region. The dominant factor at that time appeared to be the weak growth in NSW as a whole. Over that period the Southern Brigalow region lost employment faster than NSW as indicated by the negative local effects.

In the 1986 to 1991 period growth in NSW was very strong. This was offset marginally in the Southern Brigalow where local factors were negative. Perhaps this was a period when the high growth in NSW made it possible for some people to leave the region and find employment elsewhere in the high growth industries and regions of NSW. Finally, in the period from 1991 to 1996, most of the potential growth from high growth in NSW was offset by negative local factors, with unfavourable seasonal conditions and commodity prices being important.



FIGURE 3-R: TOTAL STATE AND LOCAL COMPONENTS OF CHANGE: SOUTHERN BRIGALOW 1981 TO 1996



### 3.5 AVERAGE INCOMES

The ABS Population Census includes information on personal incomes. This provides the basis for comparing incomes across industries and from region to region. This information is provided in Table 3-I.

Incomes in the Southern Brigalow region average 85 per cent of the NSW level. This percentage is about average for regional NSW. The highest percentages occur in industries that have statewide determined employment conditions such as mining, utilities, education and community care.

Additional information compiled by the Department of Social Security is indicative of the relative position of household income in the region. Bray and Mudd (1998) compiled estimates of household income from tax statistics and related those to the levels of income tax paid and (Federal government) social welfare benefits paid. For the Southern Brigalow region the estimates were:

Gross Income	\$1084m
Income tax paid	\$192m
Social welfare benefits	\$181m

Welfare payments amounted to 17 per cent of gross income compared with the NSW level of 12 per cent. The ratio of tax paid to benefits received in the Southern Brigalow was 1.1 that is well below the ratio for NSW of 1.6. Thus, this region is one where the household income situation appears to be well below the average for NSW. Only in Dubbo and Narrabri does the tax paid figure exceed the DSS benefits received. The overall results would reflect the poor seasonal and commodity market situation that applied in the mid 1990s. In any case, the household income situation in the Southern Brigalow region is weak relative to NSW, particularly in those areas other than Dubbo.

TABLE 3-I: INCOMES BY INDUSTRY 1996

1 Digit INDUSTRY	Median Annual Individual Incomes		
	Southern Brigalow	NSW	Southern Brigalow :NSW
	\$	\$	%
A Agriculture, Forestry & Fishing	17,962	18,035	100
B Mining	49,723	55,395	90
C Manufacturing	23,315	27,288	85
D Electricity, Gas & Water Supply	32,517	35,495	92
E Construction	25,276	27,430	92
F Wholesale Trade	25,019	28,612	87
G Retail Trade	17,017	17,571	97
H Accommodation, Cafes & Restaurants	15,129	18,014	84
I Transport and Storage	25,950	30,257	86
J Communication Services	29,615	32,965	90
K Finance and Insurance	25,553	31,574	81
L Property and Business Services	24,576	30,773	80
M Government Administration & Defence	28,440	32,593	87
N Education	31,353	32,286	97
O Health and Community Services	23,091	24,636	94
P Cultural & Recreational Services	22,140	25,485	87
Q Personal and Other Services	20,921	23,990	87
R Non-classifiable economic units	18,149	23,374	78
& Not stated	12,445	16,449	76
<b>Total</b>	<b>22,232</b>	<b>26,078</b>	<b>85</b>

Source: 1996 Census of Population and Housing

Note: Includes income of employed persons from all sources.

### 3.6 CONCLUSIONS

The Southern Brigalow region is one that has a rich and diverse natural resource base to support a range of primary industries. That capacity has been enhanced by the development of the irrigation potential of the Macquarie and Namoi valleys. The location of the region is advantageous for inland areas in terms of being located on the Newell Highway corridor and with road and rail access to Newcastle and Sydney.

There has been substantial development of the value-adding, handling and processing of agricultural products produced in the region. This enhances the dependence on critical and variable seasonal conditions and international commodity markets. During the 1980s and the early 1990s the primary industries have not been a strong factor in generating growth. In fact, the relatively poor conditions for much of that period seems likely to have contributed to a very low rate of growth in those decades. However, in the latter part of the 1990s, the situation appears to have improved markedly coinciding with better seasons and better commodity prices. Combined with some migration, the region now has an unemployment rate below the state average.

Dubbo dominates the regional situation, which is the only LGA that has grown in population and employment over each of the past three population censuses. In the 1990s, all of the other LGAs experienced population and employment decline. This dichotomy is important in understanding the region and its various parts given that Dubbo has such an important effect on the various average measures presented for the region.

The regional economy lacks diversity beyond the primary industries and related manufacturing. The level of services provided in the region appears to be well below the NSW average. Apart from road transport and public sector services such as education, health and community services, there are large deficiencies in the level of services provided. These are considerably worse than shown in the areas apart from Dubbo.

The low level of business support services is likely to be an on-going constraint on the development of new businesses in the region and the prospects for the region in developing a larger tourism industry.

Finally, the region earns incomes that are around 85 per cent of the average for NSW, but that situation is likely to have improved since 1996.

# 4. REGIONAL ECONOMIC IMPACTS - BASE CASE

## 4.1 ECONOMIC IMPACTS: THE SOUTH BRIGALOW ASSESSMENT REGION

### 4.1.1 The General Approach

In this study, the base case is established as the activities taking place in the year 1998-99. This represents the most recent year for which data are available.

Both direct and indirect (or flow-on) effects are estimated. The indirect effects are estimated using an input-output table for the South Brigalow Bio-region compiled for 1996-97. Multipliers are estimated in this model and applied to the 1998-99 direct values. Hence, all impacts are valued in terms of 1998-99, but refer to a general economic structure for 1996-97 (a structure that is unlikely to have changed significantly in a short period of time).

The level of each activity was estimated from information supplied to CARE either from SFNSW or the local mills. Estimates have been made of the timber industry related activities. Non-timber industry activities including apiary, visitation, grazing, and mining have not been included (except the licence fees paid to State Forests).

The economic impacts are presented in terms of the:

- value of gross output (equivalent to business turnover),
- value added (equivalent to the measure of gross national product – using the income method of summing wages and salaries, gross operating surplus and taxes net of subsidies),
- payments to households of wages and salaries and imputed incomes to self employed, and
- level of employment.

There are reservations about the level of employment measures, as there is growing flexibility in labour markets associated with levels of skills, hours worked and employment conditions. It is an almost impossible task to reduce all of that variation into a single measure of employment. The only practical way of doing that is to refer to the total wages and salaries paid to all workers in the industry, including an imputed wage or salary to the self-employed persons and employers.

This summary is presented in two parts.

- A definition of the sectors used in the analysis and the data sources.
- Economic impact estimates for 1998-99.

### 4.1.2 Sector Definitions and Data Sources

The activities were compiled in two groups. This grouping and the identified activities are used for the presentation of the results.

- Those related to log supply and milling (primary or first stage processing).
- Those activities that occur in state forest areas that are not related to local milling. These include other State Forests operations of forest works and non-commercial thinnings; operation of State Forest District Office in Dubbo; other State Forests revenues from mining and grazing leases, firewood, fencing and sleepers.

Those activities that relate to the further fabrication of timber products (secondary processing) including structural framing, door frames, pallets etc. but excluding furniture and prefabricated buildings (or final stage processing) have not been included.

They are discussed in turn and in reference to the associated tables.

#### Log supply and milling

The base data were derived from SFNSW data and surveys of most of the mills in the region. to estimate the value of mill output, royalty payments and the costs of the main activities.

For the base year, the total volume of hardwood processed in the region was 64,882m<sup>3</sup>. This resulted in hardwood products valued at \$13.280m (ex mill gate).

The freight associated with freighting those products to their markets (either traders or processors) is shown separately as 'downstream freight', which amounted to \$0.715m.

The wood supply for processing was derived from several sources:

- Cypress Forestry is the log supply from State Forests that is processed in the South Brigalow Bioregion. The logs that are processed in other regions are included under Forestry (Other Revenues).
- Ironbark Forestry is the log supply from State Forests that is processed in the South Brigalow Bioregion.
- PP Forestry is the supply of logs from private property in the region. The milling of the private property logs is included in the total milling values.

A specific sector including costs structures and sales patterns (ie, a separate row and column in the input-output table) has been compiled for each of these supply operations. They have been based on expenditure data provided from SFNSW for their supply. The private property supply has been estimated on the basis of the cypress forest operations of SFNSW. This does not allow for any overhead/administration costs and is designed to reflect relatively low levels of forest management in most items apart from labour.

There is also a specific sector to indicate the cut, snig load and haul costs –Logging/ Haulage – which relates to that timber logged in the and milled in the region.

In summary, the timber operations (excluding downstream freight) include:

Log supplies to the value of:	
State Forests - cypress	\$2.270m
State Forests - ironbark	\$0.114m
Private property	\$0.074m
Log, snig and haul cost of:	\$3.509m
Milling operations (net of log and logging costs) to the value of:	\$7.312m

For the base case, these comprise a total ex-mill value of:

**\$13.995**

The total timber operations described also contributed:

- \$10.267m to value added,
- \$4.812m of payments to households, and
- employment for 220 people.

### **Activities not related to local log milling**

Other SFNSW operations include:

- the amount of logs 'exported' out of Forestry (other revenue) amounted to \$64,000;
- mining licences of \$28,000 and grazing licences of \$22,000;
- other timber sales of firewood \$56,000, fencing \$67,000, sleepers 5,000 and other \$2,000;
- other State Forests operations including forest works and non-commercial thinning of \$893,500; and
- the State Forests' District Office operations represented \$958,500

### **4.1.3 The Multipliers**

Table 0-3 includes the multiplier values for all of the activities. The multipliers for gross output, value added and household income are all expressed in terms of the impact per \$1 of gross output. Employment is expressed as the number of jobs per \$1000 of gross output.

The Type II ratios express the relationship between the total impact and the direct impact.

The multipliers are used to estimate the flow-on effects of economic activities. Those flow-on effects are of two types:

- *Production-induced effects* that are associated with the industry purchasing inputs from other industries, and
- *Consumption-induced effects* associated with employed households spending their earnings on consumer goods and services.

The consumption-induced effects are somewhat conjectural when dealing with changes in activities. This is because they indicate the effect of new households being established or existing households leaving as employment changes. In that sense, they represent long-run impacts when there has been population movements to adjust to job opportunities.

In the following estimates of the economic impacts, the full consumption-induced effects have been included. This is legitimate in the description of the existing industry structure, but will involve an overestimation of the short-run impacts of changes in the industry. There is limited information available for estimating the short-run impacts and so no attempt has been made to estimate them. However, in the full tables in Attachment 7, the consumption effects are separately shown so as to enable analysts to adjust those values in accord with their purpose and knowledge of household behaviour.

The multipliers reflect the strength of an industry's linkages with other industries through the use of intermediate inputs and the capacity of industries in the local region to supply those intermediate inputs. Thus, detailed expenditure data and information on the source of inputs are critical in estimating multipliers. The multipliers are included in Attachment 6.

## 4.2 THE BASE CASE

The base case has been specified in detail on the basis of the operations in 1998-99. The details for the timber operations are presented in Table 8. An overall summary is included in Table 7. That table shows the industry contribution to the economy of the South Brigalow Bioregion

Table 8 shows that the gross output from milling and forestry operations was \$16.091m that generated flow-on impacts of \$10.005m to give a total impact of \$26.145m. In terms of employment, there were 258 persons employed directly and a total of 368. The total value of income to households was estimated to be \$8.551m.

Milling of the logs generates about one-half of the impacts under all of the measures. Forestry and Logging/Haulage each contribute around one-quarter of the total impacts when the local and export uses are combined.

The multiplier impacts were around 1.6 that is in the moderate range. The industry in the region is not large and so the support industries tend to be limited in scope. The operations are based on the supply of \$2.458m of logs to local processors. Thus, the ratio of the total impact to the value of logs is over 9, which is a substantial 'value-adding' effect. A similar high 'value adding' ratio exists when considered in terms of employment.

Forestry-based operations in the South Brigalow Bioregion amount to about one per cent of the regional economy

TABLE 7: SUMMARY OF REGIONAL ECONOMIC IMPACTS

	South Brigalow Bio-region	Total Impact	Share of Region
			%
Gross Output (\$'000)	3,532,371	26,145	0.74
Value-Added (GRP - \$'000)	1,980,351	16,817	0.85
Household Income (\$'000)	925,030	8,551	0.92
Employment (no.)	34,970	368	1.05

TABLE 8: REGIONAL ECONOMIC IMPACTS: 1998-99

IMPACTS	Flow-on Effects				TOTAL IMPACT
	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	
GROSS OUTPUT (\$'000)					
Local Milling:					
Cypress Forestry	2,270	56	256	313	2,583
Ironbark Forestry	114	12	46	59	173
PP Forestry	74	2	8	10	84
Logging/Haulage	3,509	949	1,596	2,545	6,054
Milling (net)	7,312	951	4,140	5,090	12,402
TOTAL (mill gate)	13,280	1,971	6,046	8,017	21,296
Downstream Freight	715	190	271	460	1,175
TOTAL MILLING	13,995	2,161	6,317	8,477	22,472
Forestry Office	959	330	469	799	1,758
Forestry (Other Revenue)	244	15	58	73	317
Forestry (Other Operations)	894	201	505	705	1,599
TOTAL GROSS OUTPUT	16,091	2,707	7,348	10,055	26,145
VALUE ADDED (\$'000)					
Local Milling:					
Cypress Forestry	2,177	32	145	177	2,354
Ironbark Forestry	95	7	26	33	128
PP Forestry	71	1	5	6	77
Logging/Haulage	2,234	542	902	1,444	3,678
Milling (net)	5,690	570	2,341	2,911	8,600
TOTAL (mill gate)	10,267	1,152	3,419	4,571	14,837
Downstream Freight	403	113	153	267	670
TOTAL MILLING	10,670	1,265	3,572	4,837	15,507
Forestry Office	597	186	265	451	1,048
Forestry (Other Revenue)	221	8	33	41	262
Forestry (Other Operations)	621	116	285	401	1,022
TOTAL VALUE ADDED	11,488	1,460	3,870	5,330	16,817
HOUSEHOLD INCOME (\$'000)					
Local Milling:					
Cypress Forestry	213	15	70	85	298
Ironbark Forestry	38	3	13	16	54
PP Forestry	7	0	2	3	10
Logging/Haulage	1,140	283	434	717	1,857
Milling (net)	3,415	276	1,127	1,403	4,817
TOTAL (mill gate)	4,812	578	1,646	2,223	7,036
Downstream Freight	184	57	74	131	315
TOTAL MILLING	4,997	635	1,719	2,354	7,351
Forestry Office	321	97	128	224	546
Forestry (Other Revenue)	48	4	16	20	68
Forestry (Other Operations)	396	53	137	191	587
TOTAL HOUSEHOLD INCOME	5,762	789	2,000	2,789	8,551
EMPLOYMENT (no.)					
Local Milling:					
Cypress Forestry	7	1	3	3	10
Ironbark Forestry	1	0	1	1	2
PP Forestry	0	0	0	0	0
Logging/Haulage	35	10	18	28	64
Milling (net)	176	9	46	55	231
TOTAL (mill gate)	220	20	67	88	307
Downstream Freight	6	2	3	5	11
TOTAL MILLING	226	22	70	93	319
Forestry Office	16	4	5	9	24
Forestry (Other Revenue)	2	0	1	1	2
Forestry (Other Operations)	15	2	6	8	22
TOTAL EMPLOYMENT	258	28	82	110	368

Rounding Errors may occur

Forestry - Other Revenue includes sales to mills outside the region; firewood, fencing and sleepers;  
and mining and grazing licence fees

Forestry - Other operations includes other forest works and non-commercial thinning



TABLE 9: REGIONAL ECONOMIC MULTIPLIERS

		Flow-on Effects				
	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL IMPACT	Type II Ratio
MULTIPLIERS						
GROSS OUTPUT (\$)						
Local Milling:						
Cypress Forestry	1.000	0.025	0.113	0.138	1.138	1.138
Ironbark Forestry	1.000	0.109	0.404	0.513	1.513	1.513
PP Forestry	1.000	0.025	0.113	0.138	1.138	1.138
Logging/Haulage	1.000	0.271	0.455	0.725	1.725	1.725
Milling (net)	1.000	0.130	0.566	0.696	1.696	1.696
TOTAL (mill gate)	1.000	0.148	0.455	0.604	1.604	1.604
Downstream Freight	1.000	0.265	0.379	0.644	1.644	1.644
TOTAL MILLING	1.000	0.154	0.451	0.606	1.606	1.606
Forestry Office	1.000	0.345	0.489	0.834	1.834	1.834
Forestry (Other Revenue)	1.000	0.061	0.238	0.299	1.299	1.299
Forestry (Other Operations)	1.000	0.225	0.565	0.789	1.789	1.789
TOTAL GROSS OUTPUT	1.000	0.168	0.457	0.625	1.625	1.625
VALUE ADDED (\$)						
Local Milling:						
Cypress Forestry	0.959	0.014	0.064	0.078	1.037	1.081
Ironbark Forestry	0.831	0.062	0.228	0.290	1.122	1.349
PP Forestry	0.959	0.014	0.064	0.078	1.037	1.081
Logging/Haulage	0.637	0.154	0.257	0.412	1.048	1.647
Milling (net)	0.778	0.078	0.320	0.398	1.176	1.512
TOTAL (mill gate)	0.773	0.087	0.257	0.344	1.117	1.445
Downstream Freight	0.564	0.159	0.214	0.373	0.937	1.661
TOTAL MILLING	0.762	0.090	0.255	0.346	1.108	1.453
Forestry Office	0.623	0.194	0.277	0.471	1.094	1.755
Forestry (Other Revenue)	0.904	0.035	0.135	0.169	1.073	1.187
Forestry (Other Operations)	0.695	0.476	1.169	1.645	4.189	6.029
TOTAL VALUE ADDED	0.714	0.091	0.241	0.331	1.045	1.464
HOUSEHOLD INCOME (\$)						
Local Milling:						
Cypress Forestry	0.094	0.007	0.031	0.037	0.131	1.398
Ironbark Forestry	0.331	0.029	0.110	0.139	0.470	1.420
PP Forestry	0.094	0.007	0.031	0.037	0.131	1.398
Logging/Haulage	0.325	0.081	0.124	0.204	0.529	1.629
Milling (net)	0.467	0.038	0.154	0.192	0.659	1.411
TOTAL (mill gate)	0.362	0.044	0.124	0.167	0.530	1.462
Downstream Freight	0.258	0.080	0.103	0.183	0.441	1.708
TOTAL MILLING	0.357	0.045	0.123	0.168	0.525	1.471
Forestry Office	0.335	0.101	0.133	0.234	0.569	1.698
Forestry (Other Revenue)	0.196	0.016	0.065	0.081	0.277	1.414
Forestry (Other Operations)	0.444	0.219	0.563	0.782	2.406	5.424
TOTAL HOUSEHOLD INCOME	0.358	0.049	0.124	0.173	0.531	1.484
EMPLOYMENT (no./\$'000)						
Local Milling:						
Cypress Forestry	0.003	0.000	0.001	0.001	0.004	1.510
Ironbark Forestry	0.012	0.001	0.004	0.006	0.017	1.475
PP Forestry	0.003	0.000	0.001	0.001	0.004	1.510
Logging/Haulage	0.010	0.003	0.005	0.008	0.018	1.793
Milling (net)	0.024	0.001	0.006	0.008	0.032	1.314
TOTAL (mill gate)	0.017	0.002	0.005	0.007	0.023	1.398
Downstream Freight	0.009	0.003	0.004	0.007	0.016	1.800
TOTAL MILLING	0.016	0.002	0.005	0.007	0.023	1.409
Forestry Office	0.016	0.004	0.005	0.009	0.025	1.565
Forestry (Other Revenue)	0.007	0.001	0.003	0.003	0.010	1.484
Forestry (Other Operations)	0.017	0.008	0.023	0.031	0.092	5.494
TOTAL EMPLOYMENT	0.016	0.002	0.005	0.007	0.023	1.425

# 5. SOCIAL PROFILING FOR THE SOUTH BRIGALOW REGION

## 5.1 INTRODUCTION

This section of the report identifies (a) specific social catchments within the South Brigalow Assessment region (b) the demographic profiles of each social catchment, (c) community sensitivity to change indicators for each social catchment and (d) profiles of the number of forest and timber industry employees within each social catchment.

The information used in the analysis is based primarily on 1996 census data and information on the location of licensed timber processing industries supplied by NSW State Forests.

## 5.2 DEFINITION OF SOCIAL CATCHMENTS

Social catchments represent geographically defined areas within the South Brigalow Assessment region that contain a network of interdependent towns that are likely to be related in terms of industry location, employee residential locations, local industry expenditure, employee household expenditure and the use of social infrastructure services by industry employees. The social catchment will often include a regional or sub regional centre and many smaller towns and communities which are dependent on these centres for the supply of goods and services to industry and industry employees.

Social catchments can best be described using survey data collected from industries and employees within a region, which provides locational information about the industries and industry expenditure and industry employees use of specific towns in the region (Fenton, 1998, 1999<sup>2</sup>). Without primary survey data to aid the definition and identification of social catchments, these catchments have to be defined through the use of other secondary information. In the following analysis, the social catchments for the South Brigalow Assessment region were defined using information on (a) the number of businesses, industries and other service providers located within specific towns (the number of functional units), (b) an examination of the road network within the region, (c) distance between towns and (d) the density of towns and communities in the region.

Direct geographic comparisons with social catchments identified in the Upper and Lower North East and Southern Forest CRA regions<sup>3</sup> are not possible as these regions are larger and have identified social

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<sup>2</sup> Fenton, D.M. (1998). *Resource, Forest Industry and Employee Catchment Analysis for the SouthEast Queensland RFA Region. Report prepared for the Department of Primary Industries and Energy (Canberra).*

Fenton, D.M. (1999). *The social impacts of dairy industry deregulation and water reform on dairy farmers and communities in the Bega Valley. Report prepared for the Bega Valley Water Management Committee, Bega, NSW*

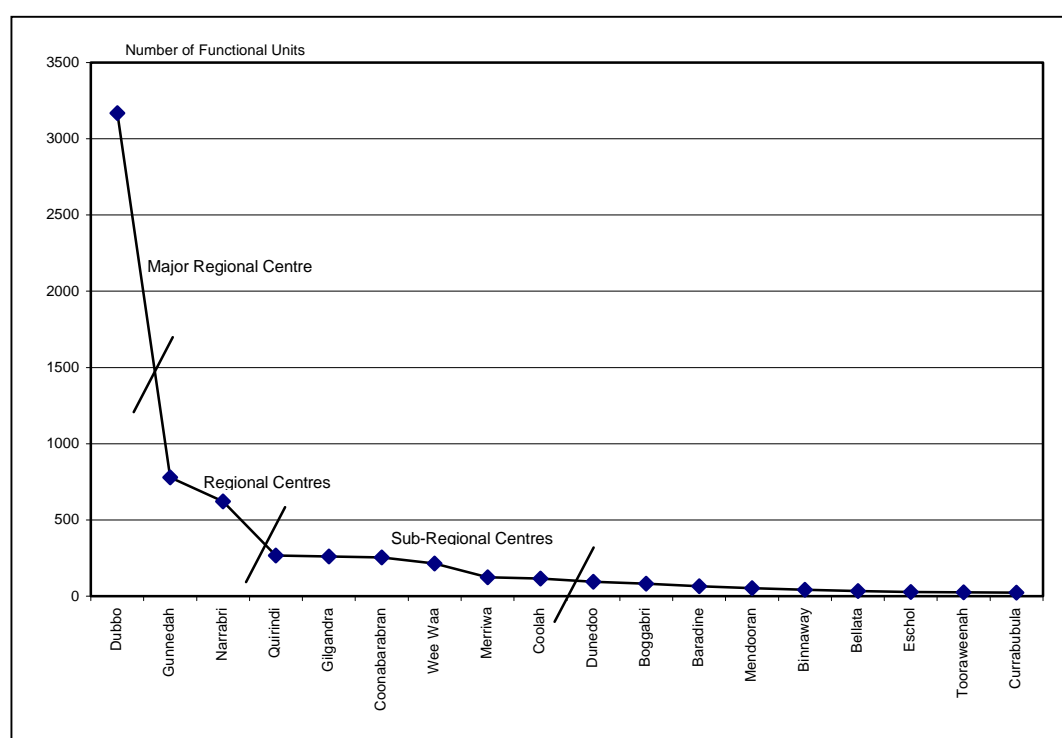
<sup>3</sup> Fenton, D.M. (1998b). *Social Catchments and Social Profiles for the Upper North East CRA Region (NSW). Report Prepared for Department of Urban Affairs and Planning, RACD, Sydney, NSW*

catchments generally one hierarchical level above the social catchments identified in the South Brigalow CRA region. For instance, if the same level of social catchment was applied in the South Brigalow region as had been identified in other CRA regions, two social catchments would have been identified which would have included social catchments based on the two major urban centres of Tamworth and Dubbo. In the South Brigalow CRA region smaller geographic social catchments have been identified which are hierarchically embedded within the larger social catchments of Dubbo and Tamworth.

### 5.3 NUMBER OF FUNCTIONAL UNITS IN TOWNS

The yellow pages directory was examined in order to identify the number of functional units within towns in the South Brigalow Assessment region. While the use of this directory is likely to underestimate the number of units within specific towns, it nevertheless provides a relative indication of the number of industries, businesses and service activities within towns.

Figure 1 shows a plot of the number of functional units against specific towns located within the South Brigalow Assessment region. This figure, which shows towns with more than 20 functional units, suggests that a hierarchy of towns within the region exists, which consists of (a) major regional centres, (b) regional centres and (c) sub-regional centres. Towns with less than 20 functional units represent small micro catchments within the region



The urban centres of Dubbo and Tamworth (located outside the CRA region) are major regional centres located at the top of the town hierarchy, and represent major service centres to many other towns located within the region. Regional centres include the towns of Gunnedah and Narrabri. These towns have smaller catchments than the major regional centres, and service other smaller towns localised within the vicinity of each regional centre.

### 5.4 IDENTIFICATION OF SOCIAL CATCHMENTS

The identification of social catchments is particularly important in defining a geographic area, which consists of communities and townships, which are inter-dependent and inter-related. The use of Local

Fenton, D.M. (1998). *Social Catchments and Social Profiles for the Lower North East CRA Region (NSW)*. Report Prepared for Department of Urban Affairs and Planning, RACD, Sydney, NSW  
 Fenton, D.M. (1999). *Social Catchments and Social Profiles for the Southern Forest CRA Region (NSW)*. Report Prepared for the Social Assessment Unit, Forest Branch, AFFA, Canberra.

Government Areas or other geographic boundaries are often defined on the basis of specific administrative criteria and do not necessarily reflect the social and economic inter-dependencies at the local level. In addition, the use of larger administrative boundaries often masks important social and economic variation occurring within the region. In contrast to the use of existing administrative boundaries, such as local government areas, an analysis of specific towns is also often too narrow to be useful as again many towns will be socially and economically interdependent within a specific geographic region.

The use of social catchments provide a meaningful unit of social and economic analysis at the local level, which is not artificial as is the case when other administrative boundaries are used, and which accounts for much of the inter-town dependencies at the local level. The social catchments that have been identified for the South Brigalow CRA region define approximate geographic regions at the local level which are likely to consist of towns or localities which include, (a) the employees place of employment, (b) the employees place of residence, (c) towns from which employees access social infrastructure services and facilities and (d) locations from which employees source their household expenditure on goods and services. At the industry level, social catchments also often consist of those towns in which localised industry expenditure occurs. Although at the industry level, major capital equipment purchases particularly in the timber industry, will often be sourced from the major regional centres. Social catchments were defined through (a) an examination of the existing road network in the South Brigalow CRA region, (b) the geographic distribution of towns, (c) the topography of the region and (d) the application of a gravity model to more accurately identify the boundaries of town catchments across existing road networks.

Where appropriate and when using the gravity model to identify the catchment boundary between two towns, the number of functional units within a town (Figure 1) was used to identify the attractive power of each town and the distance between each town was measured in relation to the number of road kilometres between towns. The gravity formula given below was used to identify the catchment boundary between major regional, regional and several sub regional towns as identified in Figure 1.

$$D_{AB} = \frac{T_{AB}}{1 + \sqrt{(S_B / S_A)}}$$

Where:  $D_{AB}$  is the distance of the catchment boundary in kilometres from town A to town B

$T_{AB}$  is the distance in kilometres between pairs of towns A and B

$S_A, S_B$  is the attractive power of towns A and B measured in relation to the number of functional units found within each town.

While the gravity model identified the approximate catchment boundary between towns on the basis of the existing road network, each catchment was also to be described using demographic information derived from the 1996 census. As the smallest unit of analysis for census data is the census collector district (CCD), the boundaries of census collector districts were ultimately used to define the catchment boundary. As such each catchment consisted on the aggregation of a number of census collector districts which approximated the catchment boundary as defined by the gravity model.

Through this procedure, and as shown in Figure 2, eight social catchments were defined. Again, as the boundaries of these catchments are based on census collector district boundaries the true social catchment may in some cases differ to the catchment boundaries as shown in Figure 2.

## 5.5 SOCIO-DEMOGRAPHIC PROFILES

Census information (1996) was used as the basis for identifying specific socio-demographic profiles. The 27 profiles selected are shown in Table 1. Several profiles were selected in order to provide descriptive information about the catchment. These profiles included population size, the number or occupied private dwellings, occupancy rate, employment in agriculture, forestry and fishing and employment in manufacturing industries. Other profiles were selected on the basis that they provided an indication of

advantage or disadvantage within the community, or that they were indicators of community vulnerability or sensitivity to change. Such profiles included age dependency, unemployment rates, workforce participation and family, occupation, income and educational characteristics.

The value for each demographic profile was also transformed into a standard score using a Z-score transformation, with a mean equal to zero and standard deviation of 1.00.

Profiles within plus or minus 1.00 standard deviation of the mean, and generally considered 'average'.

Scores less than 1.00 standard deviation below the mean maybe considered 'below average' while scores greater than 1.00 standard deviation above the mean maybe considered 'above average'.

Figure 11, as contained in Attachment 2, shows the demographic profile for the South Brigalow CRA region and also provides values on the demographic profiles for rural NSW as a whole. An inspection of the chart associated with Figure 11 (Attachment 2) indicates the unemployment rate is below average when compared to rural NSW. This indicates there is a significantly lower unemployment rate amongst the general population in this region when compared to all areas in rural NSW.

All figures also show the location and number of employees associated with licensed native timber processing industries within the region. The location in all cases is based on the nearest town. In addition, information is also provided showing the number of employees within two industry employment categories as identified in the 1996 census. Some caution should be used in the interpretation of employment in these industry categories as employment may have changed significantly since 1996. In addition, employment is based on the aggregation of CCDs and some randomisation of the ABS counts may have occurred for specific CCDs prior to aggregation.

**TABLE 10. SOCIO-DEMOGRAPHIC PROFILES**

<b>Socio-Demographic Profile</b>	<b>Definition</b>
Number of Occupied Private Dwellings	
Resident Population	
Occupancy Rate	Resident population/Number of occupied private dwellings
Percent Rental Accommodation	As a percentage of all private dwellings
Percent Public Housing	As a percentage of all private dwellings
Percent Aged 14 and Below	As a percentage of the total resident population
Percent Aged 15 to 64	As a percentage of the total resident population
Percent Aged 65 and Above	As a percentage of the total resident population
Dependency Ratio	Ratio of the percentage of the population below 14 years of age and above 65 years of age to the percentage aged between 15 and 64 years. Scores in excess of 100 indicate more people in the dependency age groups (below 14 and over 65) than people in the non-dependency age group (15-64 years). Scores below 100 indicate more people in the non-dependency age group when compared to the dependency age groups.
Unemployment Rate	The number of all unemployed persons expressed as a percentage of the workforce.
Unemployment Rate (15-19 year olds)	The number of unemployed persons between 15 and 19 years of age expressed as a percentage of the workforce aged between 15 and 19 years of age.
Unemployment Rate (Males 25-44 years)	The number of unemployed males between 25 and 44 years of age expressed as a percentage of the male workforce aged between 25 and 44 years of age. This profile was included as the majority of timber industry employees are males between 25 and 44 years of age (EBC, 1997; 1998)
Workforce Participation Rate	The number of persons in the labour force expressed as a percentage of the total number of persons aged 15 years and over
Weekly Family Income Less than \$299	Percentage of all one family households with a weekly household income less than \$299
Percent Separated or Divorced	The number of all separated and divorced persons expressed as a percentage of all persons over 15 years of age.
Percent Speaking English Not at All or Poorly	The number of persons indicating they do not speak English or speak English poorly as a percentage of all persons born overseas and aged over 5 years.
Percent Left School Aged Less than 15 Or Never Attended	The number of persons who left school less than 15 years of age or never attended as a percentage of all persons over 15 years of age.
Percent Aged 15 years and Over With No Qualifications	The number of persons aged 15 years and over with no qualification as a percentage of the number of people aged 15 years and over.
Percent One Parent Families	The number of one parent families in occupied private dwellings as a percentage of all families in occupied private dwellings
Percent of One Family Households With No Motor Vehicle	The number of one family households with no vehicles as a percentage of all occupied private dwellings
Percent of Labourers and Related Workers	The number of labourers and related workers as a percentage of all employed persons
Percent Aboriginal and Torres Strait Islanders	The number of persons indicating Aboriginal, Torres Strait Islander or both Aboriginal and Torres Strait Islander origin as a percentage of all persons
Percent Employed in Agriculture, Forestry and Fishing	The number of persons employed in industries defined as agriculture, forestry or fishing as a percentage of all employed persons
Percent Employed in Manufacturing	The number of persons employed in industries defined as manufacturing as a percentage of all employed persons.
<i>Source:</i>	<i>ABS (1996).</i>
<i>Prepared by:</i>	<i>EBC (2000).</i>

## 5.6 COMMUNITY SENSITIVITY INDICES

In addition to describing specific socio-demographic profiles for each social catchment, core indicators of community sensitivity to change or vulnerability were also identified.

Previous research based on the clustering of specific demographic profiles (Fenton, 1998a; 1998b;

1998c<sup>4</sup>) has shown that many of these profiles clustered into four distinct groups which included, (a) Unemployment and Income, (b) Education and Occupation, (c) Family and Housing and (d) Age Dependency. Table 11 identifies the four clusters and shows the specific demographic profiles that have been included within each cluster.

**TABLE 11. FOUR CLUSTER SOLUTION OF DEMOGRAPHIC PROFILES**

<b>Cluster</b>
<b>Unemployment and Income</b>
Total unemployment
Unemployment (25-44 years)
Weekly family income <\$299
<b>Education and Occupation</b>
Left school before 15 Years
Percent over 15 years with no qualifications
Percent labourer or related workers
<b>Family and Housing</b>
Percent dwellings rented
Percent families with no vehicle
Percent separated and divorced
Percent of one parent families
<b>Age Dependency</b>
Percent aged 14 years or less
Percent aged 65 years or greater
Dependency ratio
<i>Source: EBC (2000).</i>

The standard score transformation of each profile within each of the four clusters was summed and averaged which provided a single standard score for each of the four community sensitivity indices.

Figures 11 to 27 (Attachment 2) show each of the four community sensitivity indices expressed as a standard score with a mean of zero and a standard deviation of 1.00. As was the case with the individual demographic profiles, Figures 11 to 27 also show each of the four community sensitivity indices for each social catchment relative to the South Brigalow CRA region and Rural NSW. An index which is within plus or minus 1.00 standard deviation of the mean, is considered 'average' when compared to either the South Brigalow CRA region or Rural NSW. Visual inspection of the bar charts for each social catchment clearly shows which of the four indices are below or above the average

Figures 3 to 10 show each of the four community sensitivity indices plotted against the number of forest and timber industry employees within each catchment. It should be noted that the number of forest and timber industry employees is derived from the census classifications of (a) forestry and logging, (b) wood and paper product manufacturing undefined, (c) log sawmilling and timber dressing and (d) other wood product manufacturing. The use of these census classifications does not allow any discrimination to be made between employees involved in softwood or hardwood processing.

Figures 3 and 4 clearly show that the social catchment of Coonabarabran has higher rates of unemployment and low family incomes when compared to all other catchments. This occurs when the catchments are compared relative to the South Brigalow CRA region and when compared to Rural NSW. Although Dubbo and Narrabri have over 50 forest industry employees (Figures 3a and 3b) these employees nevertheless represent less than one percent of the workforce in these areas (Figures 4a and 4b). Dubbo and Narrabri are less sensitive to change in relation to unemployment and income when

<sup>4</sup> Fenton, D.M. (1998a). Community Sensitivity Indices for Regional Australia. Data prepared for the Bureau of Rural Sciences, Canberra.

Fenton, D.M. (1998b). Social Catchments and Social Profiles for the Upper North East CRA Region (NSW). Report Prepared for Department of Urban Affairs and Planning, Resource and Conservation Division, Sydney, NSW

Fenton, D.M. (1998). Social Catchments and Social Profiles for the Lower North East CRA Region (NSW). Report Prepared for Department of Urban Affairs and Planning, Resource and Conservation Division, Sydney, NSW

compared to the Coonabarabran catchment which has over three percent of the workforce employed in forest industries.

In relation to education and occupation, all social catchments with the exception of Dubbo and Narrabri are sensitive to change on this dimension (Figures 5a and 6a) when comparisons are made relative to the South Brigalow region. As such all social catchments, with the exception of Dubbo and Narrabri, are characterised by low school retention rates, low numbers of people with qualifications and high number of labourers and related workers. The Coonabarabran catchment is particularly critical in the present case as it is not only above average on this index but also has high numbers of forest and timber industry employees.

Figures 7 and 8 show each of the social catchments in relation to their score on the family and housing index. Typically catchments high on this index have higher than average percentages of one-parent families, persons separated and divorced and rental accommodation. When comparisons are made within the South Brigalow region, the catchments of Dubbo, Coonabarabran, Narrabri and Quirindi are above average on this dimension (Figures 7a and 8a). In addition, Coonabarabran also has the highest percentage of forest industry employees when compared to other catchments.

In relation to age dependency (Figures 9 and 10), the catchments of Coonabarabran, Gilgandra, Gunnedah and Quirindi are all significantly above average on this index when compared to the South Brigalow CRA region and Rural NSW. Amongst these catchments, Coonabarabran and Gilgandra are particularly important as they have the high employment in forest and timber industries.

Across all four community sensitivity indices identified in Figures 3 to 10, Coonabarabran and to a lesser extent Gunnedah and Gilgandra are the three catchments which are consistently above average on these indices and at the same time have moderate levels of employment in forest and timber industries when compared to other catchments. Clearly these catchments, and particularly the catchment of Coonabarabran, may be particularly sensitive to change in forest industry activity and employment.



Figure 3a. Community Sensitivity Index: Unemployment and Income Against Forest Industry Employees (Relative to the South Brigalow Region)

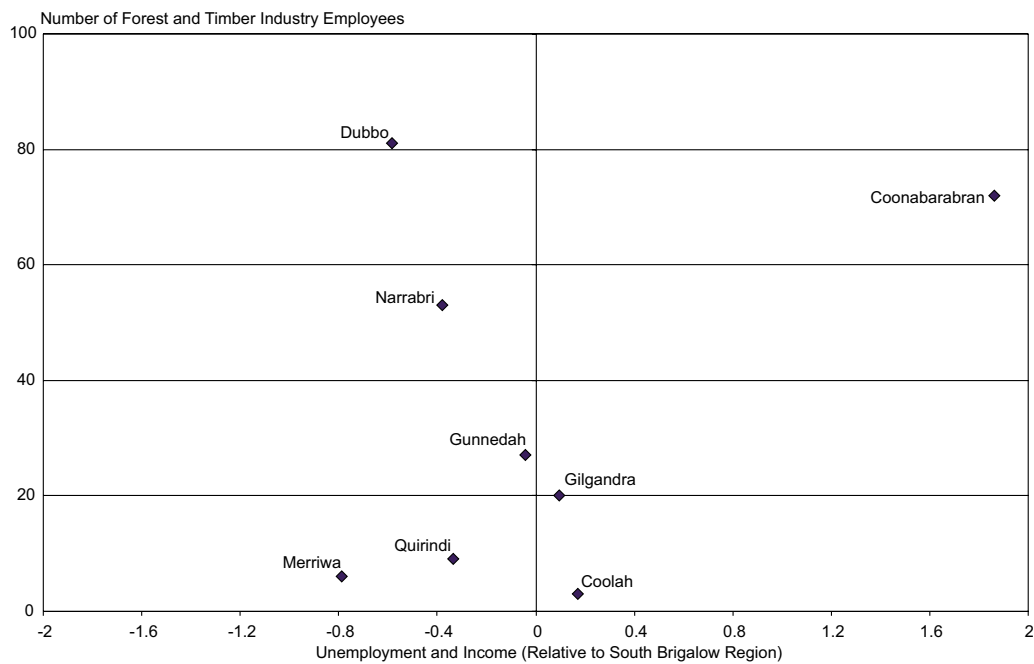


Figure 3b. Community Sensitivity Index: Unemployment and Income Against Forest Industry Employees (NSW Rural Relative)

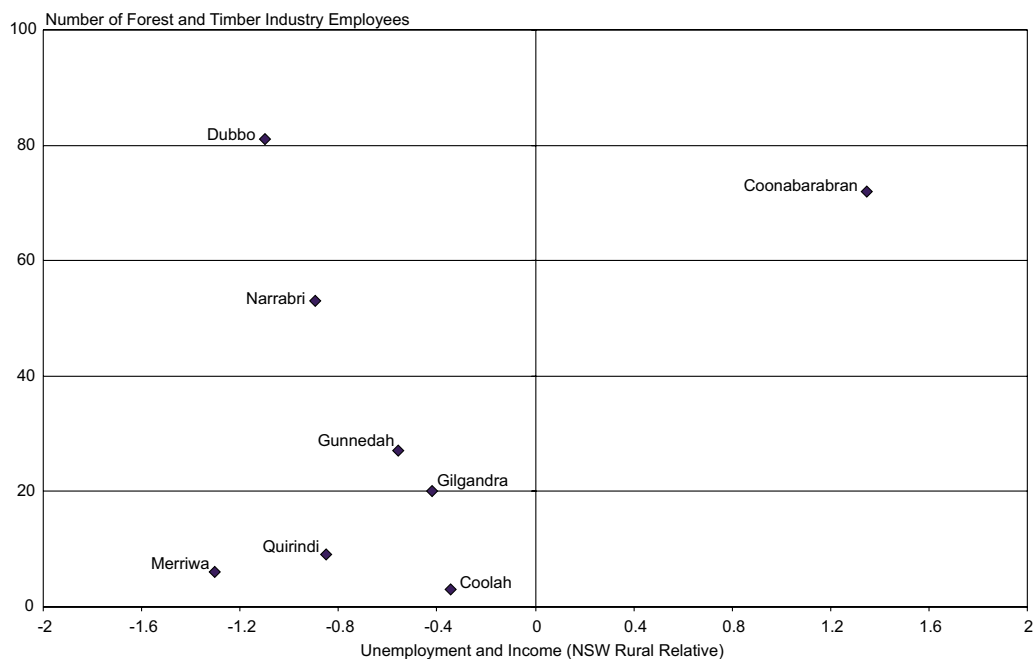


Figure 4a. Community Sensitivity Index: Unemployment and Income Against Percentage of Workforce Employed in Forest Industries (Relative to the South Brigalow Region)

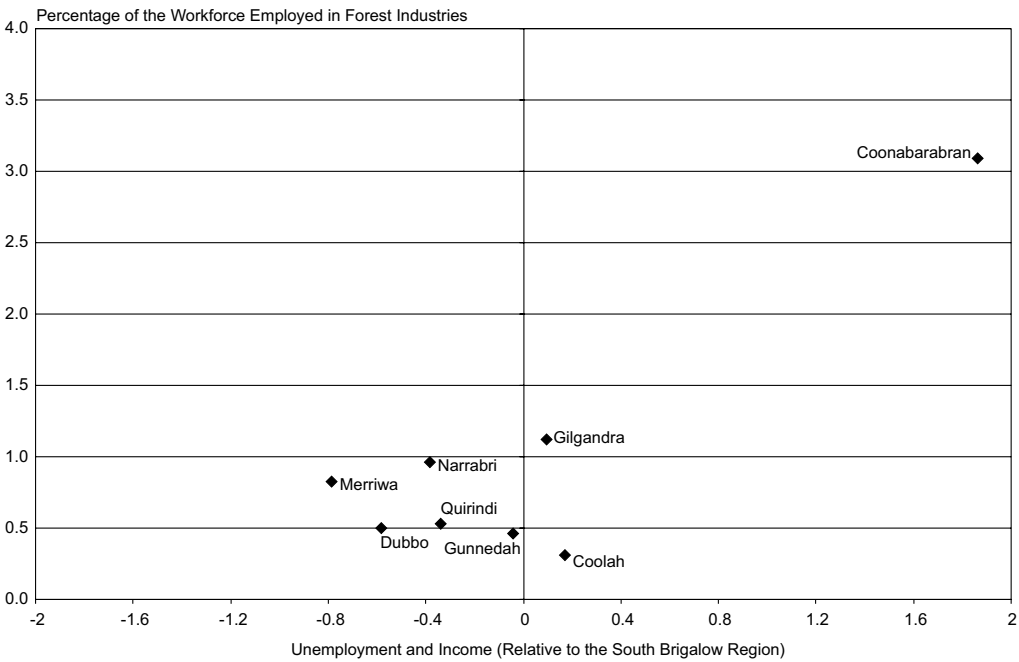


Figure 4b. Community Sensitivity Index: Unemployment and Income Against Percentage of Workforce Employed in Forest Industries (NSW Rural Relative)

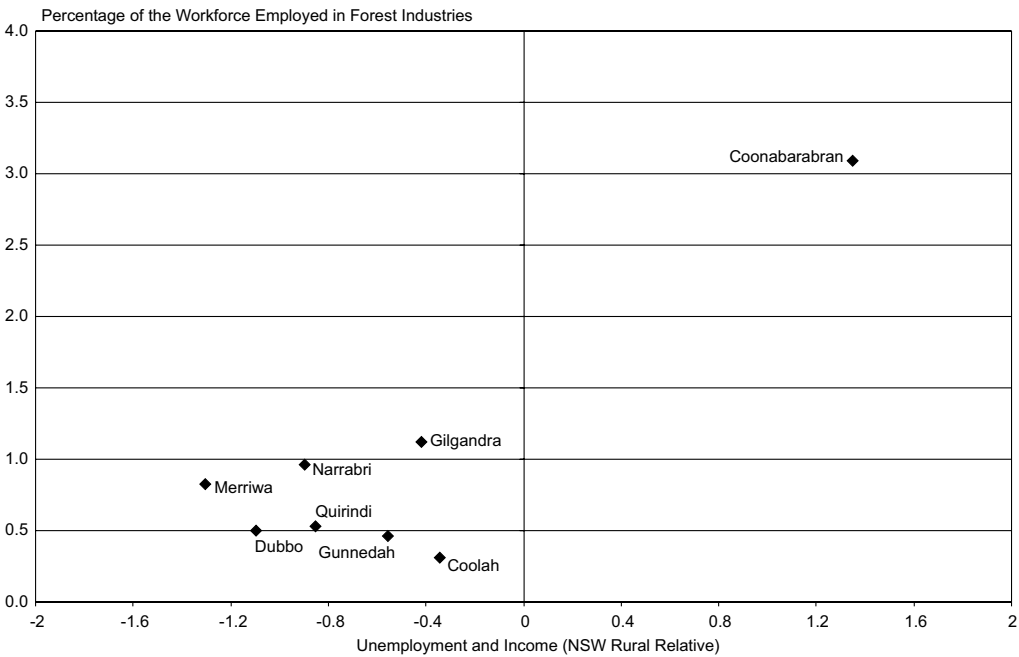


Figure 5a. Community Sensitivity Index: Education and Occupation Against Forest Industry Employees (Relative to the South Brigalow Region)

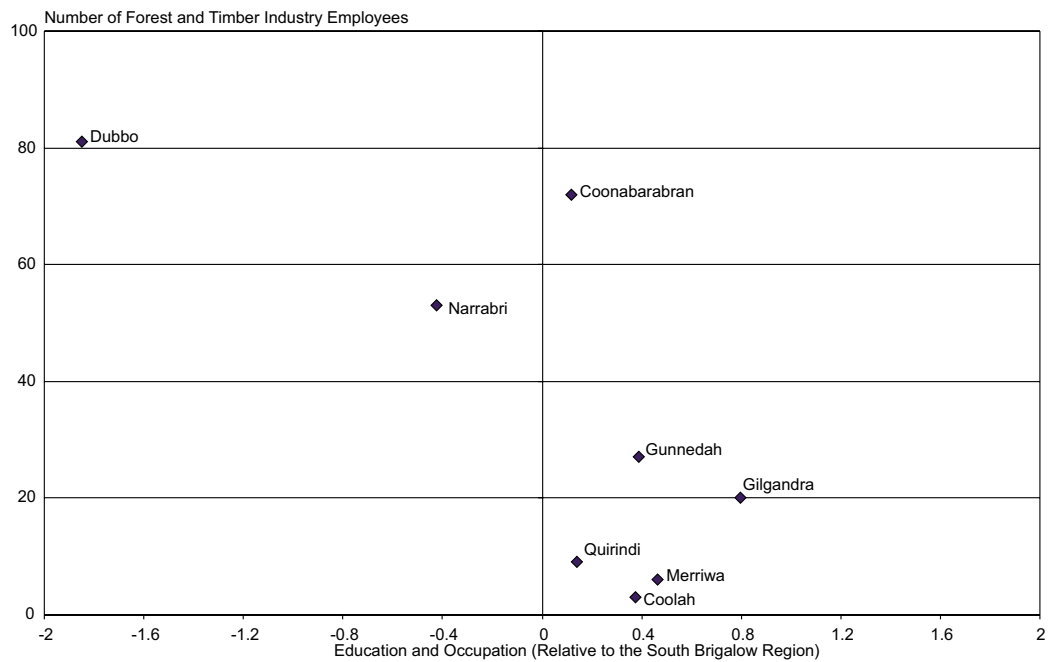


Figure 5b. Community Sensitivity Index: Education and Occupation Against Forest Industry Employees (NSW Rural Relative)

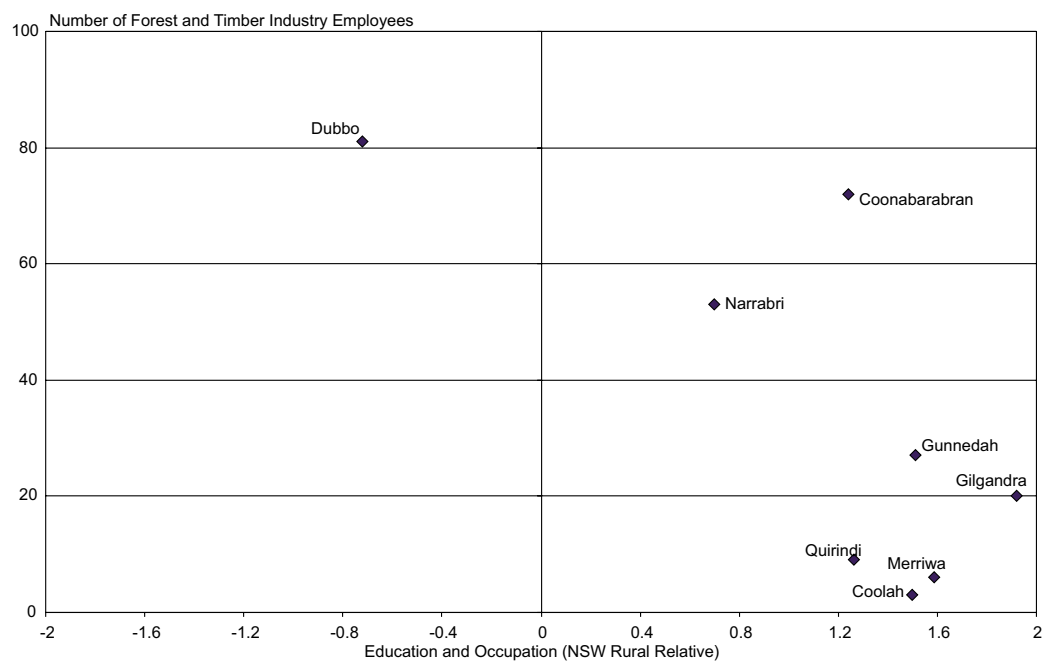


Figure 6a. Community Sensitivity Index: Education and Occupation Against Percentage of Workforce Employed in Forest Industries (Relative to the South Brigalow Region)

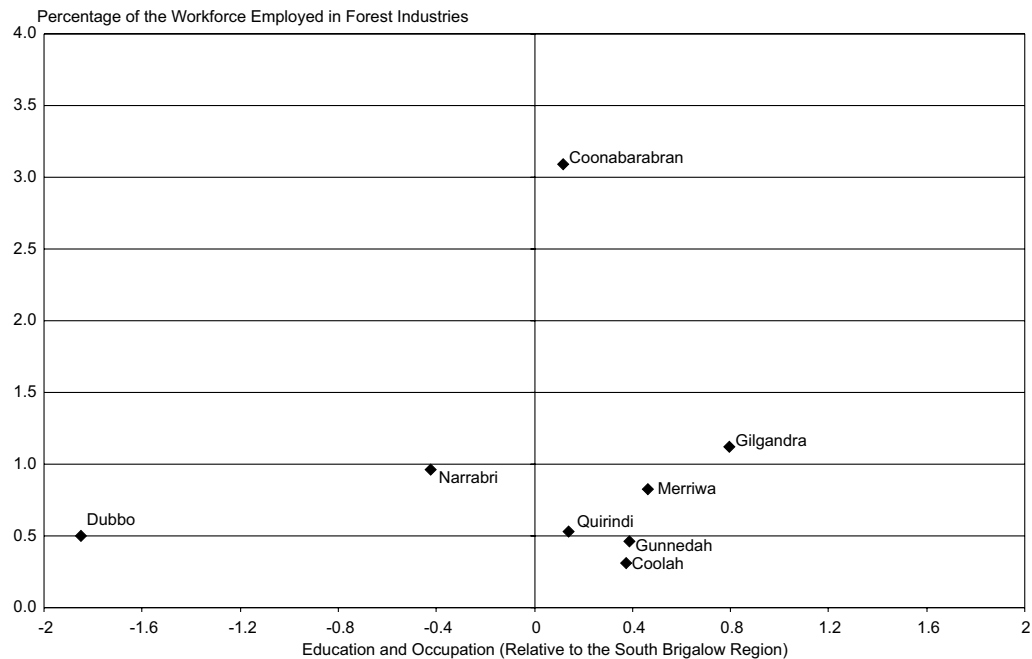


Figure 6b. Community Sensitivity Index: Education and Occupation Against Percentage of Workforce Employed in Forest Industries (NSW Rural Relative)

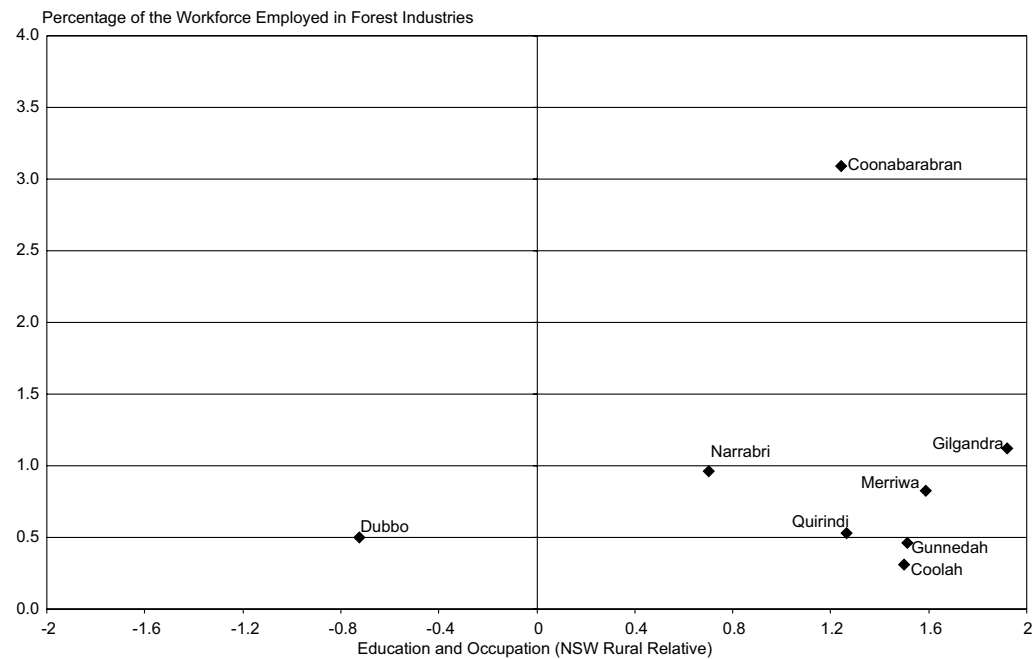


Figure 7a. Community Sensitivity Index: Family and Housing Against Forest Industry Employees (Relative to the South Brigalow Region)

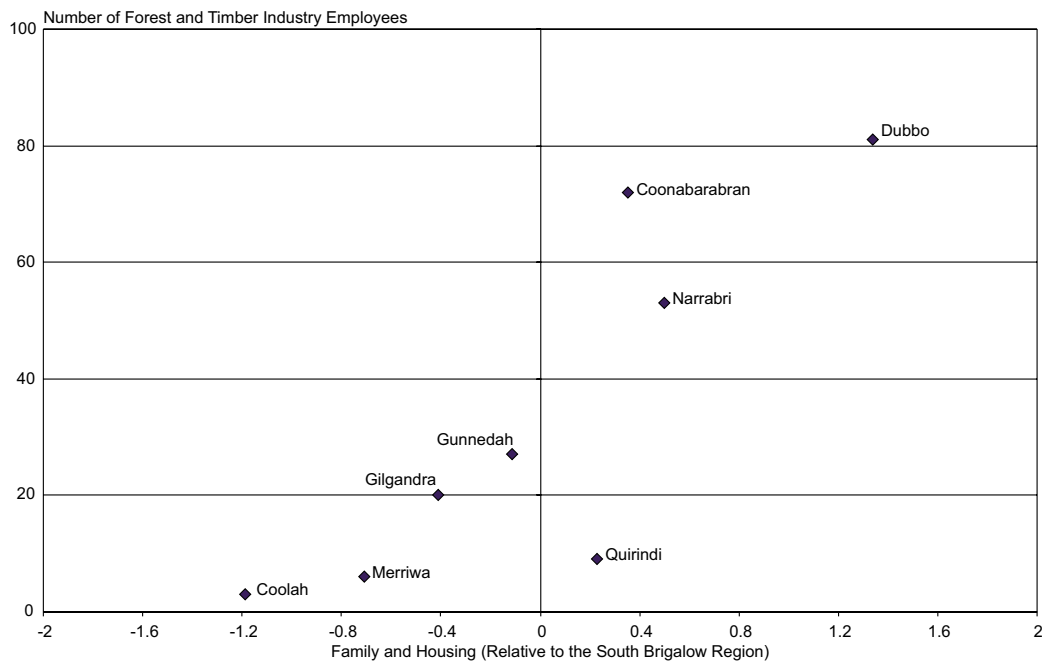


Figure 7b. Community Sensitivity Index: Family and Housing Against Forest Industry Employees (NSW Rural Relative)

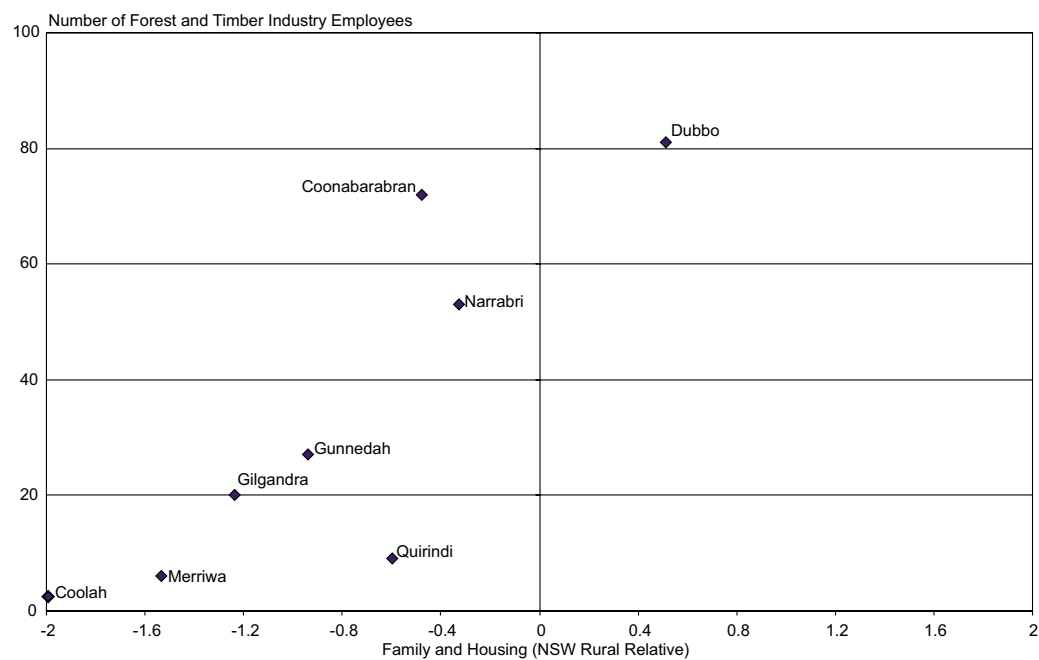


Figure 8a. Community Sensitivity Index: Family and Housing Against Percentage of Workforce Employed in Forest Industries (Relative to the South Brigalow Region)

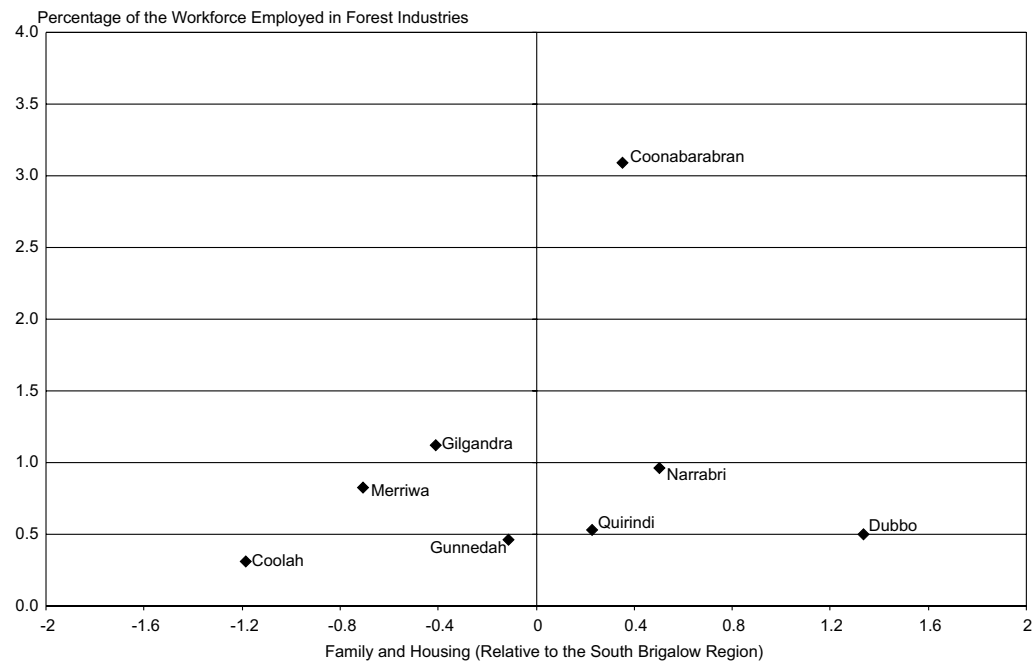


Figure 8b. Community Sensitivity Index: Family and Housing Against Percentage of Workforce Employed in Forest Industries (NSW Rural Relative)

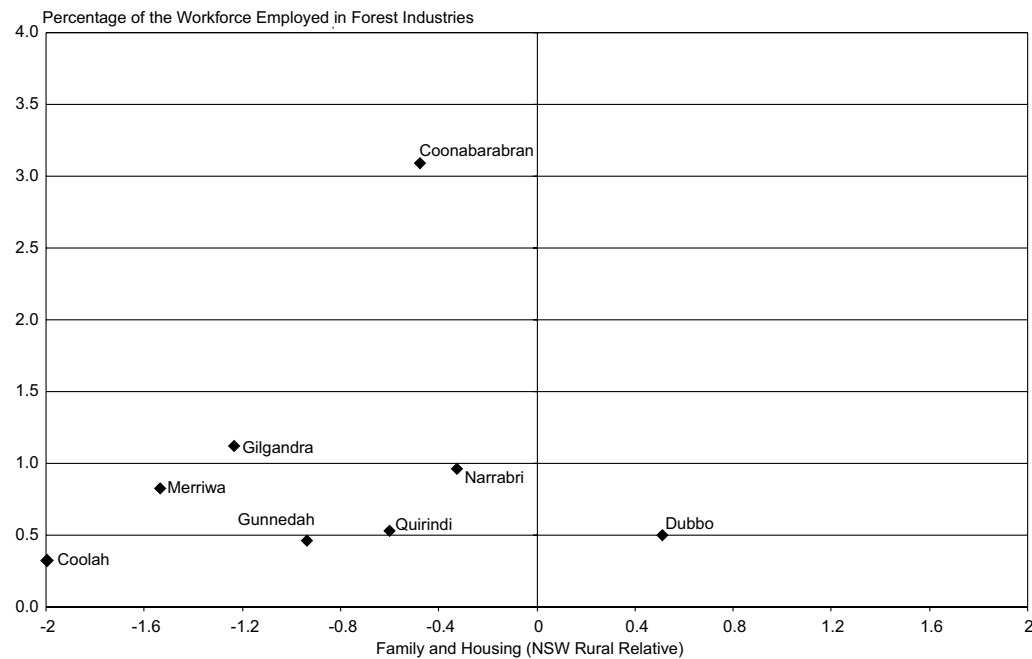


Figure 9a. Community Sensitivity Index: Age Dependency Against Forest Industry Employees (Relative to the South Brigalow Region)

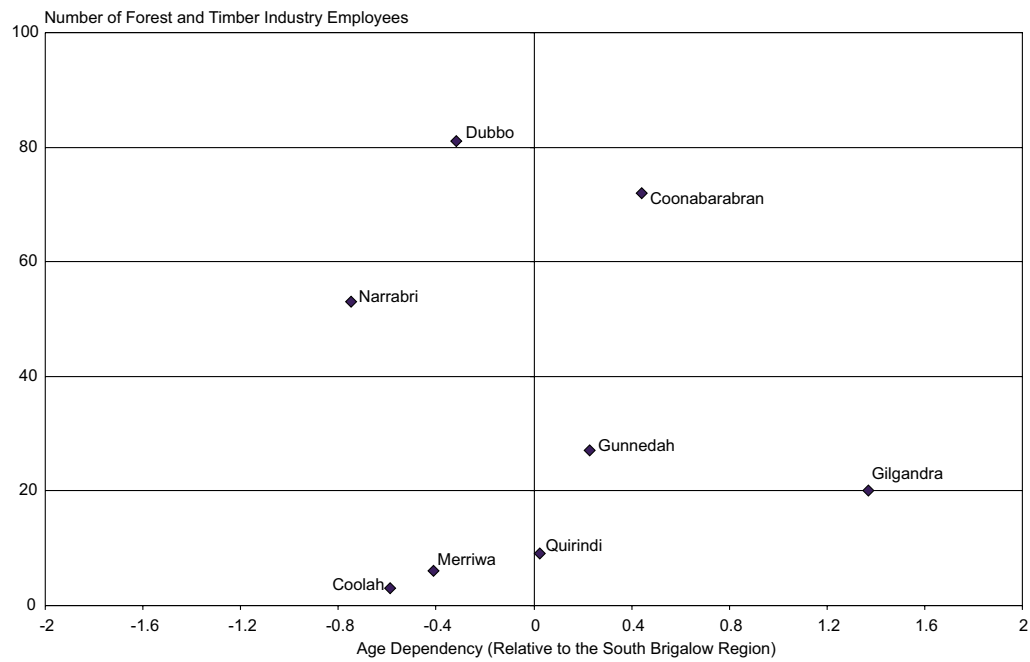


Figure 9b. Community Sensitivity Index: Age Dependency Against Forest Industry Employees (NSW Rural Relative)

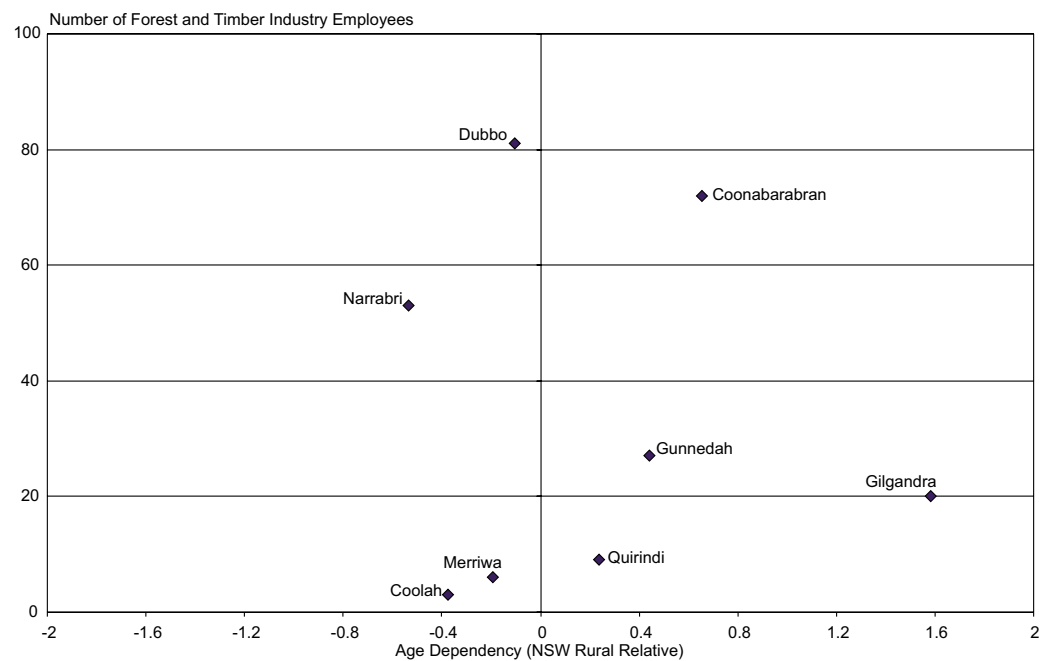


Figure 10a. Community Sensitivity Index: Age Dependency Against Percentage of Workforce Employed in Forest Industries (Relative to the South Brigalow Region)

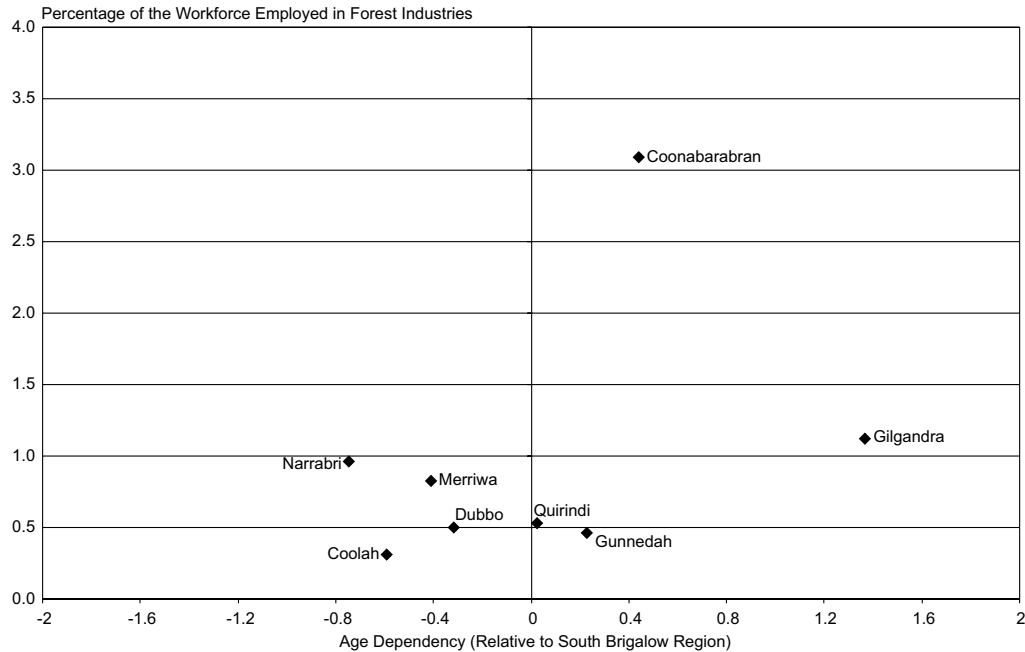
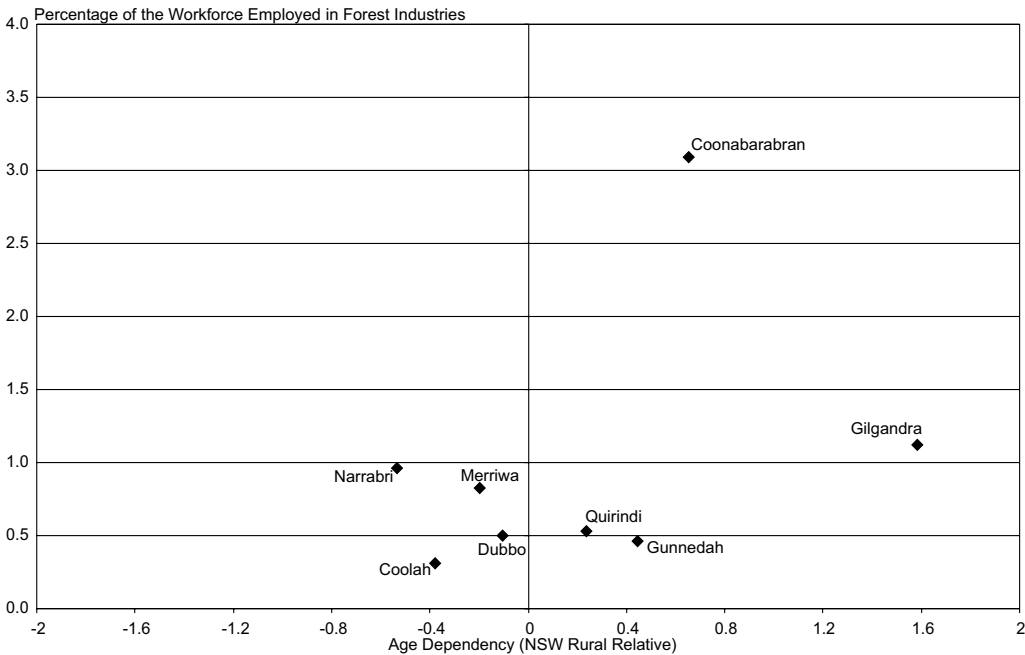


Figure 10b. Community Sensitivity Index: Age Dependency Against Percentage of Workforce Employed in Forest Industries (NSW Rural Relative)





# 6. INDIGENOUS SOCIAL PROFILING FOR THE SOUTH BRIGALOW REGION

## 6.1 INTRODUCTION

This report identifies the socio-demographic profiles for indigenous communities within the South Brigalow CRA region and is based on the analysis of socio-demographic profiles and social catchments for the general population in the South Brigalow CRA Region<sup>1</sup>. Information on the concordance between previously defined social catchments and specific indigenous areas used in this report is presented in this report (Table 12). Figure 1 also shows the location of indigenous areas within the South Brigalow CRA region.

“Indigenous Areas”, as presented in the analysis below, are geographic areas as defined and utilised by the Australian Bureau of Statistics. Indigenous areas refers to areas where Aboriginal peoples live, aggregated to ensure a sufficient Aboriginal population in any one area to protect the confidential nature of individual’s information.

**TABLE 12. CONCORDANCE TABLE FOR SOCIAL CATCHMENTS AND INDIGENOUS AREAS.**

Social Catchments	Indigenous Areas	Table Number
Coolah	Rylestone/Mudgee/Coolah	13
	Scone/Merriwa	14
Coonabarabran	Coonabarabran	4
	Rylestone/Mudgee/Coolah	13
Dubbo	Dubbo	5
	Rylestone/Mudgee/Coolah	13
Gilgandra	Gilgandra	6
Gunnedah	Coonabarabran	4
	Gunnedah Town	8
	Gunnedah Balance	7
	Narrabri Balance	9
	Quirindi/Murrurundi	12
Merriwa	Scone/Merriwa	14
Narrabri	Narrabri Balance	9
	Narrabri Town	10
	Narrabri (Wee Waa)	11
Quirindi	Quirindi/Murrurundi	12

## 6.2 SOCIO-DEMOGRAPHIC PROFILES

Census information (1996) was used as the basis for identifying specific socio-demographic profiles. The 27 profiles selected are shown in Table 13 below and were used in defining the socio-demographic profiles of populations within specific social catchments (EBC, 2000)<sup>5</sup>. Several profiles were selected in order to provide descriptive information about the community. These profiles included population size, the number or occupied private dwellings, occupancy rate, employment in agriculture, forestry and fishing and employment in manufacturing industries. Other profiles were selected on the basis that they provided an indication of advantage or disadvantage within the community, or that they were indicators of community vulnerability or sensitivity to change. Such profiles included age dependency, unemployment rates, workforce participation and family, occupation, income and educational characteristics.

Tables 4 to 14, as contained in Attachment 3, show the demographic profiles for specific indigenous areas and the value on each profile for rural NSW. The value for each profile within each area was also transformed into a standard score using a Z-score transformation, with a mean equal to zero and standard deviation of 1.00. Tables 4 to 14 (Attachment 3) show for each area whether the profile for the area is within plus or minus 1.00 standard deviation from the mean, and is therefore considered 'average' when compared to rural NSW or whether the profile falls 'below average' (less than 1.00 standard deviation below the mean) or is 'above average' (greater than 1.00 standard deviation above the mean). Visual inspection of the bar charts of standard score transformations shown for each area (Tables 4 to 14, Attachment 3, clearly show which specific socio-demographic profiles are below or above the average when compared to rural NSW.

**TABLE 13. SOCIO-DEMOGRAPHIC PROFILES**

Socio-Demographic Profile	Definition
Number of Occupied Private Dwellings	
Resident Population	
Occupancy Rate	Resident population/Number of occupied private dwellings
Percent Rental Accommodation	As a percentage of all private dwellings
Percent Public Housing	As a percentage of all private dwellings
Percent Aged 14 and Below	As a percentage of the total resident population
Percent Aged 15 to 64	As a percentage of the total resident population
Percent Aged 65 and Above	As a percentage of the total resident population
Dependency Ratio	Ratio of the percentage of the population below 14 years of age and above 65 years of age to the percentage aged between 15 and 64 years. Scores in excess of 100 indicate more people in the dependency age groups (below 14 and over 65) than people in the non-dependency age group (15-64 years). Scores below 100 indicate more people in the non-dependency age group when compared to the dependency age groups.
Unemployment Rate	The number of all unemployed persons expressed as a percentage of the workforce.
Unemployment Rate (15-19 year olds)	The number of unemployed persons between 15 and 19 years of age expressed as a percentage of the workforce aged between 15 and 19 years of age.
Unemployment Rate (Males 25-44 years)	The number of unemployed males between 25 and 44 years of age expressed as a percentage of the male workforce aged between 25 and 44 years of age. This profile was included as the majority of timber industry employees are males between 25 and 44 years of age (EBC, 1997; 1998)
Workforce Participation Rate	The number of persons in the labour force expressed as a percentage of the total number of persons aged 15 years and over
Weekly Family Income Less than \$399 <sup>1</sup>	Percentage of all one family households with a weekly household income less than \$399
Percent Separated or Divorced	The number of all separated and divorced persons expressed as a percentage of all persons over 15 years of age.
Percent Speaking English Not at All or Poorly	

<sup>5</sup> EBC (2000), *Social Catchments and Socio-Demographic Profiles for the South Brigalow CRA Region (NSW)*. Report Prepared for the Department of Urban Affairs and Planning, NSW

	The number of persons indicating they do not speak English or speak English poorly as a percentage of all persons born overseas and aged over 5 years.
Percent Left School Aged Less than 15	The number of persons who left school less than 15 years of age or
Or Never Attended	never attended as a percentage of all persons over 15 years of age.
Percent Aged 15 years and Over With No	Qualifications
	The number of persons aged 15 years and over with no qualification as a percentage of the number of people aged 15 years and over.
Percent One Parent Families	The number of one parent families in occupied private dwellings as a percentage of all families in occupied private dwellings
Percent of One Family Households With No Motor Vehicle <sup>2</sup>	The number of one family households with no vehicles as a percentage of all occupied private dwellings
Percent of Labourers and Related Workers	The number of labourers and related workers as a percentage of all employed persons
Percent Aboriginal and Torres Strait	The number of persons indicating Aboriginal, Torres Strait
Islanders	Islander or both Aboriginal and Torres Strait Islander origin as a percentage of all persons
Percent Employed in Agriculture,	The number of persons employed in industries defined as agriculture,
Forestry and Fishing	forestry or fishing as a percentage of all employed persons
Percent Employed in Manufacturing	The number of persons employed in industries defined as manufacturing as a percentage of all employed persons.

*Note:* 1 The indigenous profiles do not report family income less than \$299 as was used in the socio-demographic profiles for the general population.

<sup>2</sup> This profile is not available in the indigenous profile.

*Source:* ABS (1996). Prepared by: EBC (2000).

### 6.3 COMMUNITY SENSITIVITY INDICES

In addition to describing specific socio-demographic profiles for each social catchment, core indicators of community sensitivity to change or vulnerability were also identified.

Previous research based on the clustering of specific demographic profiles (Fenton, 1998a; 1998b; 1998c<sup>6</sup>) has shown that many of these profiles clustered into four distinct groups which included, (a) Unemployment and Income, (b) Education and Occupation, (c) Family and Housing and (d) Age Dependency. Table 14 identifies the four clusters and shows the specific demographic profiles that have been included within each cluster.

<sup>6</sup> Fenton, D.M. (1998a). Community Sensitivity Indices for Regional Australia. Data prepared for the Bureau of Rural Scences, Canberra.

Fenton, D.M. (1998b). Social Catchments and Social Profiles for the Upper North East CRA Region (NSW). Report Prepared for Department of Urban Affairs and Planning, Resource and Conservation Division, Sydney, NSW

Fenton, D.M. (1998c). Social Catchments and Social Profiles for the Lower North East CRA Region (NSW). Report Prepared for Department of Urban Affairs and Planning, Resource and Conservation Division, Sydney, NSW

**TABLE 14. FOUR CLUSTER SOLUTION OF DEMOGRAPHIC PROFILES****Cluster****Unemployment and Income**

Total unemployment

Unemployment (25-44 years)

Weekly family income &lt;\$299

**Education and Occupation**

Left school before 15 Years

Percent over 15 years with no qualifications

Percent labourer or related workers

**Family and Housing**

Percent dwellings rented

Percent families with no vehicle

Percent separated and divorced

Percent of one parent families

**Age Dependency**

Percent aged 14 years or less

Percent aged 65 years or greater

Dependency ratio

*Source: EBC (2000).*

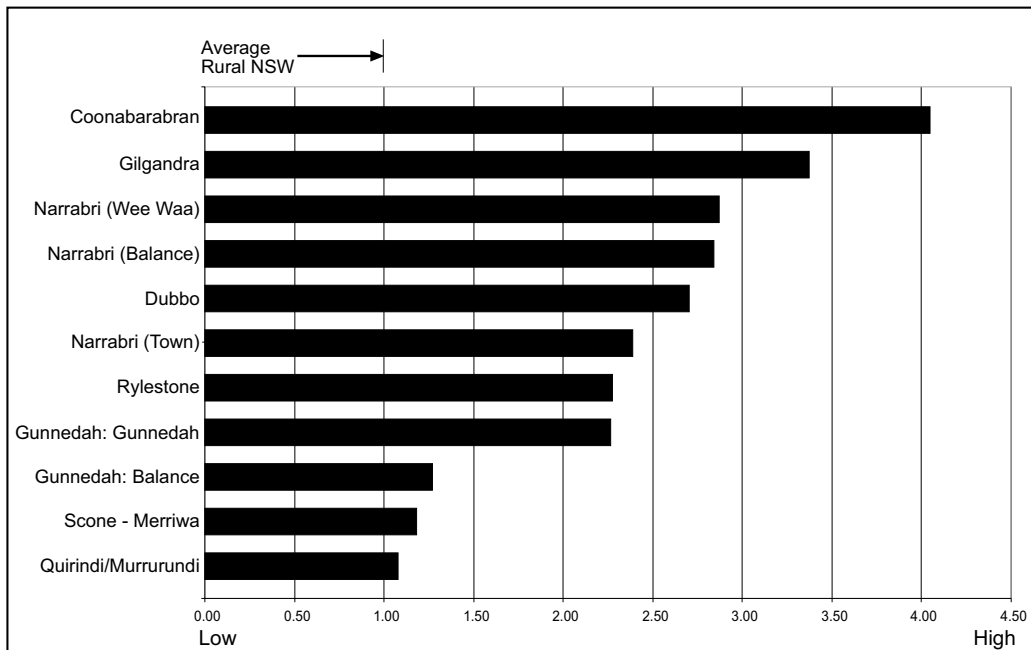
The standard score transformation of each profile within each of the four clusters was summed and averaged which provided a single standard score for each of the four community sensitivity indices.

Tables 4 to 14 (Attachment 3) show each of the four community sensitivity indices expressed as a standard score with a mean of zero and a standard deviation of 1.00. As was the case with the individual demographic profiles, Tables 4 to 14 also show each of the four community sensitivity indices for each social catchment relative to Rural NSW. An index which is within plus or minus 1.00 standard deviation of the mean, is considered 'average' when compared to Rural NSW. Visual inspection of the bar charts for each social catchment clearly shows which of the four indices are below or above the average Figure 2 shows the CSI score for each indigenous area in the South Brigalow CRA Region in relation to their sensitivity on the dimension of unemployment and income. Scores between 0 and 1.0 are considered average relative to rural NSW, while scores above 1.0 are considered above average when compared to rural NSW. It is clear from Figure 2 that all indigenous areas are above average on unemployment and income when compared to rural NSW, with the indigenous area of Coonabarabran being particularly high on this index. High levels of unemployment and low family incomes typify communities high on this index.

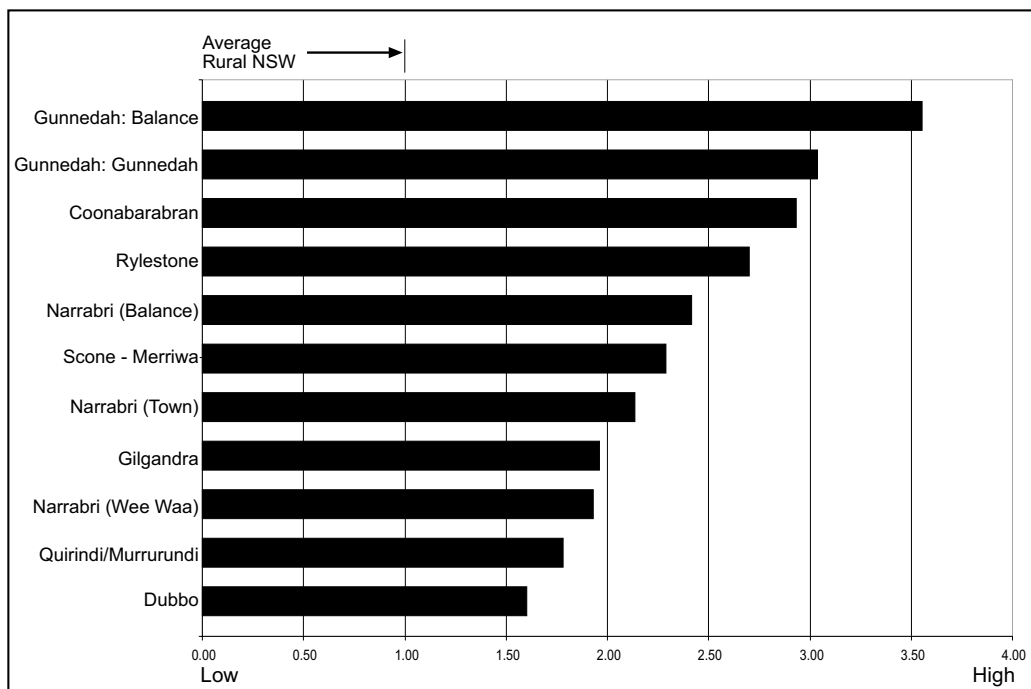
Figure 3 shows that all indigenous communities in the South Brigalow CRA region are higher than the NSW rural average on the dimension of education and occupation. These areas are characterised by low school retention rates, low numbers of people with qualifications and high number of labourers and related workers. The two indigenous areas of Gunnedah Balance and Gunnedah Town have particularly high scores on this index.

Figure 4 shows that, with the exception of Gunnedah Balance, all areas have significantly higher than average sensitivity on the family and housing dimension when compared to rural NSW, having higher than average percentages of one parent families, persons separated and divorced and rental accommodation.

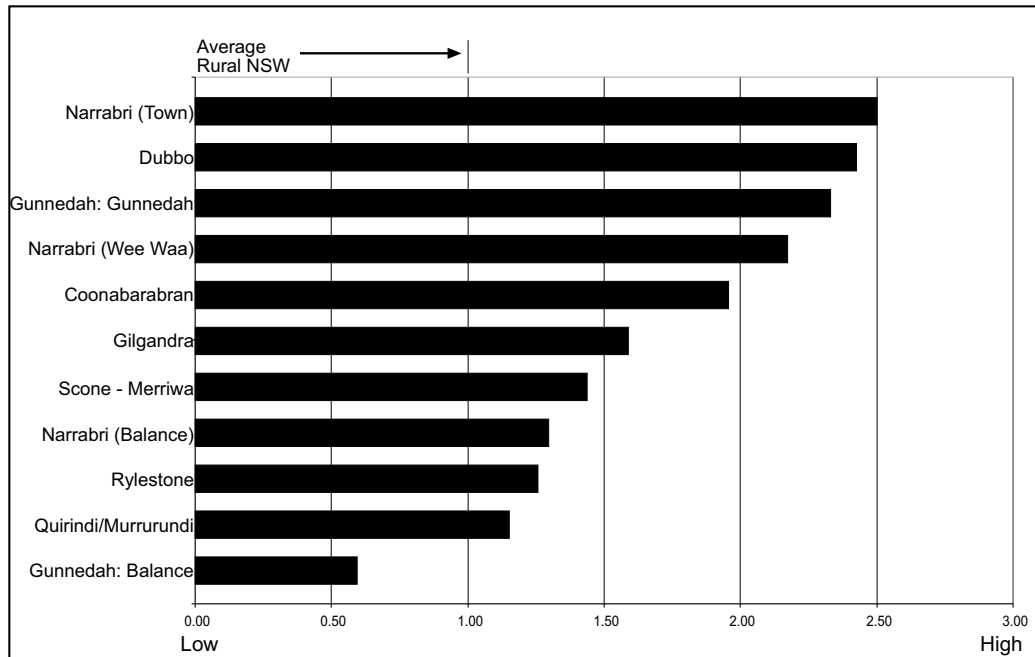
Figure 5 shows that all indigenous areas have relatively lower levels of age dependency when compared to rural NSW. This is due primarily to the very low number of people over 65 years of age across all indigenous communities.



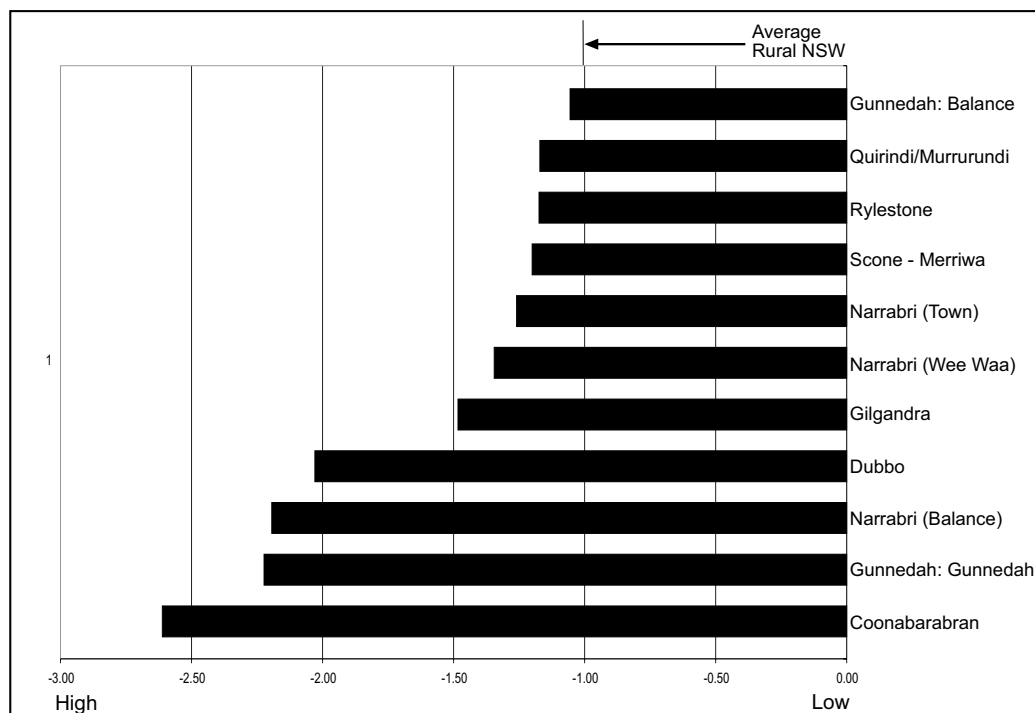
**FIGURE 2. Community Sensitivity Indices: Unemployment & Income**



**Figure 3. Community Sensitivity Indices: Education and Occupation**



**FIGURE 4. Community Sensitivity Indices: Family & Housing**



**FIGURE 5. Community Sensitivity Indices: Age Dependency**

# 7. APIARY

## 7.1 INTRODUCTION

The South Brigalow region is one of the most important areas for commercial apiarists, in terms of both honey production and other products, in New South Wales. In 1999, the New South Wales apiary industry produced approximately 15,000 tonnes of honey, with an estimated total net value of honey and other products of almost \$27m.

In 1999, it is estimated that there were approximately 800 apiary permits issued on State Forests and National Parks lands, almost exclusively to commercial apiarists.

It is estimated that in 1999, the maximum potential gross value of honey and wax produced on these sites was in the order of approximately \$10m. There was also significant unmeasured value in terms of both package bee production and resting and breeding services.

The following information was compiled from documents produced by the Australian Beekeepers Industry, the New South Wales Department of Agriculture and based on conversations with representatives from the NSW Apiarists Association and South Brigalow Apiary Officers from the New South Wales Department of Agriculture.

## 7.2 THE APIARY INDUSTRY IN NSW & THE SOUTH BRIGALOW REGION

The apiary industry was first successfully introduced into NSW during the 1820s. In 1998, it was estimated that commercial apiary activities provided direct employment for almost 630 people. It was further estimated that commercial activities represent only around 10-11% of all registered beekeepers in NSW. (Floral Resources Database 1999)

New South Wales is by far the largest state in Australia in terms of the production of honey and other beekeeping products. In a report commissioned by the Australian Beekeeping Industry and presented in 1998 (Gibbs, Muirhead 1998), it was estimated that in 1997, almost 30,000 tonnes of honey were produced in Australia, with NSW accounting for around 45% of this total. The net value of apiary products was estimated to be worth approximately \$27m in NSW in 1997. (Gibbs, Muirhead 1998)

In that year, there were approximately 209,000 commercial hives, operated throughout the State. It was further estimated that an additional 68,000 non-commercial hives were operated during this period.

Apiary activities on Crown land are overseen by a number of organisations. In general, the majority of crown lands in the region are licensed by State Forests, various Rural Lands Protection Boards and to a lesser extent, the National Parks and Wildlife Service. These organisations generally grant access to an area under annual agreements, incurring a permit fee and managed under conditions as relevant to that area and the body responsible for its management. Further details on apiary permits and conditions are provided in section 6.3.

### 7.2.1 The Apiary Industry in the South Brigalow Region

Beekeeping was first introduced into the South Brigalow region during the 1930s, although non-commercial honey production may have occurred earlier than this. In 1937, commercial apiarists began

moving hives through Rocky Glen and up to Borah Creek in the Pilliga forests to take advantage of the Ironbark in that area.

During the 1950s, the South Brigalow region experienced a beekeeping boom, with a number of new sites and producers establishing activities in the region. This increase in apiary activities was encouraged by demand for bloodwood based honey by the tobacco company W.D. and H.O. Wills, who used the honey to cure their tobacco for various pipe tobacco products.

By 1993, it was estimated that the total number of apiary permits on crown land in the Pilliga region alone had increased to almost 380. (Peter Stace, 1996)

The Goonoo forest area is also utilised by one of Australia's largest package bee exporting companies. Australian Queen Bee Exporters operate approximately 6,000 hives around NSW annually and although these hives are not solely concentrated in the South Brigalow region, the region is an important part of the breeding and preparatory stages of the Company's exporting activities. Australian Queen Bee Exporters gross between \$1-2m per annum and export Australian bee packages to such countries as Korea, Canada, France and the Middle East.

The South Brigalow region represents a major beekeeping forest system for NSW apiarists, with areas of the Pilliga East State Forest and the Goonoo forests some of the most significant honey producing areas in NSW. Due to the location of the forests with regards to surrounding communities, apiary activities in the region are overwhelmingly of a commercial nature.

### **7.3 EXTENT OF APIARY IN THE SOUTH BRIGALOW REGION**

This study has not estimated the number of apiary sites operating on private land, or utilising private lands adjacent to National Park and State forest areas.

From discussions with and information prepared by State Forests, the National Parks and Wildlife Service and various Rural Lands Protection Boards, it is estimated that there were almost 1,000 apiary sites operated on Crown lands in 1999.

#### **7.3.1 Apiary in State Forests**

In addition to managing the forest areas for timber production and forest protection, State Forests grant permits for a number of alternate land use activities. The majority of permits issued in the South Brigalow region are apiary permits.

In the South Brigalow region in 1999, State Forests issued permits to 223 separate apiarists, allowing beekeeping activities on 750 sites.

A permit allows the permit holder access to a 1.61km<sup>2</sup> site and costs \$77 per permit per annum.

Permit holders are allowed access to the permit site throughout the year and are responsible for the maintenance of the hives on the site. No additional facilities (fences, etc) are to be constructed by the permit holder. Ownership of any equipment left on the permit site three months after expiration of the permit reverts to State Forests.

Permits are renewed annually and although permit holders are under no obligation to continually renew permits, most permit holders renew their permits at the same site year after year.

If a site is relinquished, then the first apiarist to inquire is given the option to rent it. Permittees generally re-rent the sites each year so as to have the option to be able to utilise them in the event of a good flowering season.

#### **7.3.2 Apiary in National Parks**

Although not a large activity within National Parks, apiarists are allowed access to some areas under NSW National Parks and Wildlife Service (NPWS) management within the South Brigalow region.



In 1999, NSW National Parks and Wildlife Service issued 50 apiary permits allowing beekeeping activities in the South Brigalow region.

On average permits cover approximately 2km<sup>2</sup>. The annual cost of a permit is \$50 per permit per annum.

In 1999, the NSW National Parks and Wildlife Service clarified its policy towards apiary activities in areas previously utilised by apiarists and managed by other Government agencies, but transferred to NPWS management. The key points of this policy are that:

- apiarists will be allowed continued access to existing sites, and sites may be transferred to the family members, or when an apiary business is sold, to the person who has purchased the business. No new additional apiary sites can be created in reserves managed by the NPWS. However beekeeping consents/permits current on all lands transferred to the Service will be recognised.
- the NPWS is currently developing a relocation protocol which will enable sites to be moved, following a process of consultation, where there are grounds that the activity is having a detrimental impact on the environment, or the NPWS has management imperatives such as conflicts with visitors, need to change access routes and so on.
- to protect wilderness values, sites within lands declared as wilderness will be relocated to alternative sites outside the declared wilderness. In such cases the Service will consult with apiarists to identify suitable alternative sites. Where suitable alternative sites are not available, sites situated in the core of a declared wilderness will be relocated to the edge of such areas.

### 7.3.3 Other Apiary Sites

Aside from managing such activities as grazing and stocking routes, the Rural Lands Protection Boards (RLPB) in the South Brigalow region also issue permits allowing beekeeping activities on Crown land. It was estimated that in 1998, Rural Lands Protection Boards around NSW issued a total of around 2,900 apiary permits. (Floral Resources Database 1999)

Within the study region, there are three Rural Lands Protection Boards which issue apiary permits, these include the Coonabarabran, Dubbo and Narrabri Rural Lands Protection Boards.

From discussions with relevant officers at the three RLPBs, it was estimated that in 1999, there were approximately 160 sites covered by apiary permits. Due to confidentiality restrictions and the possibility of double counting between Rural Lands Protection Boards, it was not possible to estimate the number of individual permit holders.

The size of the permit site varied between Rural Lands Protection Boards and between permits within the same Board, however a rough estimate of the average size of a permit site is an area of land with a 1.5km radius.

It should be noted that not all of this land area is useable, with stocking routes, rough terrain and other factors restricting the placement of hives. It was observed by the officers contacted that the value of these sites was often their proximity to adjacent National Parks and State Forests areas.

## 7.4 CHARACTERISTICS OF THE APIARY INDUSTRY

Due to the extent of forests reserved under Crown land tenures, as opposed to remnant vegetation on private land, the apiary industry in the South Brigalow region is largely dependent on State Forests and other Government agency lands for access to the majority of suitable beekeeping sites in the region.

In a study undertaken by NSW Agriculture in the Pilliga region, the flora species identified by apiarists operating in the area as most important in terms of apiary activities were bloodwood, hangdown, broadleaved ironbark, narrowleaved ironbark and the various gum species prevalent in the area. (Stace, 1996)

In a study undertaken by NSW Agriculture in the Goonoo region, the flora species identified by local apiarists as most important to apiary activities are Narrow Leaved Ironbark, Corky Ironbark, Mugga Ironbark, Broadleaved Ironbark, Goobush, Pea Bush, Oak and ground flora scrub. (Summerville, 1997)

It is worth noting that honey production is also influenced by external factors such as weather patterns, with years of greater than average rainfall promoting optimal honey conditions. This is illustrated by the honey crops produced after the heavy rains experienced in 1950/51, 1954/55 and 1973/74. In these years, rainfall was well above average for the region, resulting in an increase in both the quality and quantity of honey produced. . (Summerville, 1997)

It is also worth noting that honey production is influenced by the flowering cycle of the local flora, especially in the South Brigalow region with the dependence on the region's numerous eucalypt species. A number of the Eucalypt species have a flowering cycle that extends over two to three years, impacting on the ability of bees to utilise these trees. For this reason honey production in consecutive years may differ substantially in any one area.

The main products produced by the apiary industry in the region are honey and packaged bees for sale overseas. There are however, a number of other products produced in addition to these. Other products include beeswax and queen bees bred to assist in the establishment of new hives. These products are sold both within the region and throughout NSW and Australia, however, to a far lesser extent than either honey or package bees.

## **7.5 ECONOMIC VALUE OF THE APIARY INDUSTRY**

The following values have been derived from information supplied by State Forests, the National Parks and Wildlife Service, NSW Agriculture and the NSW Apiarists Association. Estimates of the value of honey production are inclusive of honey produced on State Forest and National Parks land only.

Although estimates of the number of apiary sites on lands controlled by the Rural Lands Protection Boards are provided, no estimate of the value of production on these lands has been made due to uncertainty surrounding the useable area of land under each permit and the average productivity of different land areas.

It should be noted that the following estimates are for the potential maximum honey and wax produced on permit sites in State forests and National Park. In practice, not all permit sites will be utilised for maximum production and some permits may be used on an "as needs" basis only.

### **7.5.1 Gross Value of Honey in State Forests and National Parks in the Pilliga and Goonoo Forest**

The following estimates are for average sites and productivity levels and the actual gross value of production of honey in the region may vary from that estimated below.

#### **Total Number of Permit Sites in the South Brigalow Region**

From the previous section, there are approximately 750 apiary permit sites on State Forests, of 1.61km square and approximately 50 apiary permit sites on National Parks lands of approximately 2 km square.

Due to differences in access, apiarists preferred species mix and infrastructure between State Forests and National Parks sites, the simplifying assumption that the productive area of land under each tenure is equivalent has been made.

Thus, in the South Brigalow region on State Forests and National Park land, there were approximately 800 apiary sites utilised in 1999.

#### **Average Number of Hives per Site**

From studies undertaken in the Pilliga and Goonoo State Forests by NSW Agriculture, it has been estimated that there is on average 136 hives on an average apiary permit site, with a typical stocking rate of between 100 to 120 hives per site. (Summerville, 1998)

As discussed above, it is assumed that the average number of hives on any one permit site in the Pilliga and Goonoo State forest or National Parks lands is 136. Sensitivity testing for the value of honey production using a stocking rate of 100 and 120 hives per sites is also undertaken.

#### **Average Productivity per Hive**

In the studies undertaken by NSW Agriculture in the Pilliga and Goonoo State Forests, and through discussions with local apiarists, the average productivity of a hive on an average apiary site was estimated. Due to similar flora species contained in State forests and National Parks in the region, it is assumed that the productivity of an average hive on State Forests land would be equivalent to the average productivity of an average hive on a National Parks apiary site.

For the purposes of the following analysis, it is taken that the productivity of an average hive on an apiary permit site in the Pilliga and Goonoo forests is 40kg of honey per hive per annum. (Pers. Comm. Doug Summerville, NSW Agriculture; Summerville, 1998)

It should be noted that this figure may be lower than reported in other regions of NSW, however, this figure reflects the flowering cycles of the species specifically suited to honey production in the South Brigalow region.

### **7.5.2 The Value of Honey in the South Brigalow Region**

As mentioned above, the following values do not account for honey produced on apiary permit sites on Rural Lands Protection Board sites. No account is made for honey produced on private property.

Based on discussions with NSW Agriculture regional officers, it was estimated that in 1999, honey produced in the South Brigalow region had a wholesale value of approximately \$1.80 per kilogram.

Based on the figures outlined above it can be seen that the gross wholesale value of honey produced on State Forests and National Parks in the South Brigalow region is calculated as follows;

$$800 \text{ sites} \times 136 \text{ hives per site} \times 40\text{kg per hive} = 4,352,000 \text{ kg of honey per annum}$$

At a price of \$1.80 per kilogram, it can be seen that the gross wholesale value of production of honey in the Pilliga and Goonoo State Forests and National Parks is calculated as follows:

$$4,352,000\text{kg per annum} \times \$1.80\text{per kilogram} = \$7,833,600$$

From the above analysis, it is estimated that the average gross value of production of honey produced on State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$7.8m per annum.

### **7.5.3 Sensitivity Analysis**

Utilising the stocking rates of 100 hives per average apiary site and 120 hives per apiary site, the gross value of honey produced on State Forests and National Parks in the Pilliga and Goonoo forests is estimated as follows.

#### **Utilising a stocking rate of 100 hives per site:**

$$800 \text{ sites} \times 100 \text{ hives per site} \times 40\text{kg per hive} = 3,200,000 \text{ kg of honey per annum}$$

Using a price of \$1.80 per kilogram

$$3,200,000 \text{ kg per annum} \times \$1.80\text{per kilogram} = \$5,760,000$$

Thus, using a stocking rate of 100 hives per site, it is estimated that the average gross value of production of honey produced on State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$5.8m per annum.

**Using a Stocking Rate of 120 hives per site:**

$$800 \text{ sites} \times 120 \text{ hives per site} \times 40\text{kg per hive} = 3,840,000 \text{ kg of honey per annum}$$

Using a price of \$1.80 per kilogram

$$3,840,000 \text{ kg per annum} \times \$1.80 \text{ per kilogram} = \$6,912,000$$

Thus, using a stocking rate of 120 hives per site, it is estimated that the average gross value of production of honey produced on State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$6.9m per annum.

**7.5.4 The Value of Wax and Other Products**

As discussed earlier in this chapter, there are a number of other products produced by apiarists in the South Brigalow region in addition to honey.

No attempt has been made to value the component of revenue generated by package bees produced in the South Brigalow region as exported by the Australian Queen Bee Exporters, however, the South Brigalow region plays an important role in the companies production process and this should be considered when considering the values attributed to the apiary industry in the region.

In addition, no attempt has been made to estimate the values associated with breeding or overwintering services as a result of apiary activities in the region.

From discussions with NSW Agriculture, it is estimated that wax production totals approximately ten percent (10%) of honey production in the South Brigalow region. In 1999, the wholesale value of wax from the South Brigalow region was approximately \$5 per kilogram.

Based on these figures, it is estimated that the gross value of wax produced in the South Brigalow region is calculated as follows;

$$4,352,000 \text{ kg} \times 10\% = 435,200 \text{ kg of wax}$$

$$435,200 \times \$5 \text{ per kg} = \$2,176,000$$

Thus it is estimated that the gross value of wax produced from State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$2.2m per annum.

**7.5.5 Sensitivity Analysis**

Utilising the stocking rates of 100 hives per average apiary site and 120 hives per apiary site, the gross value of wax produced on State Forests and National Parks in the Pilliga and Goonoo forests is estimated as follows;

**Using a Stocking Rate of 100 hives per site**

$$3,200,000 \text{ kg of honey} \times 10\% = 320,000 \text{ kg of wax}$$

$$320,000 \text{ kg wax} \times \$5 \text{ per kg} = \$1,600,000$$

Thus using a stocking rate of 100 hives per site, it is estimated that the gross value of wax produced from State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$1.6m per annum.

**Using a stocking Rate of 120 hives per site**

Utilising the stocking rates of 120 hives per average apiary site, the gross value of wax produced on State Forests and National Parks in the Pilliga and Goonoo forests is estimated as follows;

$$3,840,000 \text{ kg of honey} \times 10\% = 384,000 \text{ kg of wax}$$

$$384,000 \text{ kg wax} \times \$5 \text{ per kg} = \$1,920,000$$

Thus using a stocking rate of 120 hives per site, it is estimated that the gross value of wax produced from State Forests and National Parks in the Pilliga and Goonoo forests is approximately \$1.9m per annum.

## **7.6 CONCLUSIONS**

It is estimated that in 1999, the potential maximum gross value of honey produced under licences on State Forests and National Parks lands in the South Brigalow Assessment region was approximately \$7.8m. It is also estimated that in 1999, the potential maximum gross value of wax produced under licences on State Forests and National Parks lands in the South Brigalow assessment region was \$2.2m.

In considering the above results, it should be noted that these values are for potential maximums only. Actual values may vary in practice, depending upon utilisation of individual apiary sites.

# 8. GRAZING

## 8.1 INTRODUCTION

As was illustrated in Chapter Three, sheep and cattle grazing is an important activity in terms of the relative share of Gross Regional Output for the South Brigalow regional economy.

Grazing activities occur predominantly on private land, with grazing also occurring on lands administered by the region's Rural Lands Protection Boards. State Forests also issues annual grazing permits which allow cattle access to certain forest areas.

In 1999, State Forests issued 33 grazing permits to 30 different graziers in the South Brigalow assessment region. Permits sizes range up to 5,000 hectares, with the majority of permit sites falling into the 1000-2000 hectare category.

It is estimated that the potential annual gross value of grazing on State Forest grazing permit areas for cattle is between \$7,114 and \$10,670 and for sheep is between \$42,682 and \$64,022.

The following is based on information provided by State Forests and NSW Agriculture from various records as well as knowledge of local State Forests NSW Agriculture Officers.

## 8.2 BACKGROUND

### 8.2.1 A Brief History of Grazing in the Region

Grazing has a long history in the South Brigalow assessment region. Cattle grazing was first undertaken in the 1800s by squatters settling in the region. The squatters grazed their cattle in the open woodlands that were predominant in the region around that time. Following fire control measures instigated by the settlers, the woodland areas eventually succumbed to thick cypress forest regeneration and the settlers were eventually unable to continue their cattle grazing in these original areas. Grazing has continued in the region since the first settlers efforts in the 1800s.

More recently, grazing has played an important role in State Forests management of fire hazards in the region's forests, especially the Cypress forests in the Goonoo area. Grazing permits have been utilised, in part, to reduce the amount of ground fuel in forest areas and so to assist in minimising the fire risks inherent in both young and mature Cypress forest areas.

### 8.2.2 State Forests Grazing Permits

Amongst other forest uses, State Forests issues permits allowing grazing activities on State forest land. Permits are issued as annual permits, renewed on 31 December each year. A fee, as determined by State Forests and relevant to the area of land and facilities covered by the permit is paid each year to State Forests. State Forests also issue conditions governing the use of the land.

All permits now issued by State Forests are the standard Occupation Permit with the Intent to Graze. These permits have gradually been replacing other permits types previously issued, which have often had a duration of up to 30 years. A copy of the standard grazing permit and conditions are attached as Attachment 4.

In addition to the conditions as outlined by State Forests, graziers are also responsible to adhere to relevant regulations as specified by local councils and Rural Lands Protection Boards. All fees levied by these bodies are payable by the grazier to the relevant body in addition to the State Forests permit fees.

In addition to access to State Forests land, grazing sites often provide access to important infrastructure. Infrastructure on grazing sites mainly encompasses fencing and dams and is usually important to both State Forests land management activities and the graziers use of the land.

The standard infrastructure expected by a grazier when tendering for a permit area would be water supply and sound fencing between the forest and any neighbours.

The successful tender of grazing permits will often call for the permit holder to provide maintenance or renewal of these facilities. If maintenance or renewal is required, State Forests generally guarantees a minimum period of time which the permit holder may have access to that land.

### **8.3 CHARACTERISTICS OF GRAZING IN THE SOUTH BRIGALOW REGION**

Although grazing permit areas are rarely used continuously by graziers in any one year, these areas play an important role in effective livestock management. Grazing may occur on State forest land at any time throughout the year, however, areas are generally utilised in the cooler months of the year, especially during autumn and spring. Forest permit areas can play an important role in forest management during these months as the forests can provide additional feed and help avoid overgrazing pastures in the summer months. The forests also provide shelter for stock during cooler weather.

Forest permit areas are also important to graziers during periods of drought. Periods of minimal or no rainfall can place excessive strain on usual feeding areas and forest areas can be used to supplement feed stocks or used intermittently to take pressure of other land areas.

Grazing on State forests land in the South Brigalow region is mainly restricted to cattle grazing, with sheep grazing occurring to a far lesser extent. The region's forests have also been utilised by horse graziers, however, this is not a common use of the land.

In the South Brigalow region, rainfall distribution over the year is relatively constant. Grazing is influenced by rainfall to the extent that high levels of rainfall will encourage grass and other plant growth, providing increased feed stocks. In general, a significant rainfall event encourages the increased utilisation of State forest areas for grazing.

### **8.4 EXTENT OF GRAZING IN STATE FORESTS**

In 1999, State Forests issued 33 grazing permits to 30 different graziers in the South Brigalow region. These permits were mainly annual permits, except where previous longer term permits still had currency. In the case of these longer term permits, permit holders are still required to pay the annual permit renewal and so these permits can effectively be treated as permits issued for that year.

The cost of permits issued varies depending on the size of the permit site, proximity to facilities and infrastructure provided on the site itself. In 1999, the average cost of a grazing permit was approximately \$360, with the cost of permits ranging between \$110 and \$1,380.

The total value to State Forests of permits issued in 1999, was approximately \$12,000.

The size of permits sites varies both between forest areas and within any one forest itself. Permit site sizes have been designed to allow appropriate multiple use forest management, maximise useable area to the grazier and assist in fire reduction strategies.

Permits issued in 1999, covered areas as small as 10 hectares to areas as large as 5,000 hectares, with most permit site sizes falling between the 1,000-2,000 hectare size.

The total area of land utilised for grazing (in conjunction with other uses) on State Forests in the South Brigalow assessment region is approximately 38,000 hectares. This represents approximately 7 percent of the total State Forests estate in the assessment region.

It should be noted that although a permit may provide nominal access to a certain area of land, the land able to be utilised by the grazier may be less than specified in the permit. This can be because of such factors as slope, dense forest cover, land areas set aside for regeneration and so on.

As discussed in the previous section, State forest grazing areas are generally only utilised by permit holders as an addition to private grazing areas and are generally only used for at most six months of the year.

## **8.5 ECONOMIC VALUE OF GRAZING IN STATE FORESTS**

This section provides an estimate of the potential annual gross value of grazing and employment associated with grazing on State Forests land in the South Brigalow region. Due to the unavailability of certain data, gross value figures only are estimated. Sensitivity analyses are also provided.

It should also be noted that although employment estimates are provided, these estimates relate to actual employment on particular grazing sites and no attempt has been made to translate these estimates into full time equivalents.

South Brigalow region specific data utilised in the following calculations was provided by State Forests and NSW Agriculture Grazing Officers.

### **8.5.1 Average Annual Grazing on State Forests**

It has been estimated that the average carrying capacity for cattle in the South Brigalow forests are approximately one dry beast equivalent per 20 hectares per annum. It has been further estimated that the average carrying capacity for sheep in the South Brigalow forests is approximately one sheep per 5 hectares per annum. The ratio of appropriate land for cattle to sheep grazing on State forests is 4:6 respectively, or approximately 40 percent of the area available under grazing permits is suitable for cattle grazing, with the remaining 60 percent suitable for grazing sheep.

These estimates are based on State Forests and NSW Agriculture Officers knowledge and experience of grazing permit areas in the South Brigalow region and should be taken as indicative of carrying capacity only.

From the previous section, it was estimated that the total area of land available in State forests under grazing permits is approximately 38,000 hectares. It should be noted that, due to various land features and access restrictions, not all of this area may be useable for grazing purposes. Thus the following analysis provides estimates of potential maximums and actual values may be less than reported.

### **8.5.2 Gross Value of Grazing on State Forests**

Grazing in the South Brigalow region is predominantly undertaken on private land. State Forests grazing permit areas are generally utilised to supplement grazing activities on private lands, with the main purpose of grazing on State Forests being to assist in the livestock growing process during some part of the year.

It is estimated that on average, permit areas are utilised for approximately 2-3 days in any one month. Thus it is estimated that, on average, State Forests permit areas are utilised by graziers to assist in stock growing between 24 and 36 days per year.

From discussions with NSW Agriculture Grazing Officers in the region and from previous CRA studies, it is estimated that the average weight gain attributable to grazing activities on State Forests is of the order of approximately 0.3 kilograms per day. (Report on the Profile and Economic Evaluation of Grazing in



State Forests, 1999.) For the purposes of sensitivity analysis, a range of 0 kilograms and 0.5 kilograms per day weight gain is proposed. This range is estimated as a basis for accounting for the various reasons graziers utilise State Forests grazing permit areas.

To assess the value of grazing on State Forests in the South Brigalow assessment region, the following assumptions have been made:

- weight gain attributable to grazing on State Forests is calculated for 24 and 36 days in the year
- weight gain from grazing on State Forests would be expected to be classified as medium to low when compared to potential weight gain on purpose specific private land
- weight gain is estimated to be approximately 0.3 kilograms per day on average, with a range of 0 kilograms to 0.5 kilograms per day used for the purposes of sensitivity analysis

### **Average Number of Stock Grazing in State Forests Areas**

From the previous section, there is approximately 38,000 hectares of land available under grazing permits in the South Brigalow assessment region. Furthermore, it is estimated that approximately 40 percent of this area is suitable for cattle grazing and 60 percent of this area is suitable for grazing sheep.

Thus, the areas covered by grazing permits and potentially utilisable for cattle and sheep grazing are estimated as follows:

Cattle:

38,000 hectares x 40 percent = 15,200 hectares

Sheep:

38,000 hectares x 60 percent = 22,800 hectares

Utilising the carrying capacities as discussed in Section 7.5.1, the potential maximum number of livestock grazing on State Forests land covered by grazing permits is estimated as follows:

Cattle:

15,200 hectares / 1 dry beast equivalent per twenty hectares = 760 cattle

Sheep:

22,800 hectares / 1 dry beast equivalent per five hectares = 4,560 sheep

Thus, it is estimated that, in an average year, the potential number of livestock grazing in State Forest areas covered under grazing permits in the South Brigalow assessment region is around 760 cattle and 4,560 sheep.

### **Potential Annual Gross Value**

Following discussions with NSW Agriculture Grazing Officers located in the South Brigalow assessment region, it is estimated that an average liveweight for stock grazing on State forest areas in the region is approximately \$1.30 per kilo. This liveweight assumes that stock are sold prior to reaching a mature age of thirty months or more. It is assumed that this liveweight applies to both cattle and sheep grazed in the region's State forests.

From the previous sections, it is seen there are approximately 760 cattle and 4,560 sheep grazed on State Forests grazing permit areas in an average year. The average total weight gain per year of cattle and sheep whilst in these areas is estimated as follows;

For 24 days in a year

Cattle:

760 cattle x 0.3kg per day x 24 days = 5,472 kilograms

Sheep:

4,560 x 0.3kg per day x 24 days = 32,832 kilograms

For 36 days in a year

Cattle:

$760 \text{ cattle} \times 0.3\text{kg per day} \times 36 \text{ days} = 8,208 \text{ kilograms}$

Sheep:

$4,560 \times 0.3\text{kg per day} \times 36 \text{ days} = 49,248 \text{ kilograms}$

Thus, it is estimated that in an average year, the total potential average annual weight gain for cattle grazed on State Forests grazing permit areas in the South Brigalow assessment region is between 5,472 kilograms and 8,208 kilograms for cattle and between 32,832 kilograms and 49,248 kilograms for sheep.

Utilising the live weights provided above, it is estimated that the potential annual gross value of grazing in State Forests grazing permit areas in the South Brigalow assessment region is estimated as follows:

Gross Value of Cattle Grazing:

$5,472 \text{ kilograms} \times \$1.30 \text{ per kilogram} = \$7,113.60$

$8,208 \text{ kilograms} \times \$1.30 \text{ per kilogram} = \$10,670.40$

Gross Value of Sheep Grazing:

$32,832 \text{ kilograms} \times \$1.30 \text{ per kilogram} = \$42,681.60$

$49,248 \text{ kilograms} \times \$1.30 \text{ per kilogram} = \$64,022.40$

Thus, it is estimated that the potential annual gross value of grazing on State Forest grazing permit areas for cattle is between \$7,114 and \$10,670 and for sheep is between \$42,682 and \$64,022.

### **Sensitivity Analysis**

Utilising an average weight gain per day of zero kilograms, the potential annual gross value of cattle and sheep grazing is estimated to be zero.

It should be realised that the methodology applied above does not account for the value derived by the grazer of resting cattle or allowing marketable cattle better access to more preferable grazing land by removing non-market cattle from these lands.

In addition, graziers often utilise grazing permit areas to maintain stock weight during periods of drought or when feedstock is low on private land. In these cases, graziers derive a benefit for grazing stock on State forests lands even though there is no weight gain experienced from utilising these areas.

Utilising an average weight gain of 0.5 kilograms per day, the potential annual gross value of cattle and sheep grazing is estimated as follows:

Cattle:

For 24 days in a year

Cattle:

$760 \text{ cattle} \times 0.5\text{kg per day} \times 24 \text{ days} = 9,120 \text{ kilograms}$

Sheep:

$4,560 \times 0.5\text{kg per day} \times 24 \text{ days} = 54,720 \text{ kilograms}$

For 36 days in a year

Cattle:

$760 \text{ cattle} \times 0.5\text{kg per day} \times 36 \text{ days} = 13,680 \text{ kilograms}$

Sheep:

$4,560 \times 0.5\text{kg per day} \times 36 \text{ days} = 82,080 \text{ kilograms}$

Thus, it is estimated that in an average year and utilising an average weight gain of 0.5 kilograms per day, the total potential average annual weight gain for cattle grazed on State Forests grazing permit areas in the South Brigalow assessment region is between 9,120 kilograms and 13,680 kilograms for cattle and between 54,720 kilograms and 82,080 kilograms for sheep.

Utilising the live weights per kilogram prices provided above, it is estimated that the potential annual gross value of grazing in State Forests grazing permit areas in the South Brigalow assessment region is estimated as follows:

Gross Value of Cattle Grazing:

9,120 kilograms x \$1.30 per kilogram = \$11,856

13,680 kilograms x \$1.30 per kilogram = \$17,784

Gross Value of Sheep Grazing:

54,720 kilograms x \$1.30 per kilogram = \$71,136

82,080 kilograms x \$1.30 per kilogram = \$106,704

Thus, it is estimated that the potential annual gross value of grazing on State Forest grazing permit areas for cattle is between \$11,856 and \$17,784 and for sheep is between \$71,136 and \$106,704.

### **8.5.3 Employment Associated with Grazing on State Forests**

The following employment estimates are based on the part-time actual employment associated with current levels of grazing in State Forests. It should be noted that these estimates do not reflect full-time employment equivalents over an entire year, rather represent actual employment for partial periods during any one year.

Due to a lack of accurate data, no attempt has been made to translate these employment estimates into full time equivalents.

It has been estimated that grazing activities, associated with grazing in State forest areas in the South Brigalow region provide employment for between 7 to 10 people (maximum) at various times throughout the year.

This employment is not continuous, as discussed earlier in this chapter, as grazing occurs for between approximately 24 to 36 days in an average year.

# 9. TOURISM AND RECREATION

## 9.1 INTRODUCTION

New South Wales has the highest rates of international and inter-state visitation (tourism) in Australia. In addition, it is estimated that there were approximately 294 million overnight recreational trips (recreation) made by residents in New South Wales in 1998.

Sydney is by far the most popular destination of all tourism and recreation in the State, with visitation to the central west and far west the amongst the least visited areas within the State.

The following is based on information provided by State Forests, the National Parks and Wildlife Service and Tourism New South Wales.

## 9.2 TOURISM IN REGIONAL AUSTRALIA

In 1998, it is estimated that there were approximately 4.2 million international visitor arrivals into Australia. It is further estimated that, on a State by State basis, New South Wales receives the majority of international visitors. This trend of visitation to New South Wales is expected to continue, especially up to and following the Olympic Games in Sydney in September 2000. (Attractions Development Strategy, 1999)

Although international visitation is concentrated in New South Wales, the majority of international tourism is within non-regional New South Wales, with the Sydney region accounting for between 73% and 78% of total visitation in New South Wales between 1988 and 1997. (Attractions Development Strategy, 1999)

In comparison, it is estimated that in 1998, there were 153.1 million day trips and 73.8 million overnight trips undertaken by Australians aged 15 years and over. Day trips are defined as recreation where there is no overnight stay away from home. It was estimated that the 73.8 million overnight trips resulted in approximately 293.5 million visitor nights being spent away from home in 1998.

The main destination for overnight stays by residents of Australia was New South Wales, where holiday and leisure, visiting friends and relatives and business were the main reasons reported as the purpose of these activities.

It is estimated that, of the 73.8 million overnight trips undertaken by residents of Australia, 25.6 million of these were in New South Wales.

Comparison of visitation to the various regions within New South Wales shows that, although New South Wales has the highest rate of domestic visitation, the central west and far west are amongst the least visited areas of New South Wales, with the far west the least visited region in New South Wales. (Attractions Development Strategy, 1999)

Of the domestic visitors to New South Wales, it is estimated that nature based tourism and recreation, based around natural features of interest, walking tracks and National Parks is the main reason for visiting rural areas in the State. (Attractions Development Strategy, 1999)

### 9.3 TOURISM IN THE SOUTH BRIGALOW REGION

The information presented in this section of the report is based on information prepared by Tourism New South Wales and relates to tourism in the South Brigalow region as defined in Chapter One of this report.

As such, the following discussion encompasses more than the Pilliga and Goonoo regions and focuses on tourism and recreation in the region in general. This discussion provides the context for understanding what draws visitors to the region and provides some insight into why and where visitors may choose to visit when in the South Brigalow assessment region.

#### 9.3.1 Visitors to the Region

The following information was provided on an LGA basis by Tourism New South Wales and relates to both domestic and international visitation to each of the LGAs within the South Brigalow region. As discussed in section 8.2, the majority of visitors to this region are domestic visitors. Also as discussed in Chapter One, it is assumed that the entire LGA is included within the study boundary, thus visitor numbers relate to any visitor attractions in that LGA and not solely the Pilliga and Goonoo forests.

The LGAs in the South Brigalow region fall primarily into 2 tourism regions, as defined by Tourism New South Wales. These are the Orana region, which includes the LGAs of Coolah, Coonabarabran, Dubbo and Gilgandra and the New England region, which includes Gunnedah, Narrabri and Quirindi. Merriwa LGA is the only LGA outside these two regions and is defined for tourism region purposes as part of the Hunter region.

In total, it is estimated that there were approximately 1,252,000 visits to the region by domestic and international visitors in 1996/97. (Tourism New South Wales Visitor Database, 1996/7)

Estimates of visitor numbers and trends for each of these LGAs are outlined below. It should be noted that these visitor numbers are based on survey results carried out over the entire tourism region and so are representations of visitor numbers to a particular LGA based on visitation in that region in general. A breakdown of visitor numbers by LGA for three successive years up to 1996/97 is also provided below.

**TABLE 15: VISITATION TO THE SOUTH BRIGALOW REGION BY LGA 1996/97**

LGA	Visits ('000)		
	94/95	95/96	96/97
Coolah	43	32	44
Coonabarabran	169	152	163
Dubbo	530	517	545
Gilgandra	100	94	105
Gunnedah	109	122	131
Narrabri	134	142	170
Quirindi	37	39	46
Merriwa	34	41	48
<b>Total</b>	<b>1,156</b>	<b>1,139</b>	<b>1,252</b>

*Tourism NSW*

From the breakdown provided above, it can be seen that there is large variation in visitors to the LGAs within the South Brigalow assessment region, with visitor numbers ranging from 44,000 to 545,000 visits in 1996/97.

It can be seen that Dubbo, as would be expected of the regional centre, has the highest level of visitation for the South Brigalow assessment region. Coonabarabran, Gunnedah and Narrabri also have a high level of visitation compared to the LGAs in the region.

It is also interesting to note that, from broader studies undertaken by Tourism New South Wales regarding the characteristics of rural tourism in NSW, approximately half the visitors to regional attractions are local residents (recreation as opposed to tourism). (Attractions Development Strategy, 1999)

In undertaking visitor surveys in each of these regions, Tourism New South Wales also collected information regarding visitor expenditure which enabled estimates of the total visitor expenditure on an LGA by LGA basis. These estimates are provided below.

**TABLE 16 - VISITOR EXPENDITURE (\$M) IN THE SOUTH BRIGALOW REGION BY LGA 1996/97**

LGA	94/95	95/96	96/97
Coolah	10	8	9
Coonabarabran	22	21	21
Dubbo	79	81	78
Gilgandra	15	13	14
Gunnedah	21	22	27
Narrabri	24	25	31
Quirindi	8	9	11
Merriwa	6	7	9
<b>Total</b>	<b>185</b>	<b>186</b>	<b>200</b>

*Tourism NSW 2000*

It can be seen from above that, of the estimated 1,252,000 visits to the LGAs within the South Brigalow region in 1996/97, this contributed approximately \$200m to the region's economy.

From the above, it can again be seen that tourism and recreation within the Dubbo Local Government Area is above that experienced in other LGAs within the region.

The figures above also illustrate how the level of revenue provided by tourism and recreation in each LGA varies. It should be noted that differences between revenue derived from tourism and recreation would vary between Local Government Areas due to differences in the size of each local economy, local attractions and so on and thus direct comparison using the figures reported above cannot be used to judge the *relative* importance of tourism to each of the LGAs.

### 9.3.2 The Region's Attractions

There are a number of nature based and other attractions that draw visitors within the South Brigalow region. The information presented below was derived from the Tourism NSW Visnet database, which lists the main tourist attractions of each Local Government Area within NSW.

The attractions listed below are representative of those found in rural New South Wales, and represent a diverse range of activities with a wide range of attraction types. While there are some larger operations, such as the Western Plain Zoo, the majority of operations are small in scale and in many cases, family owned and operated. (Attractions Development Strategy, 1999)

The following attractions were registered with Tourism New South Wales under the Visnet database. (Tourism New South Wales, 1999)

#### Dubbo

- Dibalambia Walking Tracks
- Dubbo Military Museum
- Dubbo Museum
- Dubbo Regional Art Gallery
- Dundullimal Homestead
- Jinchilla Gallery and Gardens
- Western Plains Zoo
- Tracker Riley Walking Track

**Coonabarabran**

- Coona Crafts and Gallery
- Coonabarabran Equestrian Centre
- Crystal Kingdom
- From Out of This World - The Australian Museum Diprotodon Exhibition
- Hickey Falls
- Old Timers Antiques and Gallery
- Oxley Crossing
- Sandstone Caves in Pilliga Reserve
- Sliding Spring Observatory
- Warrumbungle National Park
- Warrumbungle Aboriginal Site Tours

**Narrabri**

- Australia Telescope
- Bellata Gemstone Fossicking
- Narrabri Old Gaol Heritage Centre and Museum

**Gilgandra**

- Gilgandra Flora Reserve
- Gilgandra Historical Museum
- Gilgandra Observatory
- Hitchen House Museum
- Jack McGir Arboretum
- Orana Cactus World

**Coolah**

- Coolah Tops National Park
- David Sherlock Blacksmiths
- Bundella State Forest
- Warung State Forest

**Merriwa**

- Goulbourn River National Park
- Wollemi National Park

**Quirindi**

- Quirindi Historical Cottage and Museum
- Who'd A Though It Lookout

**Gunnedah**

- 150 degrees east Meridian
- Bindea Town Walk
- Breaker Morant Drive
- Creative Arts Centre
- Dorathea Mackellar Memorial
- Gunnedah Rural Museum
- Gunnedah Stock Selling Centre
- McDonaugh Model Train Display
- Water Tower Museum
- Wolseley Park Markets

As can be seen from this listing, the activities available to visitors to the South Brigalow region varies greatly. Activities range from nature based tourism, to museums and markets to historical centres and

heritage sites. It is also interesting to note from the above the variance in the number of tourist attractions in each LGA.

The pricing and advertising arrangements of the attractions listed above also vary considerably between location and activity type. In broader studies mentioned above, it has been estimated that approximately one third of rural attractions attract no admission fee and that around half of all attractions rely on word of mouth as the primary means of publicising their operations.

## 9.4 TOURISM IN NATIONAL PARKS

There are a number of National Park and Nature reserve areas in the South Brigalow region. Based on information provided by National Parks and Wildlife Service and compiled from both visitor records and knowledge of local National Parks and Wildlife Service officers, it is estimated that in 1998/99, there were approximately 66,250 visits to National Parks in the region.

It should be noted that no attempt has been made to value these visits and these visits reflect an estimate of the number of visits made to region's parks, rather than an estimate of the number of people visiting the parks each year.

### 9.4.1 Types of Activities Undertaken

There are a number of activities permitted in the region's National Parks and Nature Reserves, ranging from bird watching, to walking and rock climbing to camping. The activities most common in the region's parks generally revolve around the particular natural aspects of the different areas.

For example, the Warrumbungle and Mt Kaputar National Parks contain remnants of ancient volcanoes, and a diversity of landforms which make it popular for rock climbing, bushwalking and photography. The Coolah Tops National Park contains stands of Snow Gum which include the largest known examples of this species and a number of swamp areas.

The National Parks and Wildlife Service also maintains and operates a number of facilities in the National Parks in the region. These include interpretation facilities, a visitor centre, powered and unpowered camp sites, barbecues, picnic tables and shelters, water supply tanks and access roads.

### 9.4.2 Visitation to the Region's Parks

The following estimates are for the year 1998/99 and are based on visitor surveys, information collected as part of park fee administration processes and knowledge of park visitation by local National Parks officers.

It is estimated that there were approximately 66,250 visits to National Park areas in the South Brigalow region in 1998/99. A breakdown of the estimated number of visits for each of the region's various nature reserves and National parks is provided below.

**TABLE 17 - NUMBER OF VISITS TO NATIONAL PARKS IN THE SOUTH BRIGALOW REGION  
1998/99**

<b>National Park</b>	<b>Visits 1998/99</b>
Warrumbungle National Park	54,150
Mt Kaputar National Park	part of 45,000 - approximately 5,000
Coolah Tops National Park	5,000
Goulburn River National Park (v small part)	approximately 100
Pilliga Nature Reserve	estimated average 1,000
<b>National Park</b>	<b>Visits 1998/99</b>
It is estimated that the following Nature Reserves receive <b>in total</b> 1,000 visits per annum	
Arakoola Nature Reserve	
Brigalow Park Nature Reserve	
Binnaway Nature Reserve	
Careunga Nature Reserve	



Cedar Brush Nature Reserve	
Coolbaggie Nature Reserve	
Dapper Nature Reserve	
Gamilaroi Nature Reserve	
Weetalibah Nature Reserve	
Wingen Maid Nature Reserve	
Wongarbon Nature Reserve	
<b>Total</b>	66,250

*National Parks and Wildlife Service*

It should be noted that in the above estimates, account has been taken of where the region's boundary divides a park area, for example it is proposed in the Mount Kaputar National Park, approximately 5,000 of the reported visits are apportioned to the South Brigalow region area of the park. It should also be noted that, even when tourism and recreation occurs in a park or nature reserve that falls both within and outside the region, park management and general service provision may still be provided by areas within the assessment region. For example, it is estimated that virtually all economic activity related to park management and associated with visits to the Mt Kaputar National Park accrues to Narrabri LGA, which is within the assessment region.

Estimates have also been made of those areas where there is no accurate information collected on visitors to the area, such as with the estimate of 1,000 visitors per annum to the region's nature reserves. It would be expected that actual visitation in the various reserves would vary depending upon location, proximity to main roads and towns and so on.

## 9.5 TOURISM IN STATE FORESTS

There are a number of tourism activities undertaken in the region's forests, including activities common to National Parks, such as bird watching and bushwalking, as well as activities specific to the land tenure type, such as hunting and firewood gathering. It is estimated that, on average, there are approximately 15,000 visits to Pilliga and Goonoo State Forests each year.

It should be noted that no attempt has been made to value these visits and these visits reflect an estimate of the number of visits made to the Pilliga and Goonoo forests, rather than an estimate of the number of people visiting these forests each year.

### 9.5.1 Types of Activities Undertaken

Traditionally, a wider range of activities is permitted on State Forests than is generally permitted in National Parks. In the South Brigalow region however, there is a high degree of commonality between the activities undertaken under both types of land tenure.

The main State Forest areas in terms of tourism and recreation potential in the South Brigalow region are the Goonoo and Pilliga State Forests themselves. The proximity of these forest areas to local communities has led to a high degree of usage by local communities, as opposed to National Park areas which may be marketed to a different and wider market (such as the Warrumbungle National Park).

The most popular activities undertaken in these two State forest areas include bird watching, bushwalking and picnicking.

The Goonoo State Forest is also used for trail bike riding and crayfish gathering and is an important site for domestic firewood gathering. The Pilliga State forest is also popular for Koala watching as well as feral pig and goat hunting.

Both forest areas are utilised by local interest groups, such as the Dubbo Field Naturalists and are utilised by local tourist companies as part of their regional tourism experience.

State Forests also maintain and operate a number of facilities in both forest areas, including barbeques, picnic tables and shelters, water supply tanks, dams and roads.

**9.5.2 Visitation to the Region's Forests**

The following estimates of the number of visits to State Forests are based on records kept by the regional State Forests offices as well as estimates based on the local knowledge of State Forests officers. The following estimates are based on visits to the Pilliga and Goonoo State Forests only and as such, actual visitation numbers in the region may differ from those reported below.

It is estimated that, in the Goonoo State forest, there are approximately 4,000-5,000 visits per annum. These visits are predominantly from local residents.

It is estimated that, in the Pilliga State forest, there are approximately 10,000 visits per annum. Again, these visits are predominantly made by members of the local communities.

It is believed, of the visits reported, tourism from outside the region is minimal only.

# 10. MINERALS

## 10.1 INTRODUCTION

The following information provides an overview of minerals exploration and extraction in the South Brigalow assessment region. Information on mining operations in the region in general and within State Forests in particular is supplied. The information provided was compiled by the Department of Mineral Resources.

The South Brigalow assessment region lies largely within the Gunnedah Basin, a major coal-bearing sedimentary basin. Because of this, mineral occurrences especially of hydrocarbons (coal, petroleum and coal seam methane) are likely to be distributed widely throughout the region. Many factors, such as depth of burial, thickness of coal seams and volume and composition of coal or gas, are critical in determining whether these occurrences contain economic resources, however. Resources could occur on all land tenure types, although it should be noted that mining and extractive industries are not permitted in National Parks. Near surface coal suitable for open cut and underground mining occurs in the Gunnedah Coalfield in the eastern half of the study region, particularly in the area extending from Carroona, through Gunnedah and Boggabri to Narrabri. The coal bearing and overlying strata of the Gunnedah Basin have potential for petroleum, conventional gas and coal seam methane, especially in areas where there is at least moderate depth of burial. Promising gas and coal seam methane resources have been discovered west and south of Narrabri, extending into Pilliga East State Forest. This area is the subject of current intensive exploration (see below).

Construction materials and industrial minerals occurrences are widely distributed throughout the study region, on all tenures. Most quarrying operations are small, however.

Current mining titles are held for coal and industrial minerals (kaolin and other clays, and zeolites). Current exploration titles are for coal, petroleum, gold, base metals, zeolites and clay minerals. Over 60 exploration and mining titles are held in the study area. These titles, especially the petroleum exploration licences and coal authorisations/exploration licences, cover most of the South Brigalow assessment region.

The information provided in this section is intended to complement the assessment work undertaken by the Department of Mineral Resources in the Geoscience Resource Audit for the South Brigalow Assessment region. The aim of the Geoscience Resource Audit project was to undertake an assessment of the petroleum and coal bed methane resource potentials of the Pilliga area in the South Brigalow assessment region. The Geoscience Resource Audit is available as a separate project report.

## 10.2 CONSTRUCTION MATERIALS AND INDUSTRIAL MINERALS IN THE SOUTH BRIGALOW REGION

In 1999, the known production of construction materials in the South Brigalow assessment region as a whole totalled approximately 2.3 Mt and was valued at around \$12.2m. Recorded minerals production on State Forest lands accounted for approximately 40,000 tonnes of this 2.3Mt figure. Minerals produced on State Forests land in 1999 in the South Brigalow assessment region were valued at approximately \$70,000. (Department of Mineral Resources, 2000)

The Department of Mineral Resources maintains an Industrial Minerals database (INDMIN) for NSW which records industrial minerals and construction materials occurrences throughout the State. In the South Brigalow assessment region, INDMIN shows that there are 390 industrial mineral / construction material occurrences recorded in the area. The distribution of commodities is shown in the table below. The table below shows a breakdown of these occurrences by commodity.

There are approximately 170 operating sites in the assessment region, with the majority of these supplying materials for Council roads. Six of these sites are major aggregate quarries supplying the construction industry.

INDMIN records show that there were 25 construction material sites operating in State Forests in the assessment region in 1999. These sites mainly produced road materials (unprocessed construction materials) for local road and forestry road maintenance. The value of construction material production in State Forests is low (approximately \$1.75 per tonne) because of the low quality of the material produced. There were also two zeolite mines operating in the south east of the region. Other commodities known in the study area are rare earths, kaolin, diatomite, nepheline syenite, emery and limestone.

**TABLE 18 - DISTRIBUTION OF MINERALS COMMODITIES IN THE SOUTH BRIGALOW REGION**

COMMODITY	COUNT
bentonite, fullers earth	6
clay, clay/shale – structural	6
coarse aggregate – hard rock	7
coarse aggregate – sandstone	1
diamond – gem	3
diatomite	4
dimension stone – slate	1
emery	1
feldspar group – nepheline syenite	1
gravel – fluvial	16
heavy mineral sand -	2
iron oxides – magnetite	4
kaolin - flint clay	7
kaolin – refractory	2
kaolin – undifferentiated	4
limestone, marble, caliche,	9
mineral pigments	2
rare earths – excluding monazite	1
construction sand	18
sand/gravel deposits	36
silica gems	10
soil, loam	3
tourmaline	1
unprocessed construction	240
zeolite	4
zircon - gem	1

*Department of Mineral Resources Industrial Minerals Database, 2000.*

Mineral exploration carried out in the late 1980s and 1990s in the Pilliga State forest areas identified relatively high concentrations of mineral sands in this area.

The southern part of the South Brigalow Bio-region lies almost entirely within the Gunnedah Basin, which is a potentially rich region in terms of deposits. Current mining titles are held for kaolin and other clays, and for zeolites. Current exploration titles are for gold and base metals, zeolites, clay minerals, coal and petroleum. A total of 68 titles are active in the study area.

### **10.3 COAL RESOURCES OF THE SOUTH BRIGALOW ASSESSMENT REGION**

Although current coal production in the Gunnedah Coalfield is relatively small, the majority of the coal produced is for export to overseas markets. In the longer term, proposals for the development of Boggabri and Maules Creek mines are predicted to substantially increase the volume of coal being extracted in the region.

Recently, Whitehaven Coal Mining Pty Ltd applied for development consent from the Department of Mineral Resources to open a trial mine near the former Vickery Mine site. It is believed that, in its first stage, the site will produce approximately 50,000 tonnes of coal. If the trial mine proves successful, a more extensive project would be developed to initially supplement, and subsequently replace production from the existing Gunnedah Colliery.

Regional exploration has also identified substantial underground coal resources in the North Narrabri, South Narrabri and Caroonna area.

The distance of Gunnedah Basin Coal Resources from the port at Newcastle and the availability of low cost coal in the Hunter Valley region has constrained development of the coal resources in the Gunnedah Basin.

Coal production in the Hunter Valley is expected to decline substantially by the year 2012, when nine open cut mines in the Hunter Valley currently operating are expected to exhaust their reserves. This may create the opportunity for the development of large scale mines in the Gunnedah Basin to replace lost production from the Hunter after the year 2010.

### **10.4 POTENTIAL PETROLEUM RESOURCES IN THE REGION**

The following information has been taken from the Geoscience Resource Audit, as discussed in the introductory section of this Chapter.

The Gunnedah Basin, which is in part covered by the South Brigalow assessment region, is prospective for both Coal Seam Methane (CSM) and conventional hydrocarbons. Coal bed, or coal seam methane is a natural gas formed during the coalification process, whereby peat and other organic matter are turned into coal as a consequence of compaction and heat associated with depth of burial. CSM is essentially similar to natural gas found in conventional sedimentary reservoirs, however it is generally higher in pure methane concentration. Unlike conventional natural gas reservoirs where gas is trapped in the pore or void spaces of a rock such as sandstone, methane trapped in coal is adsorbed onto the coal grain surfaces or micropores.

Gas derived from the Gunnedah Basin has the advantage of proximity to existing infrastructure, when compared to similar deposits in the Gippsland Basin and Cooper Basin. Thus it would be expected that this gas would attract lower transport costs than gas collected from other areas. In addition, the proximity of this resource to existing infrastructure would also assist in keeping start-up costs lower than average. AGL currently has approval to construct a pipeline to Tamworth, with a spur to Narrabri. This is of significance to the development of gas resources in the Gunnedah Basin. This proximity to existing pipelines will allow for its physical connection to the entire Eastern Australian gas market.

The largest single petroleum exploration program in New South Wales' history is currently taking place south-west of Narrabri (Petroleum Exploration Licence 238). An American company, Forcenergy, is examining the coal seam methane potential of the area and has drilled a number of wells near Narrabri as part of a trial production test program.

As a measure of the potential economic benefits that might flow from this exploration, one estimate of the natural gas resources for Petroleum Exploration Licence 238 in the Gunnedah Basin (covering approximately 9,500 km<sup>2</sup>) has been put at over 35 trillion cubic feet (TCF). Although this is not yet at a status of producible reserves, 1TFC of gas reserves would supply, at current consumption levels, the entire Newcastle-Sydney-Wollongong gas market for approximately 10 years. Pilot plants at Bohena and Wilga Park, to the north of the East Pilliga Forest, are currently producing CSM, and between March 1998 and February 1999 the PEL 238 joint venture expended some \$30 million on the drilling of 15

wells, the acquisition of 484 km of seismic data, two cavity completions and 7 hydraulic fracture stimulations. Significant exploration activity has occurred elsewhere within the region targeting equivalent, or similar, geological units.

While New South Wales does not yet have a commercial conventional gas discovery, the current level of exploration in the Gunnedah Basin, if successful, will yield results that could be significant at three levels:

- at a regional level, by providing opportunities for gas related development and industries in proximity to the gas production wells;
- at State level, by providing incentives for petroleum investment and development in the State increasing royalties, investment in infrastructure and providing opportunities for the development of new industries; and
- at a national level, by reducing the reliance upon black coal fired power within the State and so impacting upon Australia's greenhouse targets and the diversity and stability of gas supply throughout Eastern Australia.

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**ATTACHMENT 1 - FOREST MANAGEMENT AREA, TIMBER COMMITMENTS AND SUPPLY FOR THE SOUTH BRIGALOW ASSESSMENT REGION**

## Timber Commitments and Supply for the South Brigalow Assessment region 1998/99

Management Area	Species	Product	Term & Wood Supply Agreements (m <sup>3</sup> )			Quota Allocation (m <sup>3</sup> )				Short Term Parcel Sale Allocation (m <sup>3</sup> )			
			Allocations in Term & Wood Supply Agreement HQL	Allocations in Term & Wood Supply Agreement HQS	Allocations in Term & Wood Supply Agreement LQ	Short Term Supply Agreements HQL	Short Term Supply Agreements HQS	Short Term Supply Agreements LQ	Short Term Supply Agreements HQL	Short Term Supply Agreements HQS	Short Term Supply Agreements LQ	Short Term Supply Agreements HQL	Short Term Supply Agreements HQS
<b>PILLIGA</b>	<b>Cypress</b>	Cypress Sawlog	27405	4095		16167	2413		800	120			
		Cypress Vine Posts								2000			
	<b>Hardwood</b>	Hardwood Sawlog				700	6300						
		Hardwood Firewood											4000 tonnes
		Didgeridoo								200			
<b>DUBBO / GILGANDRA</b>	<b>Cypress</b>	Cypress Sawlog				1930	150		950	50			
		Cypress Vine Posts								200			
		Cypress Miscellaneous							50	150			
	<b>Hardwood</b>	Hardwood Sawlog							115	1035			
		Hardwood Fencing								950			
		Hardwood Firewood											5450 tonnes
		Didgeridoo								10			
<b>GUNNEDAH</b>	<b>Cypress</b>	Cypress Sawlog				5540	550		235	25			
	<b>Hardwood</b>	Hardwood Fencing								500			
		Hardwood Firewood											800 tonnes
<b>WARUNG</b>	<b>Hardwood</b>	Hardwood Sawlog							600	400			
<b>Total Cypress</b>	<b>62,830m3</b>		<b>27405</b>	<b>4095</b>		<b>23637</b>	<b>3113</b>		<b>2035</b>	<b>2545</b>			
<b>Total Hardwood</b>	<b>10,810m3</b>					<b>700</b>	<b>6300</b>		<b>715</b>	<b>3095</b>			<b>10250 tns</b>

**ATTACHMENT 2 - SOCIAL PROFILING FIGURES FOR THE SOUTH  
BRIGALOW ASSESSMENT REGION**

Please see file titled – “Attachment 2 – Brigalow Social Profiles”

**ATTACHMENT 3 - INDIGENOUS SOCIAL PROFILING FIGURES FOR THE  
SOUTH BRIGALOW ASSESSMENT REGION**

Please see file titled – “Attachment 3 - Brigalow Indigenous Report”.

## ATTACHMENT 4 - STATE FORESTS GRAZING PERMIT CONDITIONS

**Conditions of Occupation Permits (for Grazing of Pasture)****Contents**

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D.	Improvements, goods and chattels may become Crown property	1
E.	Rights to enter the land, conduct activities, and direct the removal of stock	2
F.	Indemnification of the Crown	2
G.	Grazier's legal obligations	3
H.	Rates and levies	3
I.	Noxious plants and animals	3
J.	Diseases of stock and plants, movement of stock	3
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M.	Grazing management guidelines	4
N.	Monitoring of grazing management performance	5
O.	Pasture biomass and grass height assessment	5

**A. Definitions**

the Grazier	the person, persons, or company at the time named on the Occupation Permit as authorised to graze stock on the permit area. <i>Synonyms are: Permittee, Permit Holder</i>
State Forests of NSW	<i>refers to</i> Forestry Commission of New South Wales <u>trading as</u> State Forests of New South Wales.
the Crown	the government of New South Wales or any department or statutory body of the government of NSW.
the area, the land	the land over which the grazing is authorised by the permit, as defined on the permit and attached map.

**B. Limitations**

- 1) The permit shall only be exercised genuinely in the Grazier's own interest and only for purposes specified in the permit. The Grazier shall not transfer, assign, or in any way deal with the permit or any right or interest thereunder without written consent from State Forests of NSW.
- 2) The permit does not grant any rights over public, reserved and forestry roads.
- 3) The land is subject to the Mining Act 1973 provisions relating to land permanently dedicated.

**C. Renewal, Cancellation, Termination**

- 1) State Forests of NSW may decide not to renew the permit or to renew it upon acceptance by the Grazier of amended or varied conditions or at an amended rental. Unless such decision is given at least one (1) month before the annual term expires, the permit may be renewed by payment of the annual rental not later than one (1) month before the annual term expires.
- 2) The rental may be reviewed from time to time by State Forests of NSW and adjusted at intervals of not less than one year, in line with the "Sydney - All Groups" consumer price index (CPI). If rural price index\* movements differ substantially from CPI, adjustments may be negotiated on that basis. \* **Index of prices received by farmers**, in *Australian Commodities*, ABARE (quarterly publication)
- 3) State Forests of NSW, if of the opinion that the Grazier has contravened or failed to comply with any provision or condition of the permit or any provision of the Forestry Act 1916 or the Forestry Regulation 1994, may suspend operation of the permit and may, after affording the Grazier an opportunity to be heard, cancel the permit.
- 4) State Forests of NSW may cancel the permit by giving the Grazier at least one month's notice in writing. If the land or any part thereof is required for any forestry, mining or other public purpose, State Forests of NSW may withdraw forthwith the permit wholly or in part, with no minimum notification period. The Grazier shall not be entitled to any compensation in respect of any such cancellation or withdrawal. A reasonable reduction of the annual rental will be allowed. Where the Grazier has effected improvements on such land with the written consent of State Forests of NSW, State Forests of NSW may allow such fair and reasonable payment as it thinks fit as compensation for the Grazier's interest in those improvements.

**D. Improvements, goods and chattels may become Crown property**

- 1) Upon expiration, surrender or cancellation of the permit for any reason, all improvements on the land become Crown property with no compensation payable for them, unless approved otherwise in writing by State Forests of NSW.
- 2) On application within one (1) month after such expiration surrender or cancellation, State Forests of NSW may allow the former Grazier to remove from such land any movable improvements effected by or at the expense of the former Grazier. If directed by State Forests of NSW in writing to do so the former Grazier shall remove any structure or material from the land at his own cost and without compensation. In all cases where such permission or direction has been given, the movable improvements or structures or material, as the case may be, shall be removed within such time as State Forests of NSW may specify.
- 3) Upon the expiration of three (3) months after the date of expiration, surrender or cancellation of the permit, all goods and chattels belonging to the Grazier and remaining

upon the land are forfeited and become Crown property, unless otherwise approved by State Forests of NSW.

#### **E. Rights to enter the land, conduct activities, and direct the removal of stock**

- 1) State Forests of NSW may, without incurring liability to pay compensation therefore to:
  - (a) direct the removal of all or any animals from the land or any part thereof, at such time and periods as State Forests of NSW may determine. A refund of proportionate rental shall be made for the period of such removal.
  - (b) grant to any persons permits to occupy the land or any part thereof for bee farming. State Forests of NSW shall not be liable for any damage done by bees to animals grazing on the land.
  - (c) improve or protect timber either by scrubbing, clearing, ringbarking, slashing, thinning or burning, and carry out all forestry operations in such manner and times as considered advisable.
  - (d) search for, dig, raise, gather, take and carry away materials, including rock, stone, clay, shells, earth, sand, gravel or any like material.
  - (e) use for the purpose of fighting fires any water supplied to or being on the land.
- 2) All persons authorised under the Forestry Act 1916 or Forestry Regulation 1994 have full right to enter upon the land at any time within reasonable hours to conduct authorised activities - for example cutting and removing timber, products or forest materials. The Grazier shall provide convenient gateways or openings as directed by State Forests of NSW, to assist such activities.
- 3) The public may enter the land for legal recreational or educational pursuits and activities.
- 4) The Crown and State Forests of NSW and bodies authorised by State Forests of NSW may enter upon the land with any material and equipment at any time to maintain and construct any duly authorised works. This might be to construct and maintain roads, crossings or firebreaks, either by clearing burning or any other method, at such times and in such positions as may be considered necessary.
- 5) No compensation is payable to the Grazier for activities described in this section [E.]. The Grazier shall not interfere with such activities or annoy persons undertaking them.

#### **F. Indemnification of the Crown**

- 1) The Grazier shall release to the full extent permitted by the law and shall keep indemnified the Crown and State Forests of NSW and their agents, officers and employees from and against all actions, suits, claims and demands of any kind and all costs charges and expenses in respect of loss, damage or injury to any person or property arising out of or in any way connected with any activity authorised by this permit. This applies even to loss, damage or injury arising from any act or thing which the Grazier may be authorised or compelled to do by the permit's conditions.
- 2) Nothing herein shall exclude the Crown or State Forests of NSW from liability for any loss, damage or injury due to the negligent act or omission of the Crown or State Forests of NSW.

#### **G. Grazier's legal obligations**

The Grazier should comply with the provisions of every statute, ordinance, regulation or by-law relating to the said land or the Grazier's use thereof and with the requirements of State Forests of NSW and of any local or other authority with regard thereto.

#### **H. Rates and levies**

- 1) During the currency of the permit the Grazier shall pay all rates fees and charges under the Local Government Act 1993, upon the land.
- 2) During the currency of the permit the Grazier shall pay all rates fees and charges under the Rural Lands Protection Act 1989, upon the land.

#### **I. Noxious plants and animals**

- 1) The Grazier shall effectively control or eradicate as required under the Noxious Weeds Act 1993 all plants declared noxious in the Order under that Act.
- 2) The Grazier shall take effective steps to destroy rabbits, wild dogs, dingoes, wild pigs, foxes and other animals declared noxious under the Rural Lands Protection Act 1989 and shall continue to do so during the whole term of the permit to the satisfaction of State Forests of NSW.

#### **J. Diseases of stock and plants, movement of stock**

- 1) Each time stock are moved onto the forest, the Grazier should ensure they are free of seeds of noxious plants (particularly burrs) by inspecting each animal before it enters the forest.
- 2) The grazier should ascertain the disease status of all animals proposed to be moved onto the forest. No animal known or suspected to carry or be infected with the following diseases is to be moved onto the forest by the Grazier.
  - a) cattle    bovine Johne's disease
  - b) sheep    ovine Johne's disease, footrot, lice
- 3) The grazier should promptly notify the District Forester of any suspicions that any of the stock in the forest may have Johne's disease, footrot or lice. The grazier should immediately seek, from a Rural Lands Protection Board (RLPB) Inspector or District Veterinarian (Vet), confirmation of the presence or absence of any of these conditions.
- 4) If diseased stock are detected, this shall be reported to the Department of Agriculture, to be dealt with in terms of the Stock Diseases Act 1923. Unless an alternative plan is agreed by the grazier, the District Forester and a RLPB Inspector/District Vet, the grazier will within one (1) month of confirmation of the condition's presence destock all cattle and sheep from the Permit area. The stock will be taken to another property for treatment or an abattoir for slaughter, as approved by the District Vet, and the action reported promptly to the District Forester.
- 5) Any stock found on the permit area beyond one month after destocking will be considered "abandoned". The grazier has no further claim on them, and they may be dealt with as advised by an inspector under the Stock Diseases Act 1923 at the discretion of State Forests of NSW.
- 6) The Grazier shall abide by the provisions of the Plant Diseases Act 1924.

#### **K. Fences and stock containment**



- 1) The Grazier shall take all reasonable steps to prevent the Grazier's stock from straying from the permit area or becoming a nuisance to adjoining or nearby landholders.
- 2) All fences shall be maintained in a satisfactory stockproof condition. The Grazier shall be solely responsible for the routine maintenance of the permit area's internal fences, and boundary fences that adjoin unoccupied lands. Where boundary fences adjoin occupied land, the Grazier shall be responsible for routine fence maintenance in equal share with the adjoining occupier. Routine maintenance does not include renewal or major reconstruction.
- 3) The Grazier shall not erect any additional fencing on the land in any manner or effect any other improvements whatsoever without the written consent of State Forests of NSW.

#### **L. Fire, vegetation, Crown improvements**

- 1) The Grazier shall take every reasonable precaution to prevent damage by fire on the State Forest mentioned in the permit and shall immediately report the outbreak of fire to the nearest forest officer and render assistance in extinguishing fire or preventing the spread of fire on such lands. Burning off may only be done on the area by the Grazier or his employee with the permission of the District Forester and under control of that officer or his Deputy and in compliance with the requirements of the Bush Fires Act 1949, the Forestry Act 1916 and Forestry Regulation 1994.
- 2) The Grazier shall not interfere with any trees or saplings unless in pursuance of a clearing license or other authority issued by State Forests of NSW.
- 3) The Grazier shall keep any improvements the property of the Crown upon the land in good repair, fair wear and tear excepted. The Grazier shall not remove any Crown improvements.

#### **M. Grazing management guidelines**

- 1) Unless otherwise authorised in writing by the District Forester, the Grazier should adjust stock numbers in response to the vegetation parameters as detailed below. Assessment of biomass and height will be determined by State Forests in the event of contention, as detailed in section O.
  - (a) the pasture biomass is to be not more than 1500kg/ha drymatter (in open grassy patches) by 30th November each year, or 10 weeks after the flood recedes if the area has been flooded beyond mid September.
  - (b) domestic stock should be removed whenever the pasture biomass is below 500kg/ha drymatter (in open grassy patches) or the pasture height is below 5cm leaf height (highest part of leaf of palatable native grasses, or of exotic grasses where natives are not present).
  - (c) forage supplements (eg hay) are not permitted. Mineral supplements are permitted.
  - (d) no seed is to be introduced into the area unless it is of the preferred native perennial species, and only then with the District Forester's written approval.

#### **N. Monitoring of grazing management performance**

- 1) Visual inspections should be made monthly by the grazier, and more frequently as critical points are approaching. Quadrat sampling and use of a Photostandards may be useful. Forward planning by the grazier is needed so that adjustments to stocking numbers can be scheduled as and when required by the grazier or the vegetation parameters.

- 2) State Forests will monitor compliance with the biomass and height targets, and will liaise with graziers as the need for adjustment to stocking levels becomes apparent.
- 3) The grazier is responsible to achieve the targets. State Forests of NSW may assist through timely advice. Permit cancellation would be reserved for cases of persistent non-compliance, gross negligence or misconduct. The District Forester, being responsible for management of the State Forest, has discretion in resolving imbalances between the targets in the above guidelines, and grazier preferences. In general, the minimum targets are firm, whilst some latitude might occasionally be exercised with the maximum target depending on seasonal conditions.

#### **O. Pasture biomass and grass height assessment**

For reliable consistent results the biomass should be monitored in the open grassland areas with reference to photostandards using 0.5m<sup>2</sup> quadrats (sides 70.7cm long). At each site a representative area (say 1hectare) should be sampled with a 15m grid of 0.5m<sup>2</sup> quadrats (giving around 45 quadrats) with the biomass estimated and average grass height measured, and recorded for each quadrat.

Grass height at each quadrat is taken as the average height to the heighest part of green leaf of each tussock of the more palatable native perennials (eg wallaby grass and curly windmill grass, or spear grass if the others are not present) within the quadrat (or of exotic grasses if no natives are present). If none of these tussocks are present in a quadrat, the observer may make an assessment of the material present in the quadrat, or ignore that quadrat for the grass height measure.

The biomass and grass height from each quadrat at the site are then averaged to give the site estimates. These estimates can then compared to the grazing strategy targets.

Where the grassy areas are small and scattered or patchy, or where a broad indicative result would suffice, a less formal use of the quadrats may suit. A casual walk through the patch, tossing the quadrat a few paces in front at 10 to 20 spots reasonably evenly distributed across the area would provide a rough estimate of the biomass there.

- Preferred sites are:
- i) Open grassy areas.
  - ii) At an intermediate distance from waterholes: 0.6 - 1.4 km from water, depending on the size of the compartment.

How many sites are selected will depend on the boundaries of each grazier's area, and how many fenced management units exist. Units may exist that do not have large open grassy areas, and the selection of sites there would need to seek the most appropriate places to meet the aims.