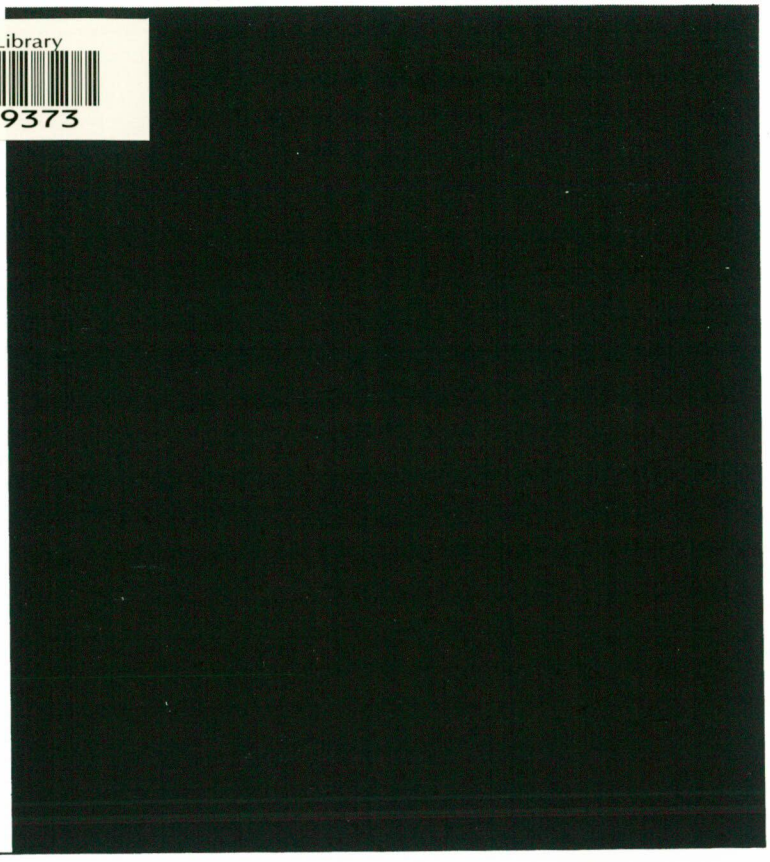
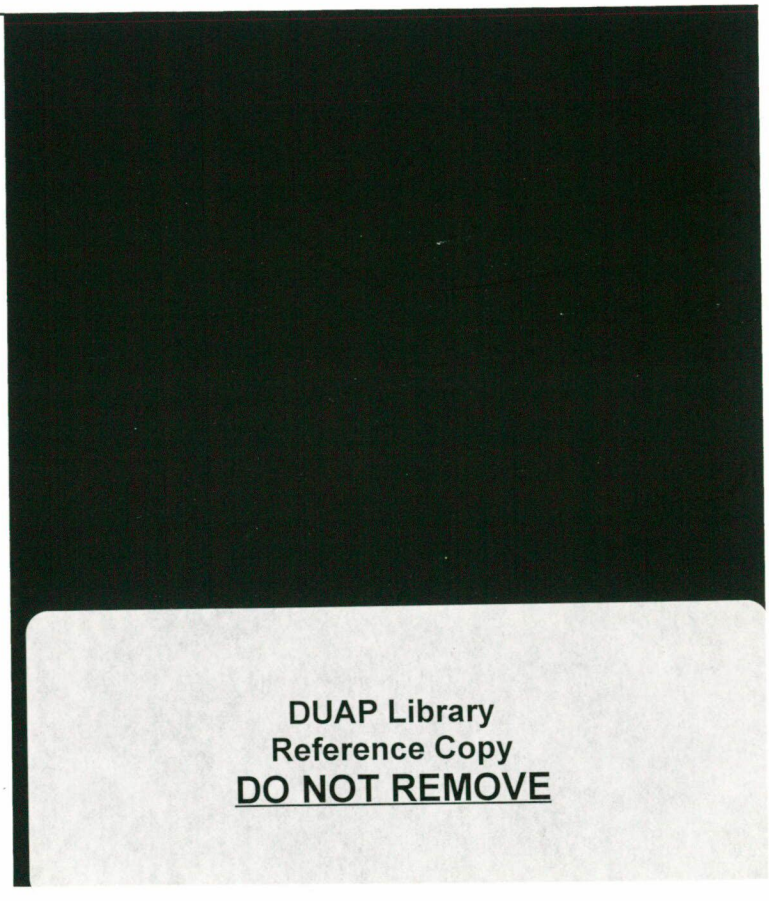


A report on forest wood resources for Southern NSW CRA Region

A report undertaken for the NSW CRA/RFA Steering Committee
December 1999



A REPORT ON FOREST WOOD RESOURCES FOR SOUTHERN NSW CRA REGION

This report was compiled by the
Bureau of Rural Sciences
and
State Forests of NSW

A project undertaken for
the Joint Commonwealth NSW Regional Forest Agreement Steering Committee
as part of the
NSW Comprehensive Regional Assessments
project number NS19/ES

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Acknowledgments
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CONTENTS

Figures

Tables

Maps

PROJECT SUMMARY

This report describes a project undertaken as part of the comprehensive regional assessments of forests in New South Wales. The comprehensive regional assessments (CRAs) provide the scientific basis on which the State and Commonwealth Governments will sign regional forest agreements (RFAs) for major forest areas of New South Wales. These agreements will determine the future of these forests, providing a balance between conservation and ecologically sustainable use of forest resources.

This report was undertaken to provide an understanding of the timber industry and minor forest produce industry in the Southern NSW CRA region. The information contained in this document relates to products and species. The document contains an introduction outlining timber supply commitments from State forests in the Southern CRA Region, followed by a description of forest harvesting, the hardwood resource usage, private forest and plantation management.

1. INTRODUCTION

1.1 AIM OF THE DOCUMENT

This report provides a description of the forest resource within the Southern CRA region. It describes the commercial forest types, the volumes and species of timber harvested, and the products produced from harvesting.

1.2 DESCRIPTION OF MANAGEMENT UNITS

The forest resources in the Southern CRA region are split into the three sub-divisions: South Coast, Tumut and North. While the North resource has almost no hardwood sawlog production at present, it is still being mapped and included in the resource descriptions. Both the North and Tumut sub-divisions encompass a significant softwood resource.

In addition to the three sub divisions, the forest resources can be described along existing State Forests of NSW (SFNSW) management units also known as management areas. These differ slightly from the timber catchment zones described in the SFNSW report Timber Priority Zoning, however, it provides a consistent description within this report by management area.

2. FOREST RESOURCE

2.1 GENERAL FOREST DESCRIPTION

The Southern CRA region of NSW, contains a mosaic of different forest types varying from the Alpine Ash forests of the Tumut/Tumbarumba region through to the moist Spotted Gum forests of Batemans Bay. Some types are dominated by a single species, but most are a mixture of eucalypts. These forest types give rise to either wet or dry sclerophyll forests. Description of forest types was obtained from 'Research Note 17 Forest Types in NSW' (Forestry Commission of NSW, 1989), 'Forest Trees of Australia' (Boland et al, 1984) and 'A Report on Forest Wood Resources and Wood Based Industries in the Eden CRA Region' (BRS, 1998). The forest types are shown as forest yield associations in Maps 2b to 2d for each of the sub-divisions, with Map 2.a showing the forest tenure for the Southern CRA region. Tables 2.A to 2.C provide the areas of the yield associations by tenure and by sub-division.

2.1.1 Blackbutt

The forest types dominated by Blackbutt (*Eucalyptus pilularis*) are found primarily along the coast, being most extensive between Milton and Jervis Bay. In the Southern CRA region, these types cover an area of approximately 42 600 hectares. Blackbutt is a commercially important species of the South Coast sub-division, see Map 2.b. Moist and dry stands of Blackbutt forest types are usually composed of between 50 to 100 percent of Blackbutt, with mixed composition of other commercially desirable eucalypts, such as, Red Mahogany (*E. pellita*), Sydney Blue Gum (*E. saligna*), Grey Ironbark (*E. paniculata*), Bangalay (*E botryoides*), Yellow Stringybark (*E. muellerana*) and Woollybutt (*E. longifolia*). Non-eucalypt associates of Blackbutt includes Red Bloodwood (*Corymbi. gummifera*), Roughbark Apple (*Angophora costata*) and Turpentine (*Syncarpia glomulifera*). Dry Blackbutt stands tend to occur along ridges and exposed slopes, while the less widespread Moist Blackbutt stands are found along south-facing slopes, in sheltered areas and can attain heights up to 45 m.

On coastal sites where there are deep sand deposits, Blackbutt dominates in tall dry forests or can be on poorer sites widely associated with Bloodwood, Grey Ironbark and Roughbarked Apple. Blackbutt also characteristically occurs with Sydney Peppermint and Smoothbarked Apple on the bottom and lower gully slopes of sandstone areas, with heights reaching 35 m and 20 m respectively. On more marginal sites, Blackbutt and Spotted Gum (*C. maculata*) occur together and are usually found with a number of other eucalypt species.

2.1.2 Gum

Gum dominated forest types cover an area of about 225 300 hectares, from the South Coast to the north sub-divisions of the Southern CRA region. There are a wide range of gum dominated

forest types and their associations vary from wet to dry sclerophyll forests. Mountain Gum / Manna Gum (*E. dalrympleana* and *E. viminalis*) stands occur over a very wide range of environmental conditions in the tablelands forests, although favour moist sites. These stands can occur as a wet sclerophyll forest attaining heights of 35 m as well as a dry sclerophyll forest associated with Narrowleaved Peppermint (E. radiata). Manna Gum – Stringybark forests are often dry sclerophyll tableland forests reaching only 18 m in height on soils of lower fertility but up to 30 m otherwise.

Two peppermints types are included in this association, Gully Peppermint (*E. smithii*) and River Peppermint (*E. elata*). Gully Peppermint occurs with Yellow Stringybark, and various Brown Barrel and Messmate types along the foothills and the escarpment zone of the tablelands. It generally forms a wet sclerophyll forest extending along gullies up to the ridges. On creek banks, pure stands of River Peppermint are characteristically found with stands usually forming a wet sclerophyll forest reaching heights of up to 40 m. They tend to occupy alluvial flats although can extend from gullies up to the ridges.

Candlebark (*E. rubida*) dominated stands are found throughout the tablelands usually forming a savannah woodland and reaching heights of only 20 m. eg Berridale district. Gum – Box – Stringybark stands usually occur as dry sclerophyll forest reaching less than 25 m in height. They occur on the drier ridges and slopes of the coast and adjacent foothills.

2.1.3 Sydney Blue Gum

Small patches of Sydney Blue Gum (*E. saligna*) stands are found along the coast of the Southern CRA region and cover about 16 800 hectares. Sydney Blue Gum usually composes greater than 50 percent of the stand and occasionally can comprise the entire stand. Species commonly associated with it include, Blackbutt, Bangalay, Spotted Gum and Turpentine, It can reach up to 35 to 45 m in height, in wet fertile conditions, but can be somewhat shorter on drier sites. A grassy understorey can occur on sites frequented by fire, while an understorey of rainforest species will develop where fire is absent.

Turpentine stands form part of this association where stands are constituted 50 per cent or more by Turpentine. These stands are usually wet sclerophyll forests between 20 m and 45 m in height and tend to favour sheltered gullies around the coastal and escarpment zones.

Bangalay stands are associated with Sydney Blue Gum, Turpentine, Red Bloodwood , Monkey Gum (*E. cypellocarpa*)and other species. It replaces Sydney Blue Gum in the more moist, sheltered gullies of the coastal zone. Attaining a height of around 30 m, it is usually a wet sclerophyll forest. On deep sandy soils, small trees of Banksia (*Banksia sp.*) can be found associated with Bangalay.

2.1.4 Spotted Gum

Spotted Gum (*Corymbia maculata*) is the most important commercial species of the South Coast sub-division, see Table 2.B. Spotted Gum stands can occur either as a pure stand or as a mixed stand of a variety of eucalypts. The understorey may be either dense, consisting of *Macrozamia sp.* or it may be an understorey of grasses and shrubs. Major associates of Spotted Gum include Sydney Blue Gum, Bangalay, Ironbarks, Stringybarks and Blackbutt. These stands covering an area of about 115 700 hectares, are found along the coastal areas of the Southern CRA region, with large patches around Batemans Bay. Stands dominated by Spotted Gum usually occur at elevations lower than 300 m and along valley slopes or ridges depending on soil moisture. Height varies depending on the site, with favourable conditions reaching 45 m

and poorer sites attaining only 25 m. It occurs on a variety of soil types of heavier texture, with a rainfall between 750 to 1250 mm.

Spotted Gum and either Sydney Blue Gum or Bangalay can dominate in some stands. These usually form a wet sclerophyll forest with a dense understorey of wattle and rainforest species. On the more favoured sites, the stands can attain heights of 45 m. On sites where there is heavily drained, shallow soiled ridges, Spotted Gum and Ironbark (*Eucalyptus sp.*) stands tend to occur.

Spotted Gum - Stringybark stands are usually wet sclerophyll in nature and are found on high quality sites on south-easterly aspects. They have a dense understorey and serve as a link between Spotted Gum associations and Messmate-Brown Barrel *(E. obliqua-E. fastigata)* associations. Yellow Stringybark and White Stringybark are the most common Stringybarks.

2.1.5 Silvertop Ash

Silvertop Ash (*E. sieberi*) usually occur as pure stands however it can also be found associated with a mixture of eucalypts including Peppermints, Stringybarks and White Ash (*E. fraxinoides*). This type covers approximately 182 800 hectares in the Southern CRA region. Where Silvertop Ash dominates, it can reach a height of 30 m in dry sclerophyll forests while a height of 40 m can be attained for wet sclerophyll forests with occurrence mainly along ridgetops. Its distribution is around the South Coast and Tumut sub-divisions. Silvertop Ash - Peppermint stands (usually Narrowleaved, Broadleaved (*E. dives*) and Sydney (*E. piperita*)) have the same general distribution as pure Silvertop Ash stands but are not as well developed and rarely exceed 30 m in height.

Silvertop Ash – Stringybark stands are generally found in the same localities as pure Silvertop Ash. Occasionally they form wet sclerophyll forests reaching 40 m in height but usually they occur as dry sclerophyll forests. White Ash stands are usually pure stands although occasionally are associated with Silvertop Ash and a mix of other eucalypts. These stands tend to occur in the moist escarpment zone on steep slopes and fringing elevated peaks.

2.1.6 Stringybark

Stringybark dominated stands are widely distributed around the Southern CRA region but are particularly predominant along the coastal zones. Common stringybark species are yellow, white and blue–leaved (*E. agglomerata*) and to a lesser extent red (*E. macrorhyncha*). They cover an area of about 194 800 hectares in the Southern CRA region and are associated with a diverse mix of eucalypts. Grey Ironbark – Stringybark stands are commonly co-dominant and occur on both moist slopes and dry exposed ridges. It forms either a wet or dry sclerophyll forest and reaches up to 40 m in height. Occasionally, Ironbark may tend towards complete dominance

Other common associates with Stringybark are Sydney Peppermint, Turpentine, Red Bloodwood, Monkey Gum and Maidens Gum (*E. globulus ssp. maidenii*). Sydney Peppermint co-dominant stands are common on the upper slopes of sandstone gorges, and reach heights of only 20 m. Where Sydney Peppermint clearly dominates, heights can attain between 20 to 35 m. Red Bloodwood and Turpentine associated stands are found in more sheltered sites and usually reach 30 m height. White Stringybark is commonly associated with Maidens gum on ridges changing to Monkey Gum on more sheltered sites.

White Stringybark is commonly found on poor dry ridges, attaining 20 - 30 m in height. It regularly occurs around the South Coast sub-division. Yellow Stringybark stands are found on

a variety of site qualities, ranging from a wet sclerophyll forest of 40 m height in moist coastal sites to a drier sclerophyll forest of lower height on dry ridge tops.

2.1.7 Coastal Grey Box – Forest Red Gum – Woollybutt

Coastal Grey Box (*E. bosistoana*), Forest Red Gum (*E. tereticornis*) and Woollybutt stands are scattered along the coastal zone of the Southern CRA region and the eastern edge of the North sub-division and cover an area of approximately 104 500 hectares. Woollybutt dominated stands tend to form dry sclerophyll forests reaching a height of 30 m, is found along ridges on moist sites and are usually adjacent to high quality forest types.

Forest Red Gum occurring with Roughbarked Apple and/or Grey Ironbark can form a forest up to 35 m in height, with a grassy understorey. Coastal Grey Box and Forest Red Gum reaching heights of 30 m, may dominate on drier coastal areas where soils are heavy and periodically waterlogged. Coastal Grey Box – Woollybutt stands can occur as either wet or dry sclerophyll forest with height varying from 25 to 30 m. Coastal Grey Box and either Mountain Grey Gum or Maidens Gum are found on drier slopes and ridges of coastal Southern NSW. These are usually dry sclerophyll forests, attaining heights of 25 m.

2.1.8 Apples

Smoothbarked Apples (*Angophora floribunda*) may occur as a dominant species within a stand but are usually found as one of many species co-dominating a stand. Along the coast it is associated with Stringybarks, Red Bloodwood and White Mahogany, while further inland it is commonly associated with various Cypress Pines (*Callitris sp.*) and Tumbledown Gum (*E. dealbata*). On sandstone formations, Smoothbarked Apples commonly co-dominate with Sydney Peppermint and Stringybark (usually White or sometimes Brown (*E. blaxlandii* and *E. capitellata*). This association ranges in height from 12 m to approximately 35 m depending on the site. A similar association has Smoothbarked Apple and Stringybark with only occasional Peppermint and occurs on ridgetops, with a low height of 15 m.

Rough-barked Apples have a widely scattered distribution throughout the Southern CRA region. Stand height is usually below 15 m and is commonly associated with Banksias (*Banksia sp.*).

2.1.9 Alpine Ash

Alpine Ash (*E. delegatensis*) has a scattered distribution in the Tumut sub-division, covering an area of approximately 103 400 hectares, with substantial areas north-east of Tumbarumba in the Bago and Maragle State forests. Alpine Ash is the main commercial species in these forests, with up to 8 700 hectares of nearly pure ash stands and another 4 900 hectares of ash/mixed gum stands.

Alpine Ash forms a wet sclerophyll forest of mostly pure Alpine Ash, with a low shrubby understorey. It favours moist, sheltered sites at altitudes between 900 m and 1500 m, and can reach a height of up to 55 m. Alpine Ash is a commercially valuable species and timber quality is influenced by fire management. On less favourable sites, Alpine Ash is associated with Mountain Gum or to a lesser extent Manna Gum and Narrow leaved Peppermint.

2.1.10 Brown Barrel – Messmate

Brown Barrel (*E. fastigata*) and Messmate (*E. obliqua*) stands are scattered throughout the tablelands and cover approximately 145 700 hectares in the Southern CRA region. Messmate stands are dominated by Messmate with Narrowleaved Peppermint as an associate. Other species associated with this forest type include Mountain Gum, Silvertop Ash, Brown Barrel, Monkey Gum, and Manna Gum. Brown Barrel-Messmate co-dominant stands are usually wet sclerophyll forests rarely under 30 m height and occasionally over 50 m in height. They are found particularly in the escarpment zones where they are a valuable timber producing type. Manna Gum or Monkey Gum can also co-dominate or dominate over Messmate, and generally occupy the drier sites on shallower soils reaching heights of up to 25-35 m.

Brown Barrel and Messmate stands are valuable for timber production and are found particularly on fertile soils, where adequate moisture is available, and in the escarpment zones. These forests occasionally reach over 40 m on the best sites and usually occur above 600 m in altitude.

Brown Barrel occurs as a clear dominant in wet sclerophyll forests and can achieve heights of 45 m on the more favourable sites (ie. deep moist fertile soils, in sheltered situations). A dense understorey of rainforest species usually occurs with these forests. On poorer sites such as ridgetops, other species such as Messmate, Peppermints and a number of Gums are associated with Brown Barrel. In the Buccleuch State forest (Tumut sub-division), the mixture of species includes Peppermint, Mountain Gum, Manna Gum, Brown Barrel and occurrences of Alpine Ash.

2.1.11 Peppermint – Scribbly Gum

There are many associations with Peppermint and Scribbly Gum (variety of eucalypts including *E. haemastoma, E. racemosa, E. rossii, E. sclerophylla* and *E. signata*). On poor, shallow-soiled slopes and ridges, Scribbly Gum can be found with various Stringybarks, Candlebark, Argyle Apple (*E. cinerea*) and Silvertop Ash with Brittle Gum (*E. mannifera*) dominating. On more favourable sites Peppermint (usually Narrowleaved) co-dominate with Brittle Gum.

Stands dominated by Peppermint (Narrowleaved, Broadleaved or Wattleleaved (*E. acaciiformis*)) are common on poor, dry, shallow slopes and ridges, with low heights of under 20 m. Scribbly Gum dominated stands can occur either as pure stands or associated with other species including Brittle Gum, Bloodwoods and Stringybarks. Scribbly Gum dominated stands prefer low fertility sites with poor drainage. Scribbly Gum can also co-dominate with Silvertop Ash, Bloodwood or Snow Gum. The Snow Gum co-dominant association is found at fairly high altitudes on soils of low fertility.

Red Stringybark (*E. macrorhyncha*) dominated stands tend to occupy ridges and dry slopes. It is usually found with Black Cypress Pine (*Callitris endlicheri*), Broadleaved Peppermint, Brittle Gum, Longleaved-(*E. goniocalyx*), Yellow-(*E. melliodora*), Red-(*E. polyanthemos*) and White-(*E. albens*) Boxes, and Scribbly Gum. Height varies between 12 and 25 m. On sites of low fertility, Red Stringybark and Scribbly Gum/Brittle Gum tend to co-dominate, with heights under 18 m.

Another associate of Scribbly Gum is Yertchuk (*E. consideniana*) which is found on the escarpment zones, occurring on dry, shallow soils of low fertility, particularly on ridgetops and exposed slopes. Blackbutt stands in low fertility areas, are commonly associated with Scribbly Gum. These stands are usually dry sclerophyll with an understorey of Black Oak

(*Allocasuarina littoralis*) and various xeromorphic shrubs. They reach up to 30 m height and generally occur on low fertility sites.

2.1.12 Western Box – Red Gum

There are a wide range of Box and Red Gum (*E. camaldulensis & E. teriticornis*) forest types within the Southern CRA region. Red Box dominated stands occur on fairly dry sites, rarely reaching over 18 m height. Apple Box (*E. bridgesiana*) associations approach the savannah woodland type of structure, occupying broad valley-floors and gentle slopes. Longleaved Box is similar to Apple Box but occurs on shallower and drier soils and usually above 600 m altitude.

Yellow Box – White Box – Red Gum associations are typically savannah woodland communities, occurring on fairly deep soil of moderate to high fertility and rainfall between 450 and 750 mm. Yellow Box dominated stands occur in scattered locations on deep, light textured fertile soils. They provide shade, honey, firewood and other farm timber. Yellow Box is commonly associated with Blakely's Red Gum (*E. blakelyi*) and can occur as either a tall or savannah woodland, on undulating topography with heights up to 25 m. Soils are deep, of moderate fertility and fairly well drained. Yellow Box – White Box stands occur under similar conditions to the previous association, with similar structure, but occur on lower rainfall sites or more excessive soil drainage.

White Box – Western Boxes (group name covering many *Eucalyptus sp.*) association provide a link between the Yellow Box – White Box – Red Gum forest types and the Western Box – Ironbark forest types. This association forms a savannah woodland. White Box and Stringybark dominated stands occur on more skeletal soils while on more favourable sites White Box tends to dominate.

Red Gum – Stringybark dominated stands occur on shallow, skeletal soils. They are normally associated with Roughbarked Apple, Black Cypress Pine, Red Ironbark (*E. sideroxylon*), Yellow and White Box, and Western New England Blackbutt (*E. andrewsii*).

River Red Gum (*E. camaldulensis*) is the most pure forest stand in the Southern CRA region with an understorey of grasses, sedges and rushes. Height ranges from 12 to 30 m and has a savannah woodland structure. It occupies river flats subject to periodic flooding. On sites where less flooding occurs, River Red Gum can be associated with Black Box (*E. largiflorens*) or Coolabah (*E. microtheca*).

Red Ironbark dominated forest types usually occur around the 400 mm rainfall zone and are normally of fairly pure composition. However, it can also be associated with Red Gums and the Western Boxes. These forest types form a rather poor dry sclerophyll forest.

2.1.13 Snow Gum

Snow Gum (*E. pauciflora*) and the related Black Sallee (*E. stellulata*) forest types are found in the highest and coldest parts of the Southern CRA region. They have limited value for timber production but provide more of a protective function. The structure varies from subalpine and savannah woodland through to dry sclerophyll forest to wet sclerophyll forest, with woodland being the most common. They occur on a wide range of sites but prefer heavy soil with prolonged waterlogging. Tallaganda State Forest has Shining Gum as a dominant in these stands.

2.1.14 Rainforest

The rainforest group consists of some 24 forest types, all with a complex structure and luxuriant appearance. It is typically a mixed composition of moisture loving trees, with an absence of eucalypts. Buttresses, fluted stems, lianes, stranglers and vascular epiphytes are usually present.

Warm temperate rainforests are found along the coastal areas of the South Coast sub-division in sheltered positions of low altitude. These forests are dominated by Lilly Pilly (*Acmena smithii*) in association with Grey Myrtle (*Backhousia myrtifolia*), with an assortment of climbers. Ferns (*Pteris sp.*) form a dense ground layer.

2.1.15 Non Forest

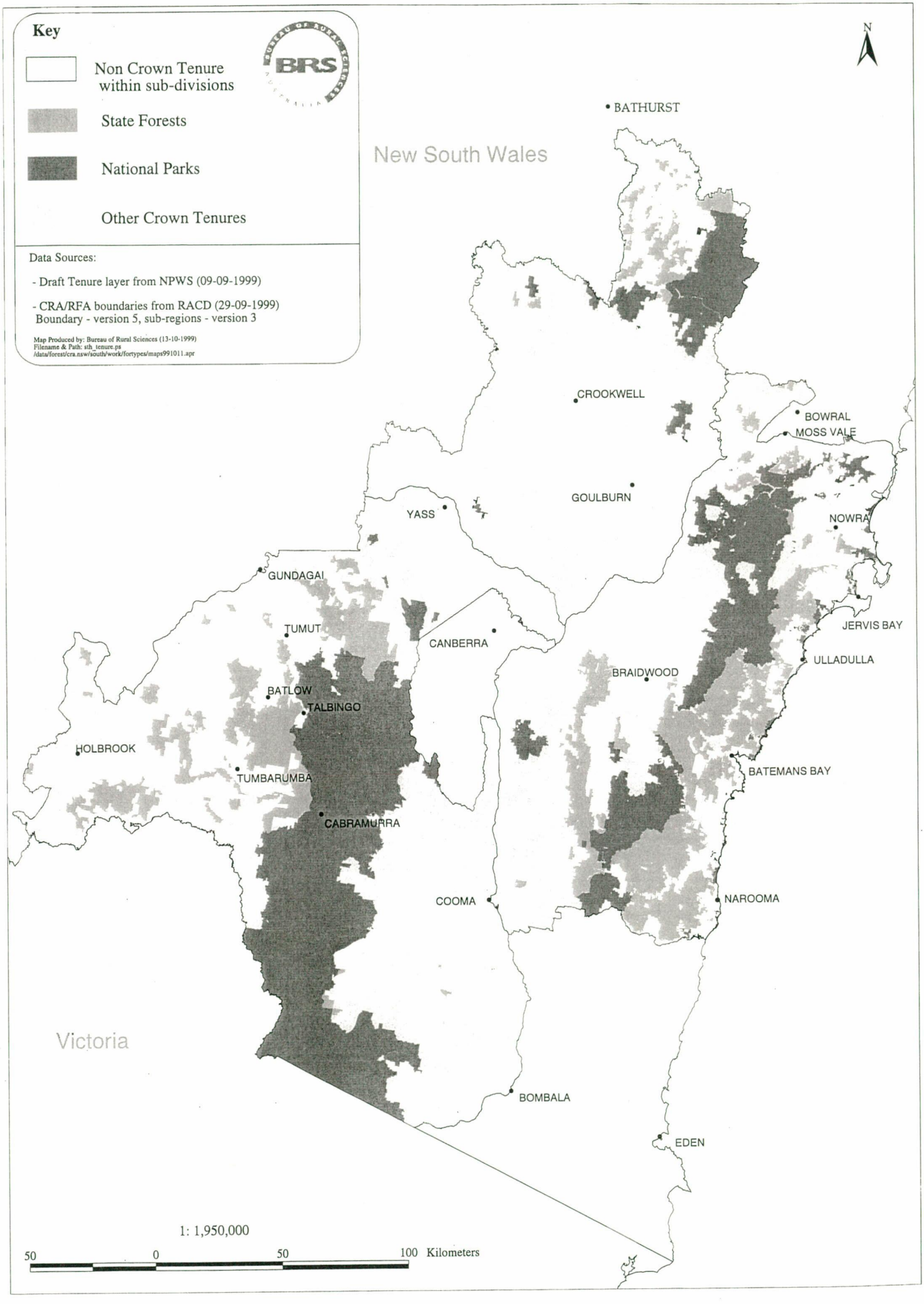
Non forest of 2 909 800 hectares covers a diverse range of vegetation and non-vegetation groups including:

- improved pasture and cropland;
- settlements;
- roads, gravel pits;
- cleared/partially cleared;
- introduced scrub;
- heath; scrub;
- mallee;
- grass tree;
- natural grassland;
- swamp;
- herbfield and fjaeldmark;
- sand ridge;
- rock; and
- water surfaces.

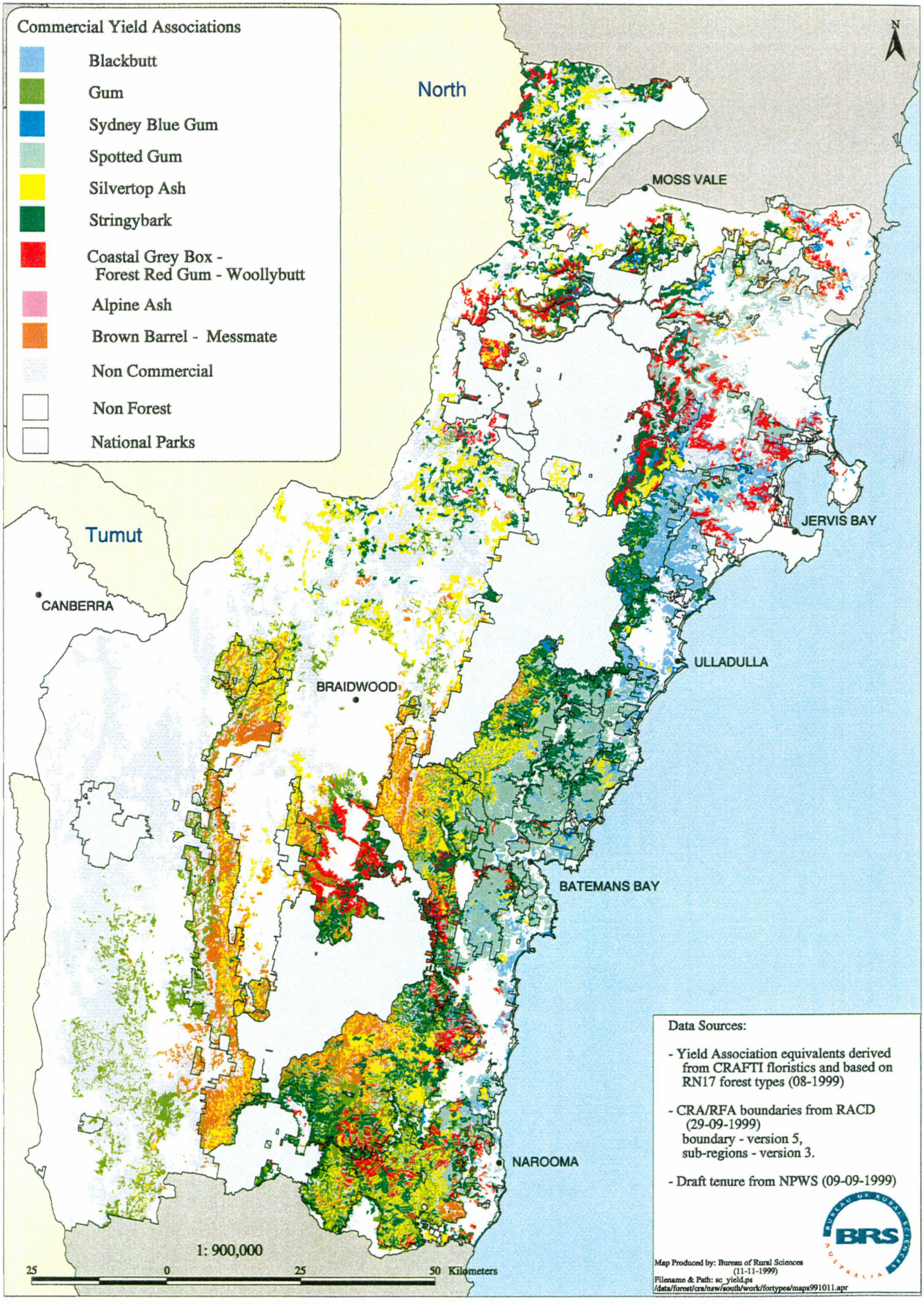
2.1.16 Plantations

The Southern CRA region currently has about 180 000 hectares of plantation, comprised mostly of Radiata Pine (*Pinus radiata)* in the Moss Vale and Tumut/Oberon areas. Further information on the plantations of Southern CRA region will be discussed in Chapter 6.

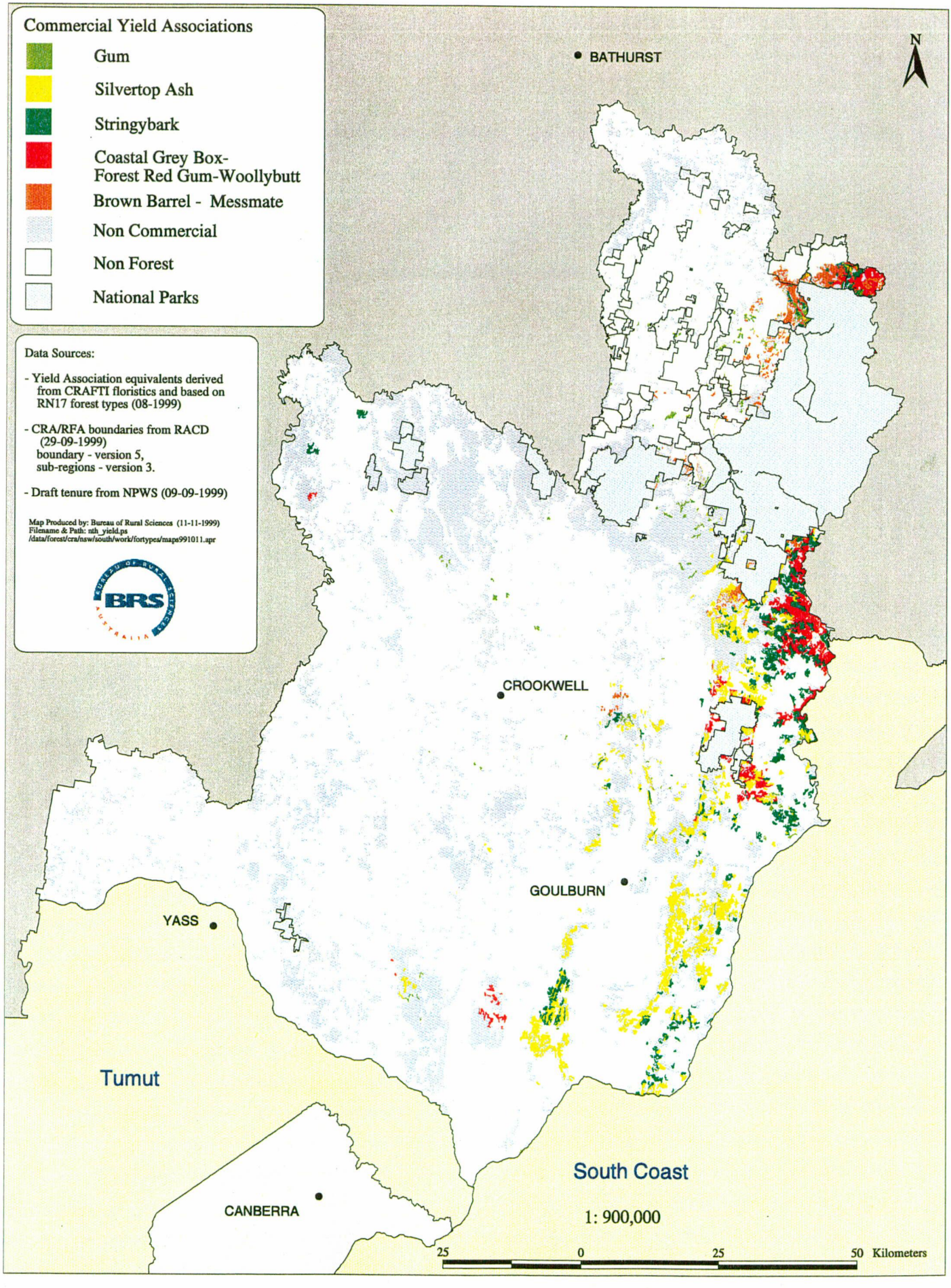
Map 2a - Tenure for the Southern CRA Region.



Map 2b - Commercial Yield Association for the South Coast Sub-Division



Map 2c - Commercial Yield Association for the North Sub-Division



Map 2d - Commercial Yield Association for the Tumut Sub-Division

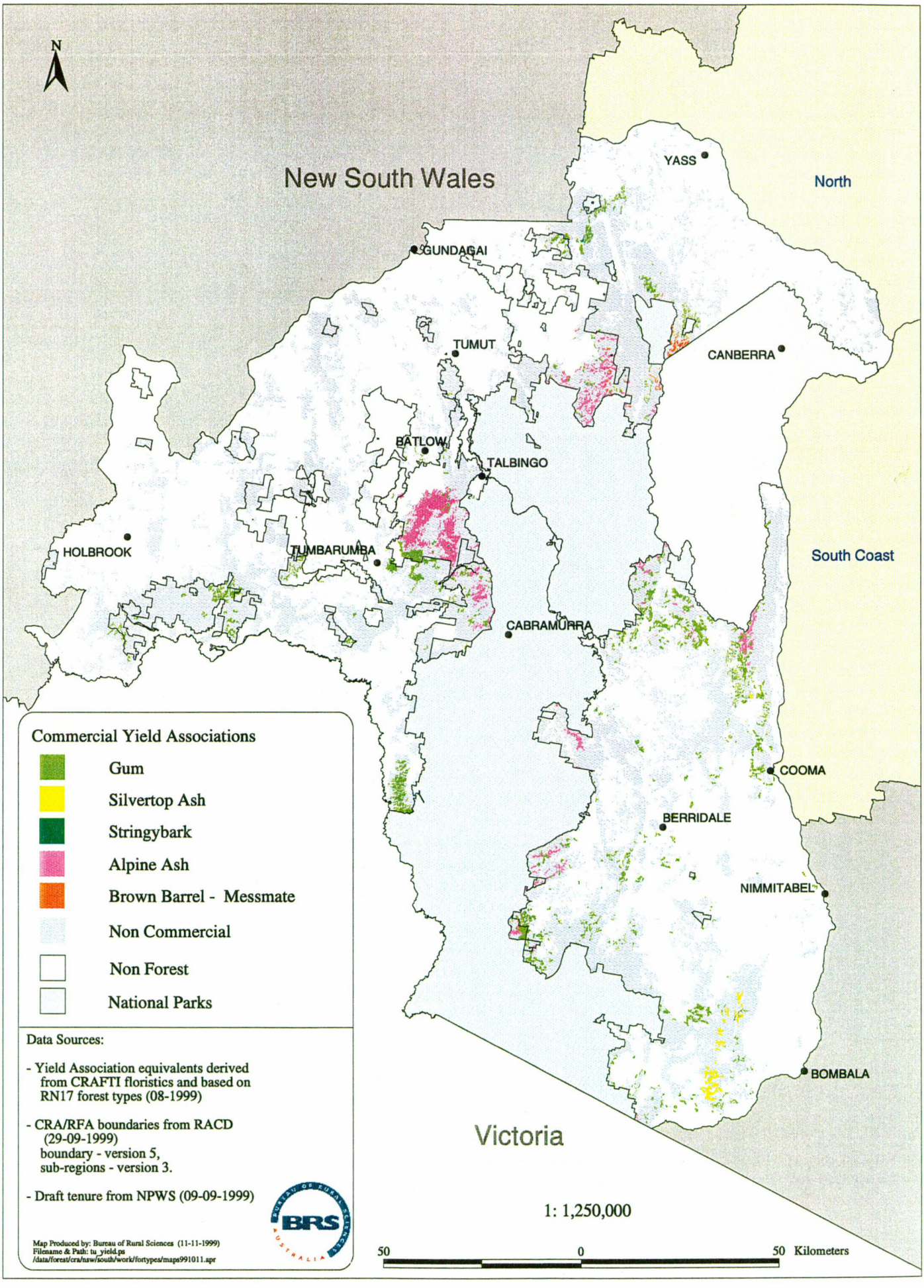


TABLE 2.A- YIELD ASSOCIATION BY TENURE FOR THE NORTH SUB-DIVISION

YA Code	Yield Association	State Forests (SF)	National Parks (NP, NPP)	Crown Reserve & VCA (CNR, CRV, VCA)	Crown Lease & Other (CLV, CNL, CNU, ALU)	Other Lands (Private) (OTH, OTHE)	Total Area (ha)
1	Blackbutt	0	0	0	0	0	**0**
2	Sydney Blue Gum	0	0	0	0	0	**0**
3	Spotted Gum	0	0	0	0	0	**0**
4	Silvertop Ash	61	12,251	1,968	2,207	19,341	**35,828**
5	Stringybark	281	14,448	972	1,413	11,281	**28,395**
6	Coastal Grey Box - Forest Red Gum	154	8,140	1,356	1,685	7,667	**19,002**
7	Apples	0	0	0	0	0	**0**
8	Alpine Ash	0	0	0	0	0	**0**
9	Brown barrel-Messmate	2,270	23,033	1,846	601	2,385	**30,137**
10	Gum	185	7,558	780	157	2,573	**11,253**
11	Peppermint-scribbly gum	3,216	44,432	12,646	12,936	101,976	**175,206**
12	Western Box-Red Gum	2,334	8,941	6,199	10,789	52,993	**81,257**
13	Snow Gum	199	4,377	157	65	1,381	**6,179**
14	Rainforest	2	1,928	0	81	91	**2,103**
15	Cypress Pine	95	71	287	345	1,821	**2,618**
16	Non Eucalypt Forest	812	1,344	193	397	10,302	**13,049**
17	Non Forest	632	2,188	21,498	17,513	944,415	**986,246**
18	Plantation*	39,776	15	5	46	1,020	**40,862**
19	Undefined	0	0	0	0	0	**0**
No code	No data	1,417	4,950	203	278	1,619	**8,467**
Total		**51,436**	**133,675**	**48,111**	**48,515**	**1,158,865**	**1,440,601**

* These plantation figures are not comprehensive and a more accurate total figure is found in Chapter 6.

TABLE 2.B - YIELD ASSOCIATION BY TENURE FOR THE SOUTH COAST SUB-DIVISION

YA Code	Yield Association	State Forests (SF)	National Parks (NP, NPP)	Crown Reserve & VCA (CNR, CRV, VCA)	Crown Lease & Other (CLV, CNL, CNU, ALU)	Other Lands (Private) (OTH, OTHE)	Total Area (ha)
1	Blackbutt	19,829	4,176	4,234	181	14,249	**42,669**
2	Sydney Blue Gum	4,173	7,129	1,962	168	3,341	**16,774**
3	Spotted Gum	64,622	5,909	5,483	740	38,966	**115,719**
4	Silvertop Ash	55,563	49,097	7,274	5,229	27,687	**144,850**
5	Stringybark	51,228	63,069	12,115	5,932	33,883	**166,227**
6	Coastal Grey Box - Forest Red Gum	14,814	33,018	12,777	2,897	22,020	**85,526**
7	Apples	2,381	1,750	119	82	1,329	**5,662**
8	Alpine Ash	0	927	0	0	0	**927**
9	Brown barrel-Messmate	50,654	43,706	1,124	1,348	13,231	**110,063**
10	Gum	66,372	24,880	4,913	7,897	32,593	**136,656**
11	Peppermint-scribbly gum	19,254	34,440	27,880	28,406	98,894	**208,874**
12	Western Box- Red Gum	66	1,353	5,089	4,807	24,117	**35,431**
13	Snow Gum	8,517	8,054	4,183	4,851	26,649	**52,254**
14	Rainforest	11,582	8,683	830	173	8,750	**30,018**
15	Cypress Pine	142	2	143	0	140	**427**
16	Non Eucalypt Forest	3,135	4,476	917	360	22,211	**31,100**
17	Non Forest	6,944	47,576	10,597	13,558	538,431	**617,106**
18	Plantation*	5,887	0	5	0	7	**5,899**
19	Undefined	0	6,435	2	1,140	337	**7,913**
No code	No data	18	884	2,914	232	17,995	**22,043**
Total		385,182	345,566	102,561	78,001	924,830	**1,836,139**

* These plantation figures are not comprehensive and a more accurate total is found in Chapter 6.

TABLE 2.C - YIELD ASSOCIATION BY TENURE FOR THE TUMUT SUB-DIVISION

YA Code	Yield Association	State Forests (SF)	National Parks (NP, NPP)	Crown Reserve & VCA (CNR, CRV, VCA)	Crown Lease & Other (CLV, CNL, CNU, ALU)	Other Lands (Private) (OTH, OTHE)	Total Area (ha)
1	Blackbutt	0	0	0	0	0	**0**
2	Sydney Blue Gum	0	0	0	0	0	**0**
3	Spotted Gum	0	0	0	0	0	**0**
4	Silvertop Ash	0	62	672	978	438	**2,150**
5	Stringybark	1	73	26	17	15	**133**
6	Coastal Grey Box - Forest Red Gum	0	0	0	0	0	**0**
7	Apples	6	0	0	0	0	**6**
8	Alpine Ash	18,006	80,015	361	1,506	2,570	**102,458**
9	Brown barrel-Messmate	121	4,393	583	1	402	**5,500**
10	Gum	7,143	44,043	5,130	3,558	17,492	**77,366**
11	Peppermint-scribbly gum	74,244	166,106	35,170	34,577	127,782	**437,879**
12	Western Box- Red Gum	17,911	43,627	12,566	15,045	76,786	**165,935**
13	Snow Gum	24,022	233,359	9,385	17,138	68,411	**352,314**
14	Rainforest	4	85	0	0	0	**89**
15	Cypress Pine	389	19,071	4,894	2,670	5,432	**32,455**
16	Non Eucalypt Forest	1,496	1,977	779	718	38,515	**43,485**
17	Non Forest	7,015	98,351	13,411	40,482	1,147,232	**1,306,491**
18	Plantation*	105,137	0	34	4	4,645	**109,820**
19	Undefined	0	112	0	15	1	**128**
No code	No data	2,241	426	506	841	36,927	**40,941**
Total		**257,736**	**691,700**	**83,517**	**117,549**	**1,526,649**	**2,677,150**

* These plantation figures are not comprehensive and a more accurate total is found in Chapter 6.

3. PUBLIC NATIVE FOREST MANAGEMENT

3.1 FOREST MANAGEMENT PLANNING

The management of native hardwood forests or State forest is principally controlled by the *Forestry Act (1916)*. Management activities, including the obtaining of forest products and the use of fire, are also governed by the:

- *Environmental Planning and Assessment Act (1979)*
- *National Parks and Wildlife Act (1974)*
- *Heritage Act (1997)*
- *Rural Fires Act (1997)*
- *Occupational Health and Safety Act (1983)*
- *Fisheries Management Act (1994)*
- *Threatened Species Conservation Act (1995)*
- *Timber Industry (Interim Protection) Act 1992*
- *Protection of the Environment Operations Act (1997)*
- *Forestry and National Parks Estate Act (1998)*

To comply with relevant legislation in relation to management activities on State forest, SFNSW follows a structured hierarchical system of planning. At a strategic level, activities must be consistent with *State Forest Practices Related to Wood Production in Native Forests: National Forest Policy* and State Forests' *Environmental Policy* and other State Forest Policies.

At a regional level, Management Area Plans have traditionally been prepared for areas of State forests, typically between 30,000 and 100,000 hectares in extent. Management Area Plans were historically matched to commercial Forestry Districts. Management Area Plans outline commercial, environmental and cultural management objectives and proposals to achieve those objectives.

To comply with Part V of the *Environmental Planning and Assessment Act (1979)* between 1979 and the commencement of the Government's Forestry Reforms in 1995, some Management Area Plans were supplemented with Environmental Impact Statements (EIS) and Fauna Impact Statements (FIS). Only one EIS/FIS was finalised within the Southern CRA region. These planning reports consider in detail the potential environmental impacts of proposed forestry activities and the proposed mitigation measures.

Management planning of State forest has traditionally been undertaken on a geographic basis. At the State level, forest areas are zoned according to their preferred management priority (PMP). The PMP zoning system has recently been updated to a Forest Management Zoning (FMZ) system. These zoning systems provide a consistent approach to the identification and management of areas with similar values and management priorities across the State.

At the operational level, large scale site specific management planning is undertaken on areas of native forest typically between 200 and 600 hectares in size called compartments. The planning that occurs at this scale principally caters for timber harvesting and operational activities that are connected with timber harvesting. The level of detail undertaken at the operational planning level varies according to the activity proposed. Harvesting is the most comprehensively planned and regulated activity that occurs on State forest. The operational plans that cover harvesting and other less intensive timber harvesting activities are called harvesting plans.

3.2 HARVESTING PLANS

SFNSW staff prepare operational harvesting plans. The plans are based on the collation of resource information collected within and in the vicinity of the area proposed for harvesting. Surveys are undertaken for a broad range of purposes including:

- Identification of threatened fauna and flora species
- Identification of Aboriginal and European heritage sites
- Identification of existing erosion/erosion potential hazards
- Assessment of soil regolith classification
- Assessment of existing and proposed road access
- Assessment of soil erosion mitigation requirements
- Assessment of safety issues
- Assessment of timber size species and quality mix
- Estimation of timber yield

Each plan clearly identifies the areas that are available for harvesting. Site specific prescriptions derived from survey and general harvesting conditions applicable to the operation are combined to form the regulatory content of each harvesting operation. Completed plans are approved by State Forests of NSW Regional Managers and the harvesting areas that they cover are subsequently licensed by the NPWS and the EPA prior to the commencement of harvesting. In areas covered by the *Timber Industry (Interim Protection) Act 1992,* a Regulatory and Public Information Committee also approve the harvesting plan.

3.3 HARVESTING REGULATION

State Forests of NSW has responsibility for the day to day management and supervision of harvesting. Harvesting must follow internal (SFNSW) and external government regulation. Internal harvesting regulations include:

- Licence Conditions issued by State Forests of NSW under the Forestry Act (1916);
- State Forests of NSW Forest Practices Code: Timber Harvesting In Native Forests, State forests and other Crown-timber lands (November1998);
- Site specific harvesting plan conditions.

External government regulation includes:

- Pollution Control Licence number 4017[1] issued by the Environmental Protection Authority;

[1] PCL 4017 is a statewide licence that covers softwood and sub-divisions South Coast and Tumut.

- Conservation Protocols for Timber Harvesting on State Forests for the Duration of the IFA Decision. NPWS, SFNSW, 29 November 1995 issued by the NPWS.

Following the signing of a Regional Forest Agreement for the Southern CRA region, harvesting regulatory conditions will be combined under the *Forestry and National Parks Estate Act (1998).* These conditions will be known as the *Integrated Forestry Operations Approval (IFOA).* The IFOA will also include NSW Fisheries regulations relating to the conservation of threatened fish species.

4. TIMBER RESOURCE AVAILABILITY AND USE

4.1 INTRODUCTION

The hardwood timber industry has undergone considerable changes over the last five years and in particular, since 1995. Essentially these changes have led to a reduction in the volume of timber being sourced from State forests in the South Coast sub-division and changes to the industry structure in the Tumut sub-division. Harvesting of hardwood sawlogs in the North sub-division has not occurred in the past two years. Table 4A provides timber volumes taken from the respective Management Areas of each sub-division, segregated into three product classes. This table is represented graphically in Figures 4a to 4c for each product class.

TABLE 4.A – QUOTA PRODUCTS HARVESTED BETWEEN JULY 1994 AND JUNE 1999

		South Coast						Tumut		North
Year	Product	Nowra	Batemans Bay	Narooma	Qbyn	Badja	Moss Vale	Bago-Maragle	Tumut	Bathurst*
1994/95	High Quality-Large	7157	21862	22854	3291	6097	2476	26989	0	1677
	High Quality-Small	3894	7428	4372	28	148	461	164	0	
	Low Quality	2114	6336	5561	1987	3759	246	7589	0	
1995/96	High Quality-Large	4916	23724	21579	7055	47	2229	20553	5884	1770
	High Quality-Small	2093	9575	5833	122	1	531	340	1039	
	Low Quality	1535	6516	3700	5574	94	312	9118	1709	
1996/97	High Quality-Large	46	28454	16353	7345	0	1371	8263	6442	941
	High Quality-Small	10	8654	4304	226	0	451	29	821	
	Low Quality	3	8745	3066	8074	0	624	9078	1891	
1997/98	High Quality-Large	0	16525	17563	7453	0	1004	16009	7739	0
	High Quality-Small	0	8135	3549	245	0	203	62	605	
	Low Quality	0	7699	6503	7634	0	328	8945	5670	
1998/99	High Quality-Large	0	18373	14021	4694	0	0	16602	8577	0
	High Quality-Small	0	7632	3433	133	0	0	181	344	
	Low Quality	0	9481	6441	15553	0	0	6961	6503	

* Bathurst volumes are for total sawlog only (no split between the grades)

Figure 4.a - High value large quota quality logs by management area

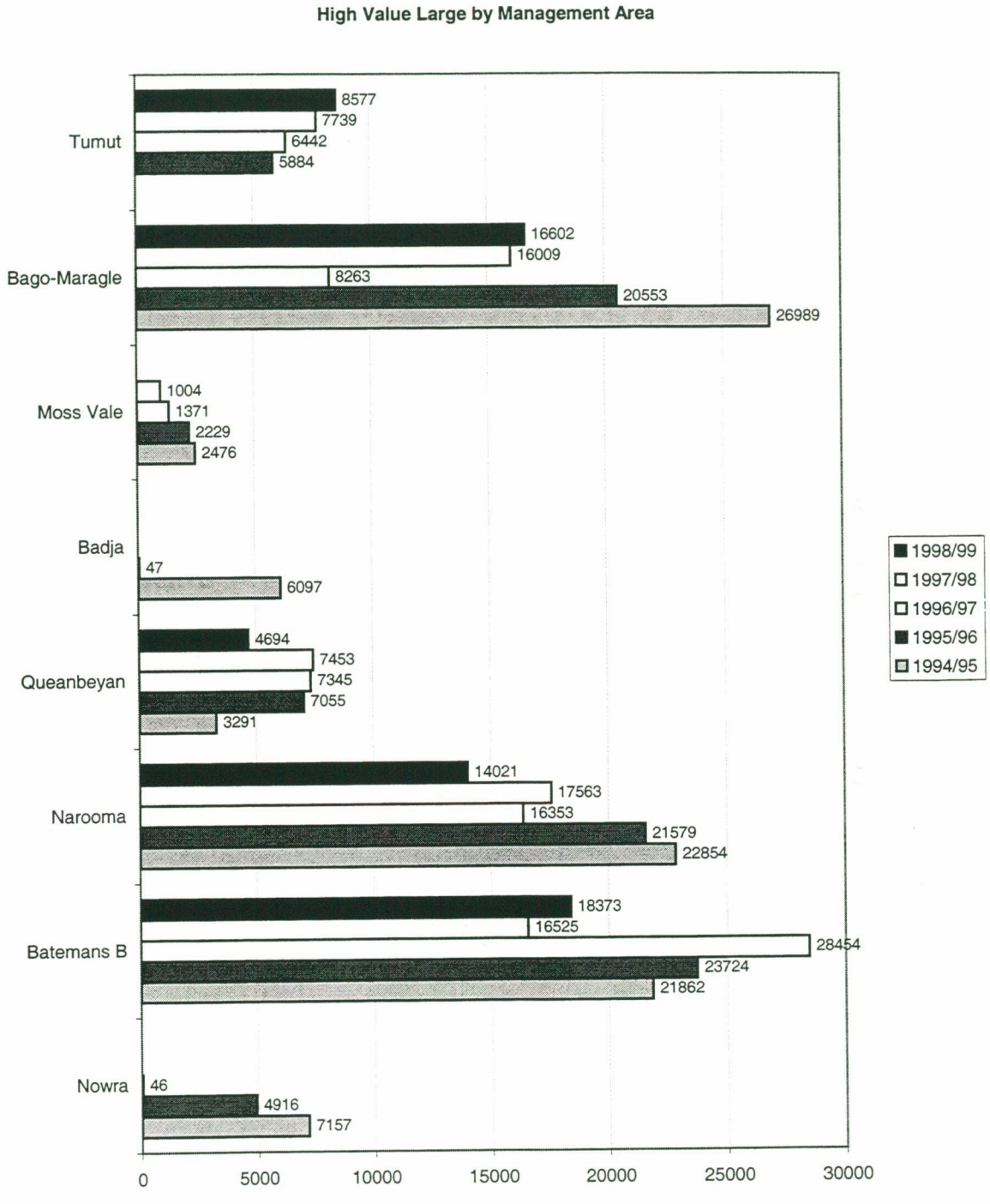


Figure 4.b - High value small quota quality logs by management area

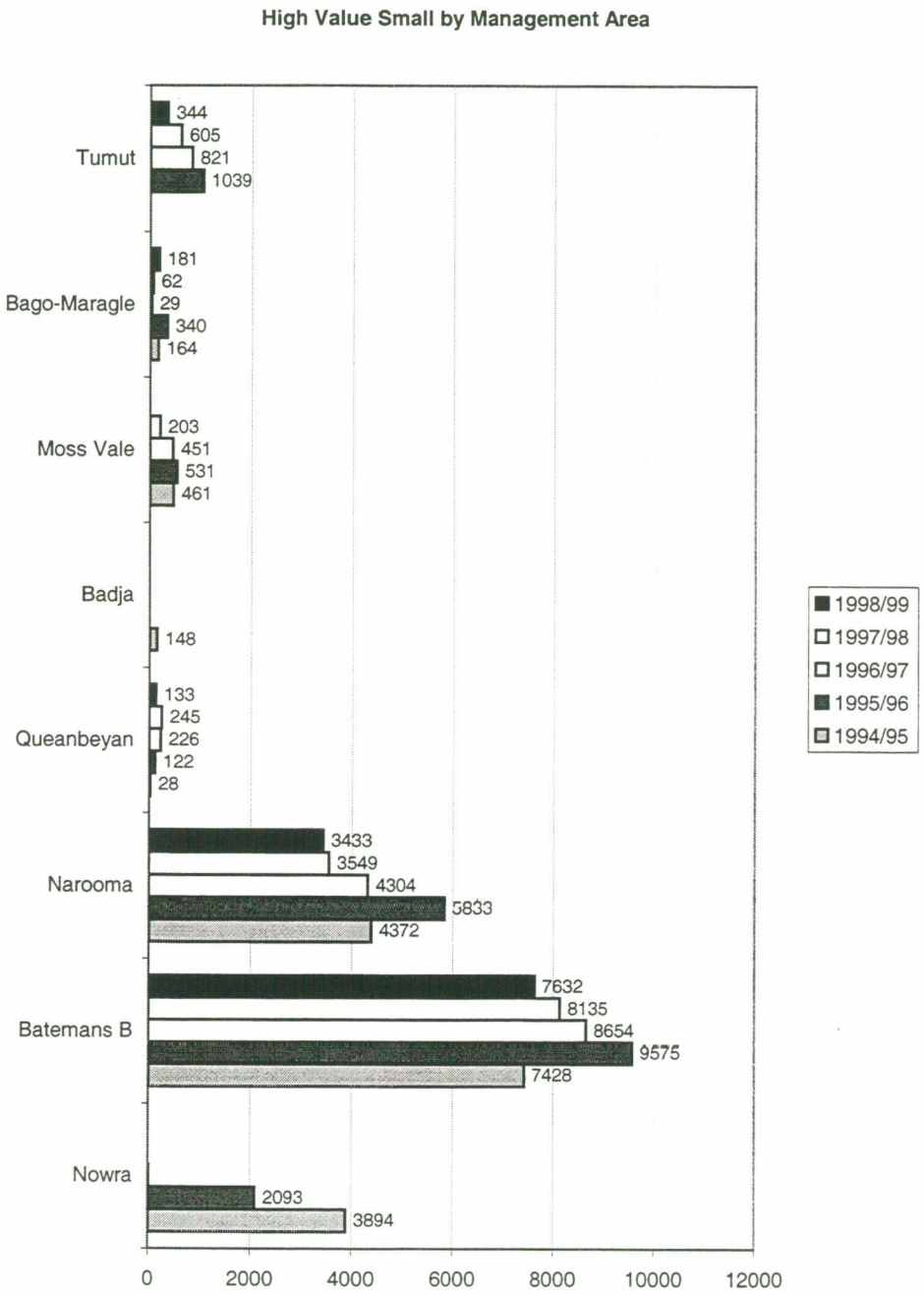
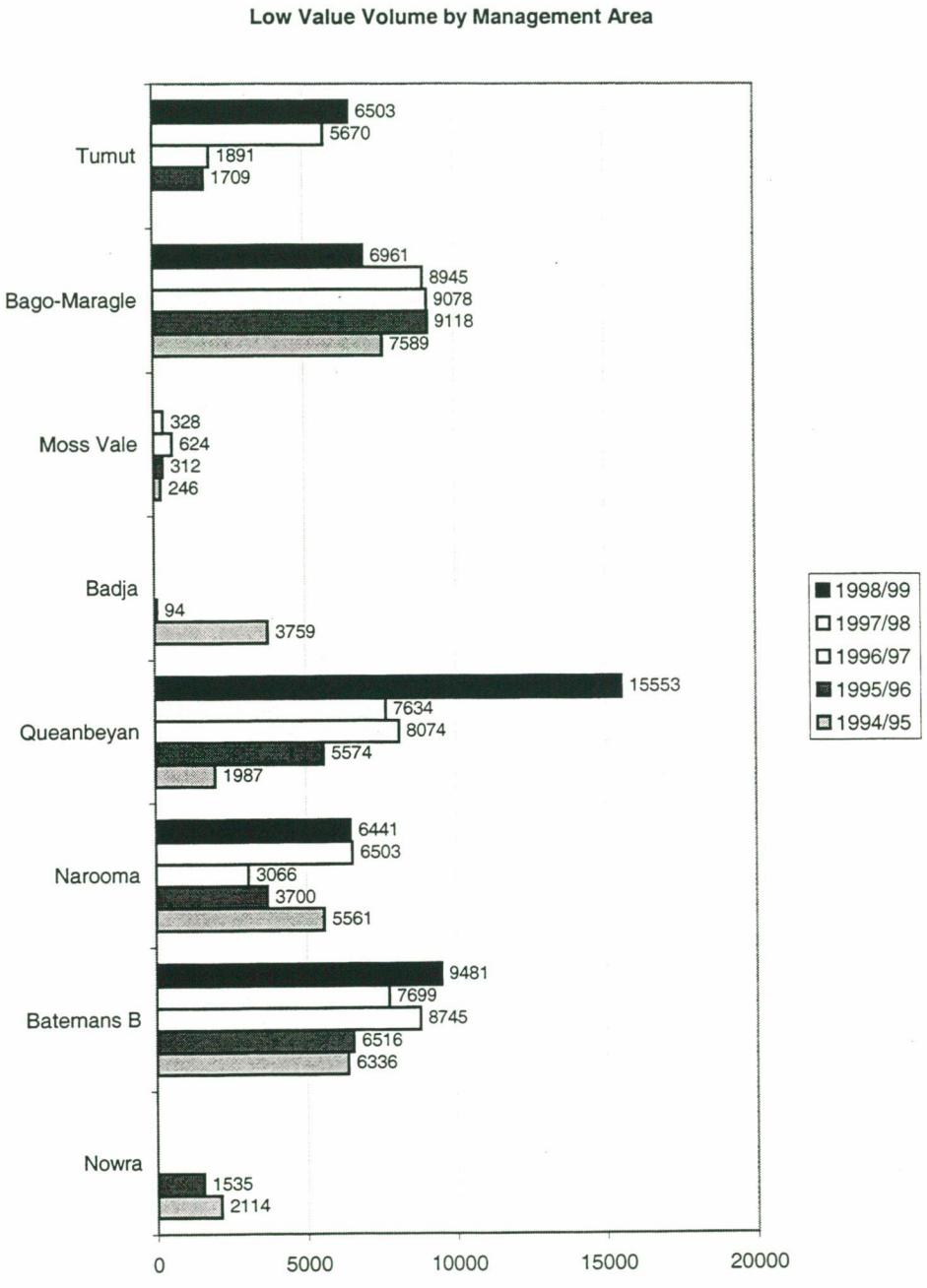


Figure 4.c - Low value volume by management area



4.2 QUOTA AND NON-QUOTA

Harvesting operations in native hardwood forests produce a variety of logs depending on length, diameter, species, straightness and presence of defects. These logs are sold to sawmills and other timber processing plants that convert them into various products depending on market demands. Quota logs (sawlogs) make up the greater proportion of the better quality, larger diameter logs (generally with diameters greater than 40cms). Non quota logs come from both ends of the quality spectrum. At the one end, they include logs higher in quality than quota logs as well as sound small diameter logs and at the other end, low quality logs with defects above the acceptable limits for quota quality logs.

The extent of harvesting operations in each year is driven by the commitment to supply quota quality sawlogs and other high value logs, or to achieve a silvicultural program, particularly thinning. State Forests of NSW endeavours to sell all log products from such operations to best advantage, while taking account of the needs of each industry sector. Not only are most quota customers dependent on a supply of non-quota logs, in most cases, quota sawlog operations would not be viable unless they were fully integrated with non-quota products being removed at the same time.

Non Quota
Non quota logs refer to those cut in harvesting operations which either due to fulfilment of high value product commitments or quality assessment are not sold as part of quota sawlog allocations.

Quota
The term quota generally refers to sawlogs of a certain specification, which are sold to designated mills. Previously, a quota referred to an annual allocation. When the term quota is used these days it usually refers to the quality of the logs that go to make up this parcel (i.e. quota quality sawlogs) as opposed to the volume allocation.

4.2.1 Non-quota log products

The non-quota industry includes log products that have very specific specifications for both quality and size such as poles, piles, veneer, and girders. However, poor quality salvage logs have no minimum specification. A description of each log product is given below:

Poles, domestic
These poles are used for electricity distribution and in structural applications such as pole frame houses. The species range covers the durable species such as Ironbark, Tallowwood and Grey Gum as well as non-durable species such as Spotted Gum and Blackbutt. While some sections of larger poles would meet quota specifications, the majority of poles if not sold as a pole, would be sold as a small sawlog.

Poles, export
These are similar to domestic poles in quality but they are smaller in diameter. While all pole species are suitable, the main species used is Blackbutt.

Piles
Most piles have a small end diameter of 30 to 35cms with a variable length depending on site conditions. Pole species are the most common ones used as piles but there is still a large demand for bark-on turpentine piles. The main uses of piles are in marine applications but considerable numbers are used in bridges and as foundation piles.

Girders
Logs sold as girders are either utilised in the full round section or they are cut into large section timber and used typically in heavy construction applications such as bridges and wharves. They are also used in specialist items like boat keels.

Veneer logs
Veneer logs are rotary peeled into sheets which are then glued together to make plywood. Small quantities are used in timber face applications. While these logs need to be of high quality, they can carry some of the defects that would be unusable in quota quality logs supplied to regular sawmills.

Small logs
These logs are of similar quality to quota sawlogs but are restricted to sizes under 40 cms centre diameter under bark (cdub).

Salvage logs
These logs do not meet the minimum specifications of any of the previous products. There is no minimum specification for these logs with the utilisation level dependant on the average net wood quality of the parcel, distance from the sawmill, the species mix, market conditions and the customers for the sawn products.

Miscellaneous products
Smaller volumes of other products are sold on a regular basis.

These are:

- Sleeper logs: These sales have decreased to small volumes due to a combination of increased harvesting regulation and reduced Rail Services Authority (RSA) demand. Integration of harvesting operations has phased out sleeper only operations. Some demand for timber sleepers still occurs and is usually met by sawmills from their product mix.
- Woodchop blocks: High quality logs are required for this use. Volumes required have increased in recent years with the growing popularity of the sport.
- Fencing Timber: In the past, most fencing timber was cut by the user close to the area of use. With regulation of operations this is no longer possible. Sales in the future will come from integrated operations and usually be cut by professional cutters.

Table 4B indicates the volumes, values and unit rates of timber products sold between 1996/97 to 1998/99.

TABLE 4.B - VOLUMES, VALUES AND UNIT RATES OF TIMBER PRODUCTS SOLD IN 1996/97, 1997/98 AND 1998/99

Timber Product	1996/97			1997/98			1998/99		
	Volume (m^3)	Value ($)	Rate ($/m^3$)	Volume (m^3)	Value ($)	Rate ($/m^3$)	Volume (m^3)	Value ($)	Rate ($/m^3$)
South Coast Sub-Division									
Poles	781	56186	71.94	923	64358	69.73	4	119	29.75
Piles	23	4458	193.83	0	0	0.00	0	0	0.00
Girders	0	0	0.00	0	0	0.00	10	1915	191.50
Quota Sawlogs	53547	2195537	41.00	42544	2038453	47.91	37078	1899612	51.23
Small Sawlogs	12864	278828	21.68	11209	241470	21.54	11198	237681	21.23
Salvage Sawlogs	20513	241803	11.79	22164	265971	12.00	31475	376288	11.96
Pulpwood	60996	533978	8.75	50567	441493	8.73	51914	482691	9.30
Misc. Fencing	1824	54694	29.99	1228	38304	31.19	1780	47558	26.72
Misc. Firewood	3285	23945	7.29	1620	11245	6.94	2890	19889	6.88
Sub-Total	153833	3389429	22.03	130255	3101294	23.81	136349	3065753	22.48
Tumut Sub-Division									
Quota Sawlogs	14705	493006	33.53	23748	989510	41.67	25180	1001550	39.78
Small Sawlogs	850	10374	12.20	667	9347	14.01	525	7563	14.41
Salvage Sawlogs	10969	128402	11.71	14615	195522	13.38	13464	187412	13.92
Sub-Total	26524	631782	23.82	39030	1194379	30.60	39169	1196525	30.55
North Sub-Division									
All Sawlogs	0	0	0.00	0	0	0.00	0	0	0.00
Sub-Total	0	0	0.00	0	0	0.00	0	0	0.00
Total for the Southern CRA									
	180357	4021211	22.30	169285	4295673	25.38	175518	4262278	24.28

4.3 SPECIES HARVESTED

The major and minor species harvested with a brief description of the main sawn or other products are listed in 4C and 4D. The break up of species harvested by Management area for 1996/97 to 1997/98 are shown in figures 4d - 4i.

TABLE 4.C - MAJOR TIMBER SPECIES HARVESTED AND THEIR PROPERTIES

Common Name	Properties
Spotted Gum	A common species on the coast, a strong durable and dense hardwood with light brown to dark brown heartwood often with attractive fiddleback. Used in heavy construction, flooring, tool handles, preservative treated poles, plywood and furniture. Traditionally used in wooden boat building due to its ability to be steam bent.
Ironbark	A very hard, very strong and very durable, tough timber with a dark brown or red-brown colour. Used for heavy engineering construction, girders, poles, decking, furniture and railway sleepers.
Blackbutt	Light brown to yellowish brown heartwood, is straight grained, of moderate to good durability and used in general construction, building, flooring, and poles.
Turpentine	A hard, strong, durable, and dense timber with a red to reddish brown fine and even textured heartwood. The timber is highly resistant to decay and termite attack and because of its durability is an extremely suitable timber for purposes such as piles, poles, girders, beams and wharf decking.
Yellow Stringybark	A relatively common timber on the coast of moderate to good durability, light yellow brown heartwood. Dries readily with dressed and finished timber of attractive appearance. Used for furniture, flooring, general construction, building and panelling.
Sydney Blue Gum	A straight-grained, relatively easy to work, fix, dress and finish timber with a pink to red heartwood of moderate durability. Used for general construction, furniture, flooring, cladding and panelling.
Brown Barrel	A pale brown timber of moderate strength and moderate to low durability, common on the Tablelands. Can be difficult to dry. Used in general construction and building where exposure to the weather is limited.
White Stringybark	A strong timber of moderate durability, pale brown in colour. Common species across the coastal areas used in general construction, and building.
Silvertop Ash	A strong timber of moderate durability, common species in the South Coast and North sub-divisions of the region. Colour a pale brown, often discoloured with pin-hole borer. Used in general construction, building and is a common pulpwood species.
Alpine Ash	Timber straight grain but can produce fiddleback feature, major species in the Tumut/Tumbarumba forests. Pale pink heartwood, moderate strength, moderate to low durability generally suited to non-exposed uses. Commonly dried and dressed, relatively easy to work. Used for flooring, plywood, furniture, joinery, paneling and general construction.

TABLE 4.D - MINOR TIMBER SPECIES HARVESTED AND THEIR PROPERTIES

Common Name	Properties
Monkey Gum	Attractive timber but subject to movement during drying. Good for appearance grade uses if dried then reconstituted or re-machined.
River Peppermint	Subject to high levels of drying stress and distortion. Can be used for panelling etc. once dried and re-machined.
Narrow-leaved Peppermint	Subject to high levels of drying stress and distortion. Can be used for panelling etc. once dried and re-machined.
Messmate	Timber has light brown to brown heartwood, is straight grained with moderate hardness and strength. Used for general construction, and some appearance grade applications.
Shining Gum	Timber has straw coloured or pale pink heartwood, is straight grained, tough but relatively easy to work. Suitable for general building, flooring, joinery, furniture, pulp and paper.
White Ash	Timber is straw coloured to light brown heartwood, moderately coarse texture, straight grained, low durability. Suitable for joinery, flooring, and general construction.
Manna Gum	Timber subject to drying distortion but can have attractive feature with pale yellow to light pink heartwood. Suitable for general construction, joinery, panelling, flooring
Coastal Grey Box	Very strong, in demand for heavy construction work. Attractive yellow brown wood suitable for appearance grade uses such as panelling.
Bangalay	Attractive red timber with nice feature grain. Subject to borer attack, but good for appearance grade uses.
Woollybutt	Red heartwood, dense, strong and durable good for construction, appearance, sleepers.
Forest Red Gum	High quality red timber, which always attracts a premium price. Used for appearance grade fitting out timber in houses, bench tops, etc. Commonly cut as natural edge slabs for bench and table tops. In high demand by craft users, joineries.
Blue-leaved Stringybark	Good quality white timber for general appearance grade uses in house construction. Suitable for flooring and panelling.
Maidens Gum	Subject to drying stress and distortion. Often has "birds eye" feature caused by insect damage which gives it a distinctive appearance. Has good potential as an appearance grade timber because of this.
Mountain Gum	Generally a straight grained timber of moderate strength and hardness but of low durability. Heartwood is straw-coloured to pink and is susceptible to *Lyctus* borers. Used for framing, flooring, panelling, joinery and handles.
Red Box	Good quality red timber for appearance grades, but not common in the Southern CRA region.
Apple Angophora Spp.	Hard, tough strong, moderately durable, susceptible to *Lyctus* borers. Heartwood light-brown, with gum veins common. Rarely sawn but sometimes used for rough farm building and fuel.
Bloodwood	Heartwood dark pink to deep red with large extensive gum veins common. Very coarse textured grain, extremely durable and used for poles, sleepers, mining timbers and fencing.
Grey Gum	Heartwood is red, hard, heavy, strong and extremely durable, with a coarse uniform texture. Used for heavy engineering construction, poles and sleepers.
Grey Ironbark	Dark-brown to red-brown heartwood, which is very hard, strong, durable and tough. Used for heavy engineering construction, poles, railway sleepers and cross-arms.
Broad-leaved Ironbark	Dark red fine textured heartwood which is hard, strong and extremely durable. Used for heavy engineering construction, poles and railway sleepers.
Gully Peppermint	Sapwood susceptible to *Lyctus* borers. A hard pale heartwood of moderate durability. Used to a limited extent for general construction purposes.
Red Mahogany	A pale red sapwood susceptible to *Lyctus* borer attack, a dark red heartwood with moderately coarse textured grain. Used for flooring, cladding, panelling, sills, bridge decking and general construction purposes.
Red Stringybark	Pale brown sapwood susceptible to *Lyctus* borers. Heartwood light pink-brown moderately fine textured grain. Moderate durability, used for general building construction and for fencing.

Figure 4.d - Species Mix – Management Area (Queanbeyan)

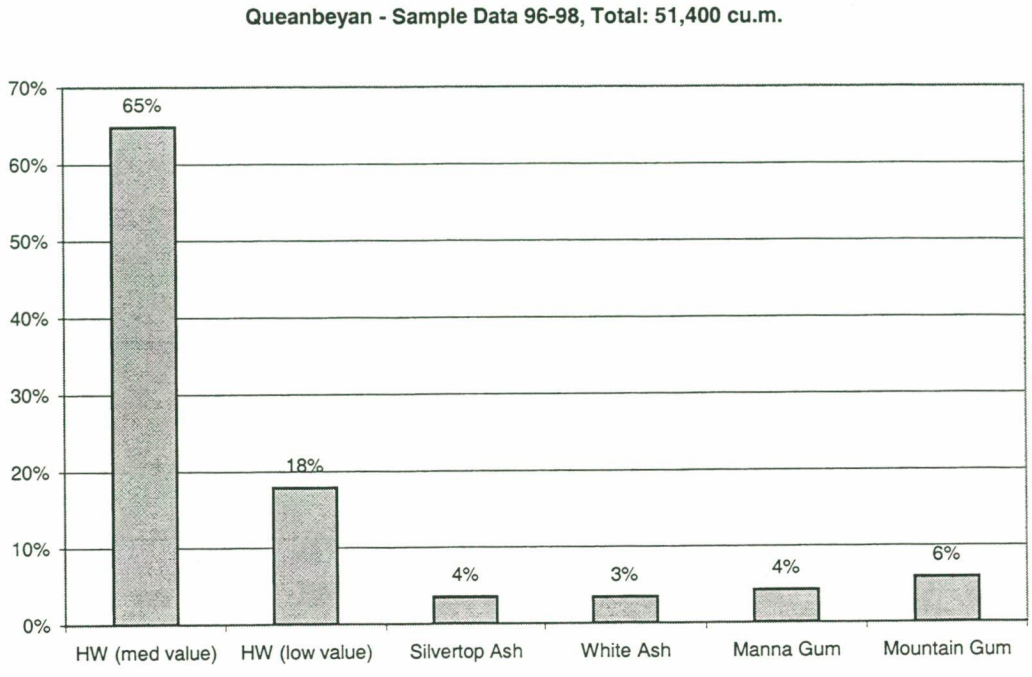


Figure 4.e - Species Mix – Management Area (Nowra)

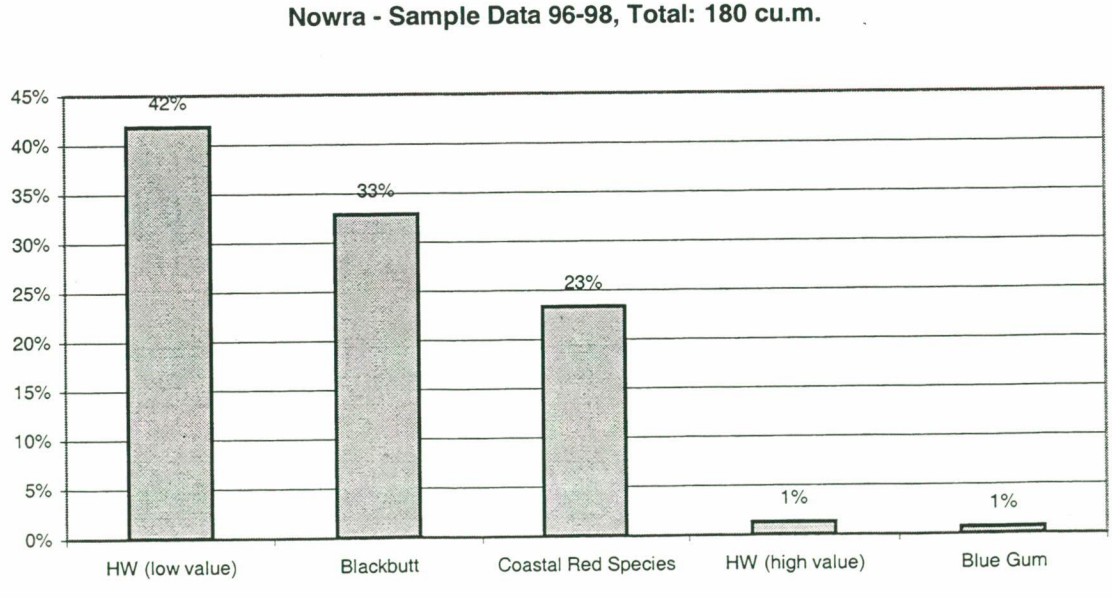


Figure 4.f - Species Mix – Management Area (Narooma)

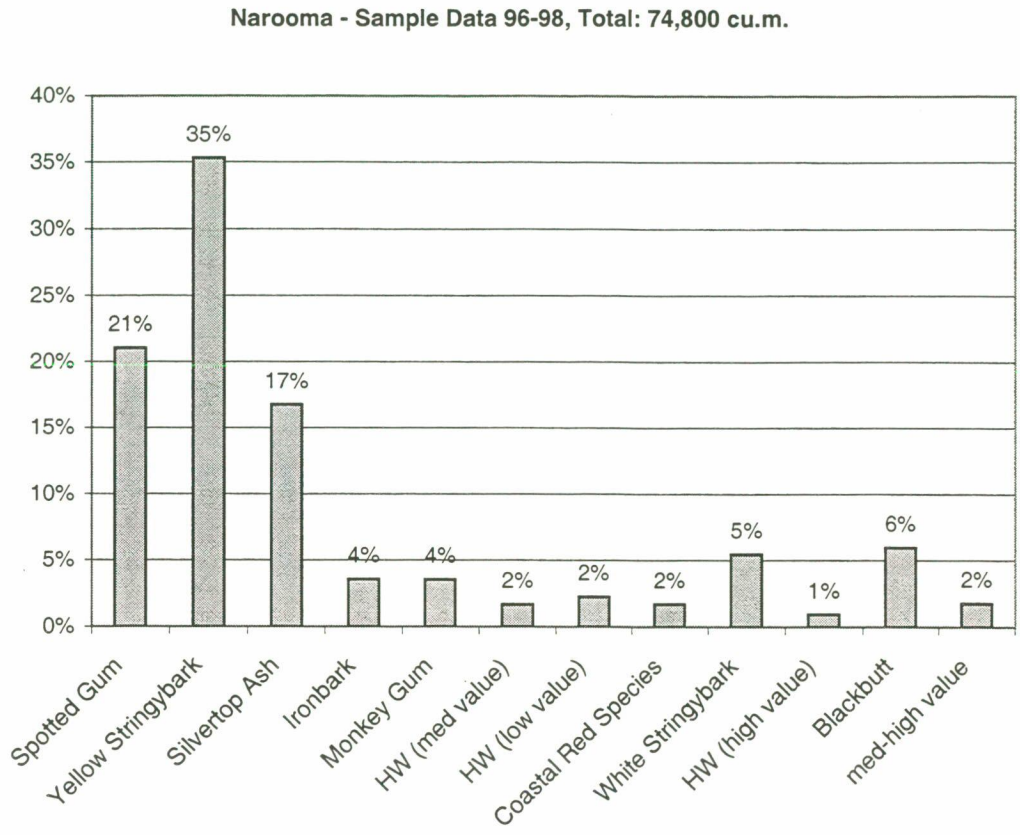


Figure 4.g - Species Mix – Management Area (Moss Vale)

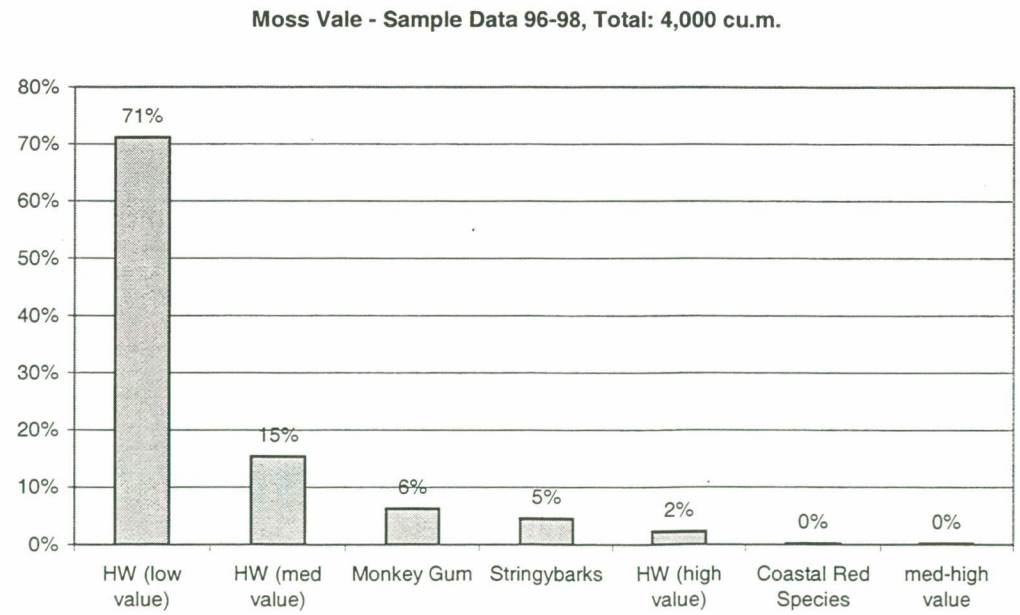


Figure 4.h - Species Mix – Management Area (Batemans Bay)

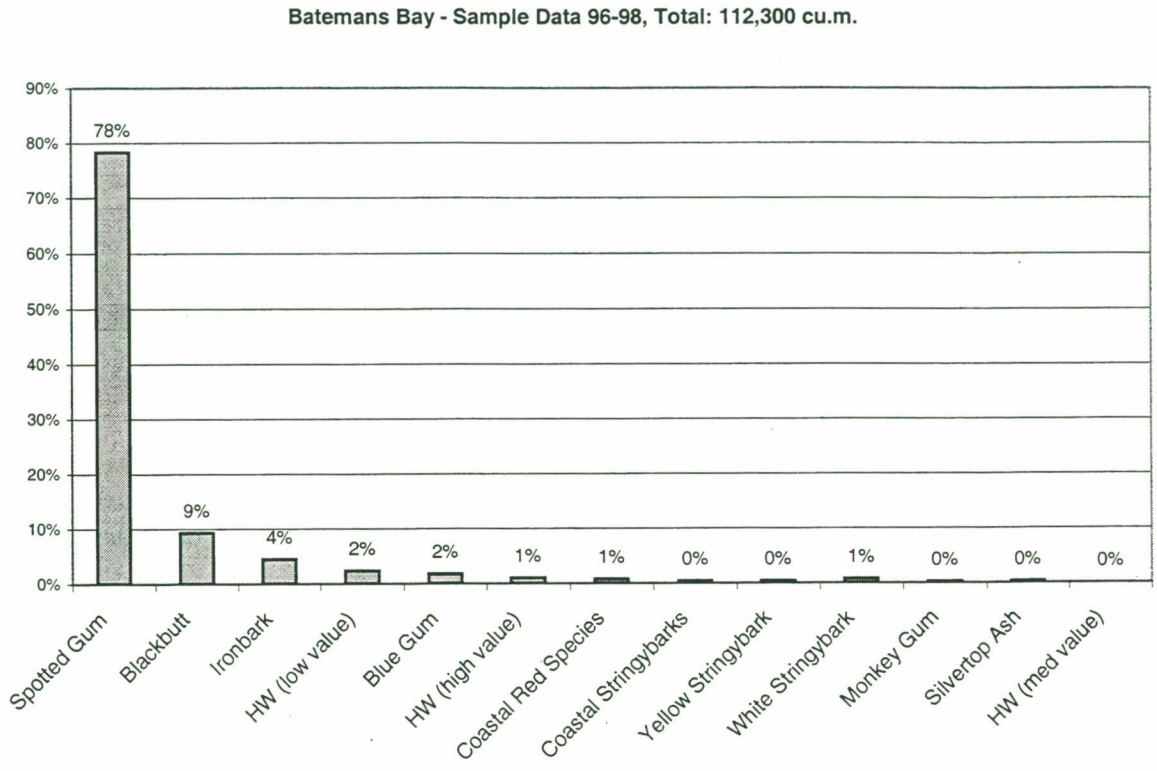
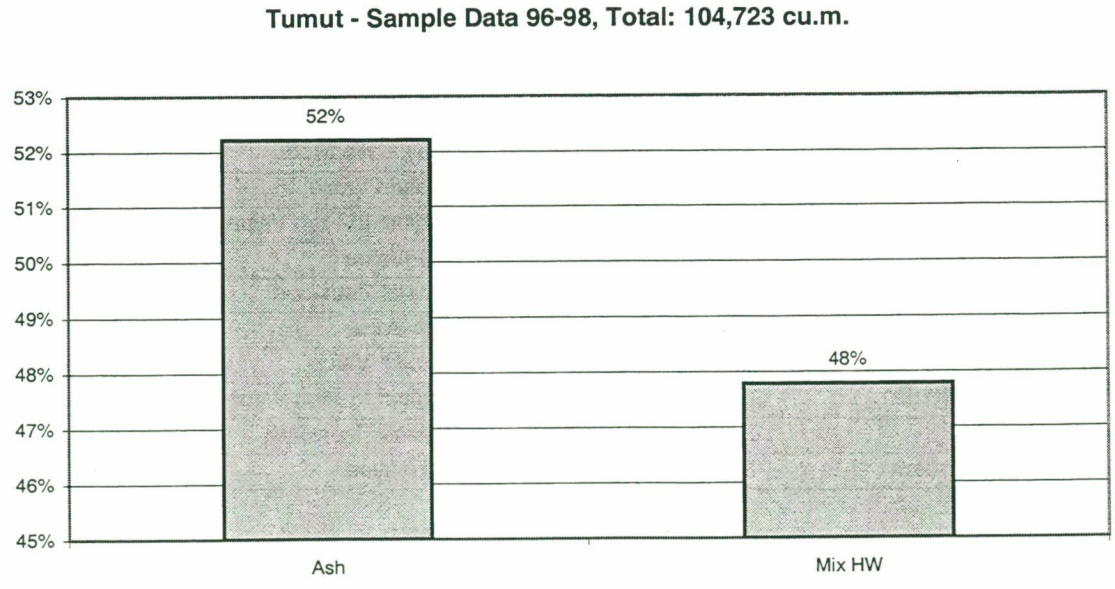


Figure 4.i - Species Mix – Management Area (Tumut)



A listing of the timbers harvested and their relative value is detailed in Table 4.E. The species are grouped into five categories including a grouping of the coastal redwood species identified as a suitable package for furniture. The Species Group gives a relative value of individual species to the sawmill industry. The Log Value Pricing System (LVPS) Equivalent Species refers to the equivalent species in tables 4.F and 4.G.

State Forests of NSW market for pulp grade timber is also dependent on species. The industry is based on the woodchip mill at Twofold Bay south of Eden which requires species of suitable basic density and recoverable fibre characteristics. Highly suitable species include Silvertop Ash, Spotted Gum and Blackbutt. Less desirable but acceptable species, due to either higher defects or lower pulping yields, are the Stringybarks and Brown Barrel, whilst unacceptable species are Turpentine, Ironbarks and other redwood species.

TABLE 4.E - SPECIES GROUPINGS FOR SOUTHERN NSW TIMBERS

Common Name	Scientific Name	Species Group	LVPS Equivalent Species
Alpine Ash	*Eucalyptus delegatensis*	High Value	N/A
Apple Angophora Spp	*Angophora species*	Low Value	Roundleaf Gum
Bangalay	*Eucalyptus botryoides*	Coastal Redwood	Red Mahogany
Blackbutt	*Eucalyptus pilularis*	High Value	Blackbutt
Bloodwood	*Corymbia gummifera*	Medium Value	Grey Gum
Blue Leaved Stringybark	*Eucalyptus agglomerata*	Medium to High Value	Coastal Stringybark
Brown Barrel (Fastigata)	*Eucalyptus fastigata*	Medium Value	Brown Barrel
Coastal Grey Box	*Eucalyptus bosistoana*	High Value	Coastal Grey Box
Forest Red Gum	*Eucalyptus tereticornis*	Coastal Redwood	Coastal Stringybark
Grey Gum	*Eucalyptus punctata*	Medium to High Value	Grey Gum
Ironbark - Grey - Red - Broad-leaved	*Eucalyptus paniculata* *Eucalyptus sideroxylon* *Eucalyptus fibrosa*	High Value Coastal Redwood Coastal Redwood	Ironbark - Grey - Red - Broad-leaved
Maidens Gum	*Eucalyptus maidenii*	Medium to High Value	Monkey Gum
Manna Gum (Ribbon Gum)	*Eucalyptus viminalis*	Medium Value	Manna Gum (Ribbon Gum)
Messmate	*Eucalyptus obliqua*	Medium Value	Messmate
Monkey Gum	*Eucalyptus cypellocarpa*	Medium Value	Monkey Gum
Mountain Gum	*Eucalyptus dalrympleana*	Medium Value	Manna Gum (Ribbon Gum)
Peppermint - Gully - Narrow-leaved - River - Sydney	*Eucalyptus smithii* *Eucalyptus radiata* *Eucalyptus elata* *Eucalyptus piperita*	Medium Value Medium Value Low Value Medium Value	Roundleaf Gum
Red Mahogany	*Eucalyptus resinifera*	Coastal Redwood	Red Mahogany
Red Stringybark	*Eucalyptus macrorhyncha*	Medium Value	Coastal Stringybark
Shinning Gum	*Eucalyptus nitens*	Medium to High Value	Brown Barrel
Spotted Gum	*Corymbia maculata*	High Value	Spotted Gum
Sydney Blue Gum	*Eucalyptus saligna*	Coastal Redwood	Sydney Blue Gum
Turpentine	*Syncarpia glomulifera*	High Value	Turpentine
White Ash	*Eucalyptus fraxinoides*	Medium Value	Brown Barrel
White Stringybark	*Eucalyptus globoidea*	Medium to High Value	Coastal Stringybark
Woollybutt	*Eucalyptus longifolia*	Coastal Redwood	Grey Gum
Yellow Stringybark	*Eucalyptus muellerana*	High Value	Coastal Stringybark

4.4 HARVEST VALUE POTENTIAL

Table 4.F and Table 4.G illustrate the market value potential of the main hardwood species in NSW. The species are ranked in terms of their residual values derived from State Forests of NSW's Log Value Pricing System (LVPS). The LVPS has only been prepared for the South

Coast sub-division. As such the Tumut sub-division is still operating under the flat rate sales system.

TABLE 4.F - MARKET VALUE POTENTIAL – RELATIVE VALUE FOR EACH SPECIES BY SIZE CLASS - LVPS

Species	Size Class		
	40-49 cm	*50-69 cm*	*70+ cm*
Blackbutt	$38.38	$47.24	$50.56
Tallowwood	$46.16	$54.98	$58.79
Brush Box	$38.09	$44.23	$47.01
Spotted Gum	$35.11	$45.23	$49.70
Coastal Stringybarks	$34.59	$41.63	$45.33
Sydney Bluegum	$34.76	$36.93	$40.46
Flooded Gum	$32.96	$35.08	$38.55
White Mahogany	$30.72	$33.08	$36.53
Grey Gum	$31.27	$33.64	$37.11
Ironbark	$46.16	$54.77	$58.58
Grey Box	$42.48	$50.87	$54.55
Fastigata	$31.07	$33.46	$36.89
Messmate	$30.70	$33.15	$36.61
Monkey Gum	$32.91	$35.38	$38.92
Silvertop Ash	$31.97	$34.10	$37.59
Silvertop Stringy	$31.37	$33.48	$36.95
New England BBT	$30.70	$33.15	$36.61
Viminalis (Manna Gum)	$30.31	$32.69	$36.09
Roundleaved Gum	$13.75	$17.99	$19.07
Red Mahogany	$34.76	$36.93	$40.46
Turpentine	$32.76	$41.19	$43.87

(NB: Figures do not represent actual values)

TABLE 4.G - MARKET VALUE POTENTIAL – VALUE FOR EACH SPECIES BY SIZE CLASS (RELATIVITY FACTOR)

Species	Size Class		
	40-49 cm	*50-69 cm*	*70 + cm*
Blackbutt (BBT)	1.0000	1.2309	1.3174
Tallowwood (TWD)	1.2027	1.4325	1.5319
Brush Box (BBX)	0.9925	1.1525	1.2251
Spotted Gum (SG)	0.9149	1.1786	1.2950
Coastal Stringybarks (CST)	0.9014	1.0848	1.1811
Sydney Bluegum (BG)	0.9059	0.9622	1.0544
Flooded Gum (FG)	0.8588	0.9141	1.0046
White Mahogany (WM)	0.8004	0.8619	0.9520
Grey Gum (GG)	0.8147	0.8764	0.9670
Ironbark (IBX)	1.2027	1.4271	1.5265
Grey Box (GBX)	1.1069	1.3256	1.4215
Fastigata (FAS)	0.8096	0.8719	0.9611
Messmate (MM)	0.8001	0.8637	0.9539
Monkey Gum (MKG)	0.8575	0.9220	1.0141
Silvertop Ash (STA)	0.8331	0.8885	0.9794
Silvertop Stringy (STS)	0.8173	0.8724	0.9629
New England BBT (NEB)	0.8001	0.8637	0.9539
Viminalis (VIM)	0.7898	0.8518	0.9404
Roundleaved Gum (RLG)	0.3582	0.4687	0.4969
Red Mahogany (RM)	0.9059	0.9622	1.0544
Turpentine (TRP)	0.8537	1.0733	1.1432

Table 4.E lists the equivalent species to those in Table 4.G. The LVPS is currently under review. The expected changes will see the value range or relativity between species increase.

Factors that will affect the suitability and usage of species in the end-product groups listed are:

- Availability;
- Market acceptance;
- Specific processing constraints such as difficulty with drying particular species;
- Colour range of species in appearance applications;
- Competing demands for use in higher value end-product applications;
- Intrinsic characteristics of species impacting ability to meet grade; and
- Sufficient supply to enable development and long term servicing of end -product market.

Decisions regarding production options and the need for particular species will depend on whether the sawmill:

- Produces for the green sawn market only – cutting for the green sawn market requires assured market outlets for scantling, engineered products (F17 to F27) and traditional recovery lines (pallets and palings). Based on the mill's ability to develop markets that demand the products, the mill will have specific preferences for species and grades of log.
- Produces for the green sawn market and its own dressing plant – a mill which produces for the green sawn market and supplies material for its own dressing plant has many options and can therefore handle a wider range of species.
- Produces for the green sawn market and is a supplier to outside dressing plants – such a mill would need to be more selective as other than the species utilised in green sawn products, it could only use species that are acceptable to the processing plants.

The suitability of each species is limited by the producers' ability to market them into saleable products. Unless the end-product can be produced from a species which conforms to the grade requirements and provides a product which is acceptable in the market place, the species must be considered to be unsuitable for that range of products.

5. PLANTATION FOREST MANAGEMENT

5.1.1 Plantation Timber Resource Availability

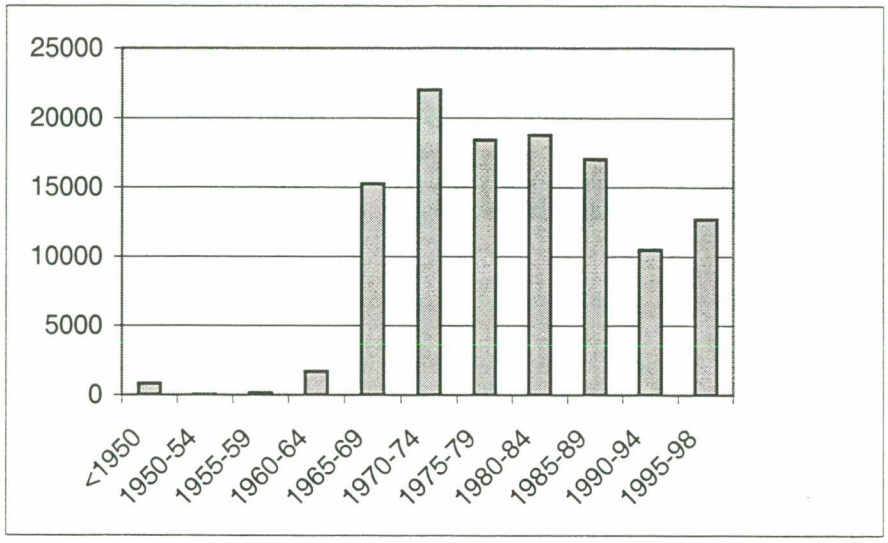
There are approximately 180 000 ha of exotic softwood plantation in the Southern CRA region, of which 48 000 ha are privately owned with the balance being state-owned and managed by State Forests of NSW. This figure includes approximately 13 500 ha of land which is awaiting re-establishment following clearfelling or failure in the first rotation. The region also surrounds the Australian Capital Territory which has a total of about 15 000 ha of Government-owned exotic softwood plantations. Map 5.a shows the plantation extent in the Southern CRA region. Radiata Pine (*Pinus radiata*) plantations dominate the plantation resource with over 98% of the above area.

In comparison with the above figures, the area of hardwood plantation in the region is negligible with approximately 40 hectares of plantation on State forest and no private plantations greater than 10 hectares in extent.

The State-owned plantations include large areas which were established in the late 1960's and early 1970's under Commonwealth-State Softwood Forestry agreements and another peak around 1985. The earlier peak has now entered its scheduled clearfelling stage. Annual plantings were reduced during the period 1990 to 1994 and have not yet reached the levels seen in the 1970's and 1980's. Figure 5.a shows the area of State owned softwood plantation by planting period.

Private plantations are comparatively younger with a significant impetus coming from the establishment of Australian Newsprint Mills at Albury in 1981 and, beginning in 1984, that company's foray into its own and joint ventured plantations. An agreement between the NSW State Government and Visy Industries will lead to the establishment of a further 30 000 ha in the Tumut area, on mainly cleared agricultural land, over the next ten years to support a major new kraft pulpwood industry at that location.

Figure 5.a - Areas of State owned softwood by planting period



Source: SFNSW

5.1.2 Forest Productivity

The current State Forests of NSW estate has an average M.A.I. of about 18 m^3/ha/year, of which sawlogs make up about 12 m^3/ha/year. This approximate average is made up of a range from some lower growth rates on poorer sites and earlier second rotation sites to later age classes using improved genetic material on highly fertile ex-pasture sites with full site preparation. Average M.A.I. is expected to improve as newer plantations replace and supplement existing ones.

TABLE 5.A - SOFTWOOD RESOURCE VOLUMES FROM STATE FORESTS' PLANTATIONS IN THE SOUTHERN CRA REGION

	Sawlogs (m^3) per annum	Pulpwood (tonnes) per annum
Current harvest	1 313 000	563 000
Potential harvest 2002 [a,b,c]	1 483 000	987 000
Potential harvest 2020 [a,b,c]	1 582 000	792 000

a) Potential 2002 level of yield based on current plantation resource including an expansion of 30 000 ha. at Tumut over the next ten years
b) Sawlog availability predicated on the sale of all pulpwood.
c) Potential yields represent sustained annual levels when normal age class distribution is achieved (even areas of all age classes). Short term availability of pulpwood exceeds long term sustainable level due to backlog of thinnings.

Source: SFNSW

Table 5.A indicate the potential yields from the current and expanded plantation estate. The expansion of the plantation estate is based on an approximate increase of 1000 hectares per year. The potential harvest in 2002 is based on the current plantation resource. Additional plantings from 1998 to 2002 will have no influence on timber availability at 2002 given their lack of merchantable product. The potential harvest in 2020 is based on the expansion program currently underway to provide pulpwood for Visy Industries as well as existing commitments.

Yield regulation:
The system used by State Forests of NSW is based around yield tables. The yield table contains potential wood production over time, given a prescribed silvicultural regime. Yield type can be derived a number of ways. The FRI (Forest Research Institute) New Zealand software product known as STANDPAK, is used to model silvicultural regimes and produce a yield table.

Yield scheduling:
The yield table is assigned to compartments. The resulting file is imported into a SPECTRUM linear program interpreter (by the USDA Forest Service Inventory and Monitoring Unit) and solved. The solution reports on long term sustainable wood flows and takes into account a variety of forest estate constraints. These constraints include long-term wood supply agreements and minimum clearfell ages for yield tables.

Inventory:
The inventory system used by State Forests of NSW is called MARVL, (Method of Assessment of Recoverable Volume by Log Grades) from the FRI New Zealand. This system relies on temporary plots where all trees are measured for dbhob (diameter breast height over bark) and log quality factors are recorded. The inventory results can indicate growth rates and potential volume recoveries. The inventory results are used as a basis to monitor harvesting yields.

5.1.3 Plantation forest silviculture

Establishment

General site preparation on first rotation sites is as follows:

- Mounding and ripping (spot cultivation on steeper sites) to 600mm.
- Aggressive grass control through knockdown and residual herbicide application.
- Genetics matched to site conditions (eg.) cuttings.
- Hand or machine planting

General site preparation on second and subsequent rotations is as follows:

- Chopper rolling or burning of residual slash depending on amount of slash from first rotation
- Mounding and ripping (spot cultivation with excavator on steeper sites) to 600mm
- Aerial spraying with herbicide to reduce competition
- Hand or machine planting

Management

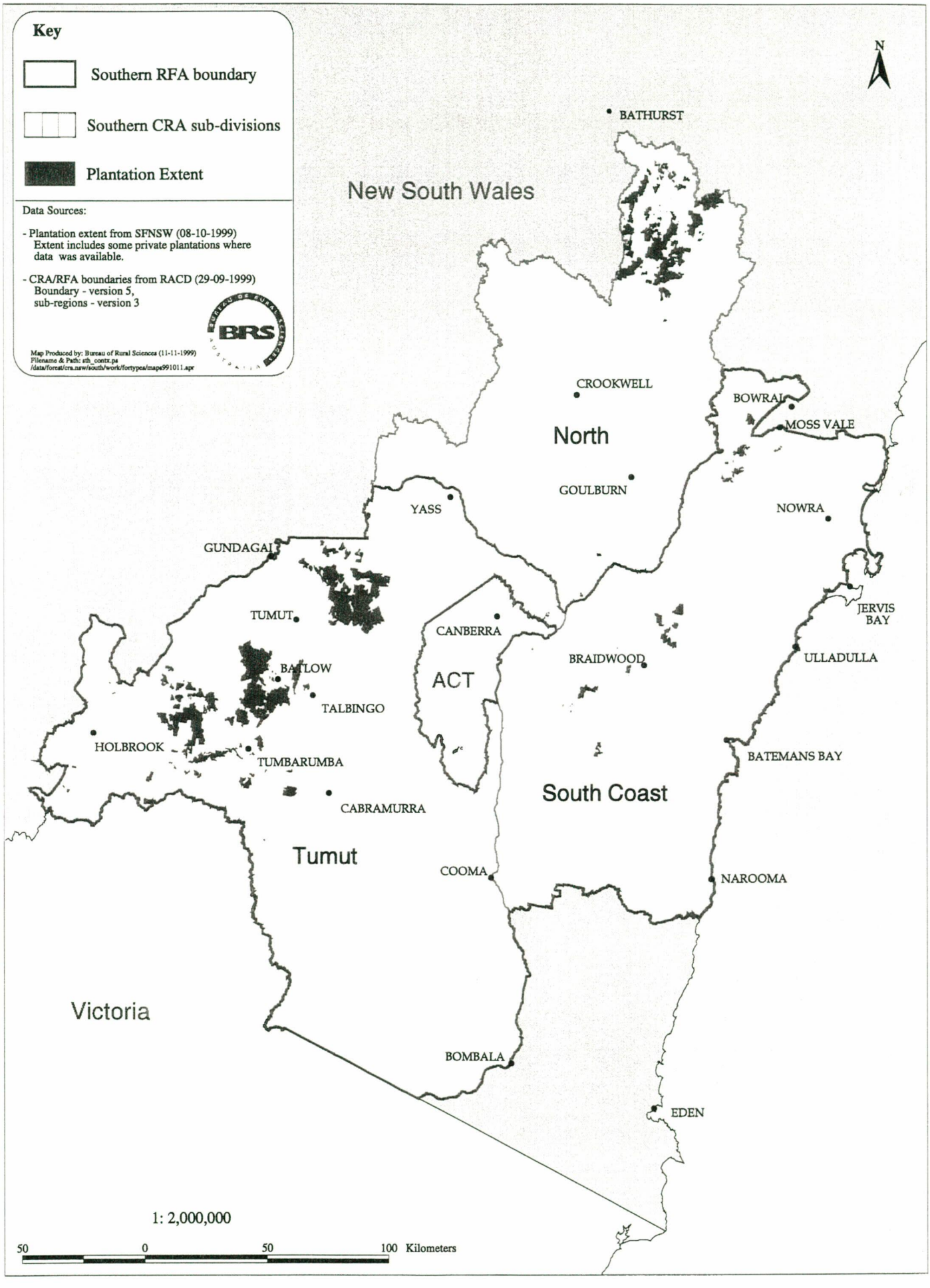
First thinning operations are normally carried out at about age 13 or 14, although many stands have had delayed thinning histories due to the lack of a reliable pulp market. Stands which are thinned on time would normally have a second thinning at about age 21 followed by a third thinning at about age 28 and a clearfelling at about age 33 to 35. The trend is towards two thinnings rather than three and an earlier clearfelling age.

Stands which are subjected to a delayed thinning regime would normally have only one thinning at about age 17 to 20 followed by an earlier than normal clearfelling (age 28 to 30) while stands which remain unthinned (eg. on steeper sites) would also be subjected to an earlier clearfelling.

Fertiliser is limited to post thinning booster applications applied to the most productive sites and remedial boron treatment at an early age where the soil is deficient in that mineral.

Pruning is carried out on the higher productivity, generally ex pasture sites, which may have excessive side branching if left unpruned. The aim being to control branching on the first 6 metres and provide a better economic return on the high productivity sites. This will ultimately produce high value clearwood (wood without branch knots).

Map 5a - Plantation Extent in the Southern CRA region, NSW



6. PRIVATE NATIVE FOREST MANAGEMENT

6.1 INTRODUCTION

Private native forests make up a large area of the Southern CRA region. There are 13 sawmills in the Southern CRA region, which utilise wood from private native forests, with 5 sawmills relying almost solely on this resource. These sawmills had an intake of approximately 19 300 m^3 for the year 1996/97, which made up about 14 per cent of the region's intake of logs for that year.

6.2 PRIVATE FOREST MANAGEMENT

Private landowners in NSW who intend to harvest native forest on their land, are confronted with the dilemma of having to deal with a number of agencies, such as the Department of Land and Water Conservation (DLWC), the National Parks and Wildlife Service (NPWS), the Environment Protection Authority (EPA) and their local shire council. Those who have not previously harvested their native forest, must first determine whether it contains State Protected Land (previously known as Protected Lands under the Soil Conservation Act 1938). State protected land is identified as:

- Land mapped as generally having a slope greater than 18 degrees to the horizontal; or
- Land which is within the bed or within 20 m of the bank of a prescribed or mapped river and lake; or
- Land which has been mapped as environmentally sensitive or liable to soil erosion, siltation or land degradation.

Clearing (including logging) of native vegetation and exotic trees on State protected land requires a development consent from the DLWC under the *Native Vegetation Conservation Act 1997* (NVC Act). Clearing (including logging) of native vegetation on areas other than State protected land also requires consent under the NVC Act unless it falls under an exemption for 'Private Native Forestry'. DLWC follows a standard suite of conditions, which are used in selecting appropriate conditions for the development consent. Appropriate conditions are selected after a site assessment has occurred. A site assessment involves an officer from DLWC conducting a survey of the land to be harvested, including determining what species are present, the diameter at breast height (dbh) of particular trees, and areas to be protected. The impact of the logging proposal on threatened flora and fauna, and on soil erosion and water quality is also assessed. This results in a map of the property, indicating where harvesting can occur and

conditions on how these areas are to be logged. A development consent would therefore stipulate the conditions, under which harvesting can occur on State protected land.

There are currently two categories of conditions:

1. Conditions to mitigate the impact of logging on the habitat of endangered flora and fauna,
2 Conditions of authority to mitigate the impacts of logging on soil erosion and water quality. In some parts of the State, selection of these conditions may be assisted by a decision support system known as LOGSPERT*.

Some of the conditions to mitigate the impact of logging on the habitat of endangered fauna are:

- Keep half the trees above 40 cm in diameter;
- Six trees per hectare must be retained as habitat trees;
- Another six trees per hectare must be retained as recruitment trees (25-60 cm dbh);
- Minimise disturbance to understorey shrubs during logging operations; and
- Reserve a minimum 20 m wide protection strip, of riparian forest, on either side of all drainage lines. (DLWC, 1997a).

The LOGSPERT conditions of authority covers roading, drainage, crossings, windrows, and snigging tracks (DLWC, 1997b).

During or after harvesting, an officer from DLWC may check whether any conditions have been contravened, particularly in cases where they believe there is a cause for concern or there has been a complaint by the public. These conditions regulate soil, water, and biodiversity aspects of native forest management and favour a low intensity logging approach.

Land which is not State protected land, and where the Private Native Forestry exemption applies, does not require a development consent. Such land may be subjected to local shire council restrictions or licencing by NPWS or the EPA.

Local shires and councils may have their own local restrictions or regulations and require a development consent or application. For instance, the Mulwaree Shire Council requires a development application for areas greater than 10 hectares. It also requires a copy of plans of the site, a statement of environmental effects and an application fee (Mulwaree SC, 1999). Private landowners are therefore obliged to check with their local shire or council for these local requirements.

Where private forestry is likely to effect threatened species, populations or ecological communities and is not covered by a development consent, a licence from the NPWS may be required. Where significant impact is likely to occur on threatened species, populations or ecological communities, a species impact statement will have to be prepared.

Private forestry, which results in water pollution from soil disturbance, is an offence unless a pollution control licence from the EPA is obtained. In practice, the EPA does not receive applications from landowners intending to carry out private forestry, and there is no evidence of private forestry being audited by the EPA. However, if the EPA receives any licence applications, they will respond to it. Currently, the EPA licences harvesting activities in State forests, requiring land management practices to reduce the risk of polluting run-off. A similar approach may be taken for Private Native Forestry.

* Logspert is a decision support system, developed by the Department of Land and Water Conservation, to facilitate selection of appropriate conditions.

In conclusion, private landowners face a multitude of restrictions from a variety of authorities, which may or may not be applicable to their particular circumstances. None of these restrictions make any reference to different silvicultural systems in relation to different forest types. Nor does it cover issues of sustainability. DLWC is currently investigating how the sustainability of wood and non wood forest values can be achieved for Private Native Forestry. (Pers. Com. R. Adam, DLWC). Codes of forest practice are already in place on State forests, which are far less confusing and take into account different silvicultural systems and sustainability, however these are not applicable to private native forests.

6.3 LEGISLATIVE REQUIREMENTS

Information in relation to legislation on private property in NSW, was based largely on the report, 'Assessment of management systems and processes for achieving ecologically sustainable forest management in NSW (1998).'

Native timber harvesting on private land is primarily regulated by the *Native Vegetation Conservation Act 1997* (NVC Act). Under the NVC Act, forestry on private land is viewed as a certain type of land clearing, and not in terms of forest management. It focuses on the harvesting side, rather than the broader context of ecological sustainable forest management. Among a range of options for management of native vegetation, it provides for the preparation of Regional Vegetation Management Plans by community based Regional Vegetation Committees. These Plans specify whether or not a development consent is required to 'clear' native vegetation.

The *Environmental Planning and Assessment Act 1979* specifies three types of planning instruments, one of which is the State Environmental Planning Policy. State Environmental Planning Policy 46 (SEPP 46), covered clearing controls and exempted private native forestry from requiring a development consent to clear native vegetation. Under the SEPP 46 exemption, private native forestry is defined as, 'the clearing of native vegetation in a native forest in the course of its being selectively logged on a sustainable basis or managed for forestry purposes (timber production)' (Parsons, 1999). The introduction of the NVC Act repealed SEPP 46, but the exemptions continue to operate under transitional provisions in the Act unless replaced by a Regional Vegetation Management Plan.

The NVC Act covers many areas, which were previously encompassed by other Acts. The Soil Conservation Act previously contained protected land, those conditions have now been transferred over to the NVC Act and is now referred to as state protected land. The *Threatened Species Conservation Act 1995 Part 6* requires a licence to damage threatened species, their habitat or ecological communities. A licence is not required if the activity has a development consent under the NVC Act. However, if no development consent is required, then a licence from the National Parks and Wildlife Service may be needed.

Regulation of private native harvesting is conducted by the NVC Act which imposes conditions under which harvesting can occur. In addition, tree preservation orders may regulate logging where they apply to rural areas. In certain council areas, harvesting activities are covered under local environment plans made under the *Environmental Planning and Assessment Act 1979.*

The *Environmental Planning and Assessment Act 1979,* provides for Local Environment Plans under which the shire or council is divided into different zones such as rural zone, and rural residential zone etc. Councils may require a development consent for 'clearing' in some or all zones. Councils implement planning responsibilities differently, and may refuse consent, or impose a range of conditions on the consent. Time and dollar costs are involved in making development applications and appeals can be made to the Land and Environment Court.

In conclusion, private forestry is encompassed by a number of Acts. The *Native Vegetation Conservation Act 1997* regulates harvesting and imposes restrictions that were previously encompassed by other Acts. Harvesting covered by exemption may come under other legislation such as the *Environmental Planning and Assessment Act 1979* or the *Threatened Species Conservation Act 1995.*

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