

# Private native forests in Australia: What did we learn from the Regional Forest Agreement program?

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## Summary

There are 164<sup>1</sup> M ha of native forest across Australia, with 37<sup>1</sup> M ha in private ownership. A further 74<sup>1</sup> M ha are under private management in a variety of leasehold tenures. Across the Regional Forest Agreement (RFA) regions, about 25% of sawlogs (~878 000 m<sup>3</sup> y<sup>-1</sup>) were sourced from private forest prior to the RFAs. Privately managed forests are an important source of timber in many regions and provide other goods and services, including grazing, honey, water, biodiversity conservation and carbon storage. This report summarises the status and some aspects of management of private forests based on information from the National Forest Inventory and the Comprehensive Regional Assessments (CRA) that underpinned the RFA program. The private commercial native forests are in Queensland, New South Wales and Tasmania with smaller areas in Victoria and Western Australia. South Australia and the Northern Territory also have considerable areas of private forest, but only a small proportion could support commercial timber production. In most regions there is a relatively even distribution of the principal forest types on public and private land, but commonly some forest types in private ownership are either absent or poorly represented on public land. A number of RFAs include specific actions to conserve examples of these.

About 32% of the forests studied for RFAs are in private ownership, but generally forest use options considered only public native forests. However, because ecological vegetation classes were mapped for all tenures in all regions, significant information was generated on the distribution and conservation values of private forests. There were also timber assessments at the strategic level in some regions, and private timber production was documented for most regions.

Management and disturbance history of private forests is overall not well documented. Disturbances such as fire and grazing, however, commonly cause impacts that differ from conditions in similar forest types on public land. Substantial areas of private forest have previously been cleared and are now in a regrowth condition.

The primary outcomes of the RFAs for private land were improved knowledge of the forest estate and its management history: across

all CRA/RFA regions, maps of forest types or forest ecosystem equivalents were produced, and statistics on areas and conservation values were derived. The identification of ecosystems occurring predominantly on private land and under-represented in the comprehensive, adequate and representative reserve system is an essential element in developing a conservation strategy across all land tenures.

*Keywords:* private forestry; forest resources; forest management; conservation; Australia

## Introduction

Twenty percent of Australia's land is forested (166 M ha, Table 1, Fig. 1, including plantations). Forests are defined as areas 'dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding two metres with existing or potential crown cover of overstorey strata about equal to or greater than 20%' (National Forest Inventory 1998). About 71% of these forests are woodland (20–50% crown cover); 25% open forest (predominately wet and dry sclerophyll) (51–80% crown cover); and 3% closed forest (81–100% crown cover) comprising 80% rainforest and 20% mangroves. Ownership is 77% public, 23% private. About 58% of the public forest is privately leased, usually for grazing (National Forest Inventory June 2001).

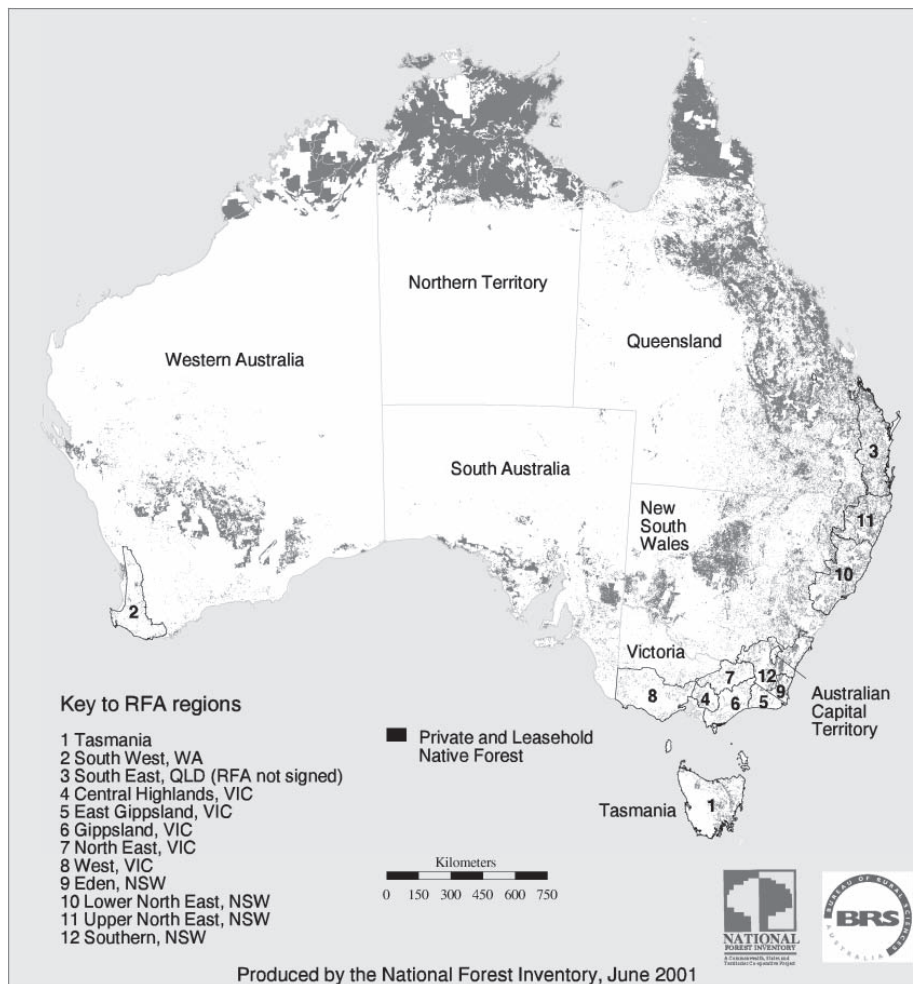
In 1992, the Commonwealth, State and Territory Governments endorsed a National Forest Policy Statement (NFPS) aimed at balancing the competing demands for conservation and industry (Commonwealth of Australia 1992). The NFPS, among other things, established a process for undertaking Comprehensive Regional Assessments (CRAs) to consider resource, economic, social, conservation and heritage values, leading to Regional Forest Agreements (RFAs) between the Commonwealth and State Governments on principles for managing public native forests over the next 20 years (Commonwealth of Australia 1995). The RFA program aimed to develop a comprehensive, adequate and representative (CAR) forest reserve system; to lay the foundations for ecologically sustainable forest management in multiple use forests; and to secure adequate wood supplies for efficient, internationally competitive wood processing industries.

Although about 32% (6.8 M ha) of the native forest in RFA regions are privately owned (Table 2), the RFA process generally

<sup>1</sup>These figures supersede data in National Forest Inventory (1998) and are based on recent mapping for the National Forest Inventory.

**Table 1.** Area of all Australia's forests by broad forest types and tenure (from NFI June 2001, NFI 2002)

Forest type	Private ('000 ha)	Leasehold ('000 ha)	Public and other tenures ('000 ha)	Private and leasehold (%)	Total ('000 ha)
Eucalypt	31 756	56 061	45 581	66	133 397
<i>Tall</i>	2 234	888	5 610	36	8 732
<i>Medium</i>	26 862	40 487	28 118	71	95 468
<i>Low</i>	1 603	10 147	2 090	85	13 840
<i>Mallee</i>	1 056	4 538	9 763	36	15 357
Acacia	2 323	12 628	1 648	90	16 600
Callitris	230	455	263	72	948
Casuarina	97	157	727	26	982
Mangrove	436	116	245	69	798
Melaleuca	917	2 681	493	88	4 092
Other	477	1 627	1 159	64	3 263
Rainforest	1 062	728	2 542	41	4 332
Total native forest	37 299	74 454	52 658	68	164 411
Plantation — all tenures					1 569
Total forest					165 980

**Figure 1.** Distribution of Australia's private and leasehold native forests and regional forest agreement regions

considered only land use options for public native forests. Regional assessments, however, provided significant information on private forests, showing that most regions contain forest types that are either absent or poorly represented on public land. Actions to conserve examples of these are included in a number of RFAs.

The aim of this paper is to provide information on private forests collated during the Regional Forest Agreement program. It

describes the methods used to collect information on private native forests and the results in each of the RFA regions.

### Analysis of private forests in the RFA program

Comprehensive regional assessments for RFAs were undertaken in 12 regions in 5 States covering 44 M ha. This included 18 M ha of public native vegetation, 8 M ha of private native

**Table 2.** Areas of private and public native forest<sup>1</sup> within RFA regions<sup>2</sup> (ha)

CRA region	Area ('000 ha)					Private proportion of total forest estate (%)
	Total for region	Public land forest and non-forest ecosystems	Private land forest and non-forest <sup>3</sup> ecosystems	Public native forest ecosystems	Private native forest ecosystems	
NSW						
Eden	809	420	131	408	125	23%
Upper North East	3 391	1 017	1 210	972	1 193	55%
Lower North East	5 288	1 772	1 441	1 739	1 435	45%
Southern	4 491	1 667	828	1 620	819	34%
South East Queensland	6 086	1 810	1 207	1 507	1 191	44%
Tasmania	6 625	4 036	2 598 <sup>4</sup>	2 262	943	29%
Victoria						
Central Highlands	1 130	610	115	585	107	15%
East Gippsland	1 217	1 060	67	966	63	6%
Gippsland	2 676	1 382	198	1 235	178	13%
North East	2 318	1 076	175	1 052	174	14%
West	5 762	757	255	714	247	26%
Western Australia	4 136	2 283	351	1 932	303	14%
Totals	43 929	17 890	8 576	14 531	6 778	32%

<sup>1</sup>Forest in this table is defined as ‘a vegetation type dominated by woody vegetation having a mature or potentially mature height exceeding 5 m, with overstorey canopy cover >20%’

<sup>2</sup>Sourced from various CRA reports and information base

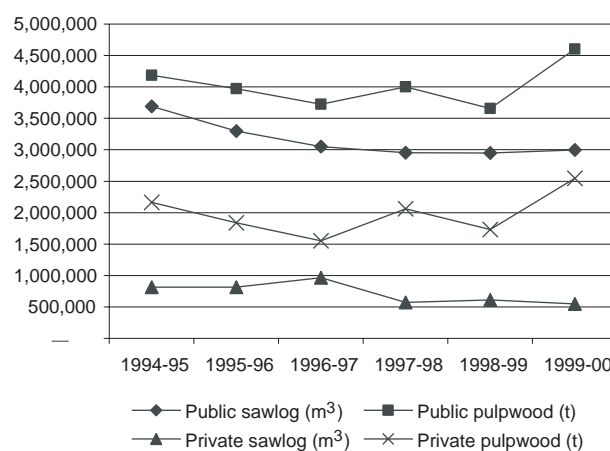
<sup>3</sup>Includes only private land carrying native vegetation, which excludes cleared private land (with exception of Tasmania)

<sup>4</sup>Includes cleared private land

vegetation, including almost 7 M ha of forest, and 18 M ha of predominantly cleared private land (Table 2). The combined area of public and private forest was 21.3 M ha, representing 13.56% of Australia’s native forest (Table 2) and most of its wood-producing forests. RFAs have been signed for 11 of the 12 regions.

During 1994/95–1999/2000 an annual average yield of 3.88 M m<sup>3</sup> of sawlogs and 6 M t of pulpwood were removed from Australia’s native forests (Fig. 2), including 3.16 M m<sup>3</sup> of sawlog and 4 M t of pulpwood (72% of total removals) from public forests and 0.72 M m<sup>3</sup> of sawlog and 2 M t of pulpwood from private forests. Across Australia, in 1997/98, 455 sawmills relied entirely on private timber; a further 397 sawmills sourced timber from both public and private forests (ABARE 2000). RFAs and pre-RFA State land use decisions such as the introduction of land clearing controls in NSW and the 1995 NSW Forest Reform Strategy (NSW CRA/RFA Steering Committee 1998a) have reduced the removal of public and private sawlogs from 4.51 M m<sup>3</sup> in 1994/95 to 3.55 M m<sup>3</sup> in 1999/2000 (Fig. 2). Pulpwood yields, however, have increased slightly from 6.3 M t in 1994/95 to 7.1 M t in 1999/2000, partially due to lifting of export restrictions following signing of RFAs in addition to market factors. The future impact of these changes on private forest harvesting is unclear, but increased pressure for sawlogs is expected in Queensland and NSW where private forest resources substantially supplement public timber supplies.

Private forests also have significant conservation values. In some cases they contain vegetation types that are either under-represented or absent on public land, including rare or endangered communities that have been identified as priorities for conservation (Table 3).



**Figure 2.** Timber harvested from Australia’s native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

Information on private native forests collected during comprehensive regional assessments mainly related to forest ecosystem conservation status and timber harvesting activity. Assessment methods varied between regions, depending on the available information base and the nature of forest utilisation, and are discussed below.

### New South Wales

#### Status of CRAs and RFAs

There are 27 M ha of native forest in NSW (National Forest Inventory June 2001), of which 7 M ha are under private

**Table 3.** Significance of private native forests in RFA regions for timber production and conservation

CRA/RFA region	Private timber harvest <sup>a</sup> (m <sup>3</sup> y <sup>-1</sup> )	Post-RFA public timber commitment (m <sup>3</sup> y <sup>-1</sup> )	Number of Ecological Vegetation Classes (EVC) in region	Number of Forest EVC in region	Number of Private Native Forest (PNF) ecosystems	Number of PNF priority conservation ecosystems
NSW						
Eden	3 000	25 000	73	56	52	7
UNE	79 000	109 000	162	151	146	56
LNE	206 000	160 000	199	188	179	85
Southern	19 000	83 600	159	139	81	34
SE Queensland	210 000	109 000 <sup>b</sup>	142	129	N/A	N/A
Tasmania	251 000	310 000 <sup>c</sup>	50	50	44	23
Victoria						
Cent. Highlands	10 000	345 000 <sup>d</sup>	40	25	22	10
E. Gippsland	Negligible	250 000	44	25	17	3
Gippsland	6 000	115 000	120	63	46	21 <sup>e</sup>
North East	<1000	68 000	57	48	41	15
West	24 000	77 900	260	183	144	129 <sup>e</sup>
Western Australia	69 000	544 000 <sup>f</sup>	27	21	21	5
Totals	878 000	2 199 400	1333	1078	793	389

<sup>a</sup>Figures derived from CRA/RFA documents. (Differences between figures in Table 3 and Figs 2–7 are attributed to different sources of data.) Pre-RFA timber harvest is not necessarily reflective of future supply or availability

<sup>b</sup>There was no RFA signed in Queensland. This commitment in the South East Queensland Forest Agreement is to be supplied until 2025.

<sup>c</sup>Includes 10 000 m<sup>3</sup> y<sup>-1</sup> *Acacia melanoxylon* (blackwood) and 300 000 m<sup>3</sup> y<sup>-1</sup> eucalypt sawlog/veneer

<sup>d</sup>This represents the current supply commitments. Legislated sustainable yield is 415 000 m<sup>3</sup> y<sup>-1</sup>

<sup>e</sup>Includes only ecosystems identified as rare, endangered or threatened

<sup>f</sup>Includes 464 000 m<sup>3</sup> y<sup>-1</sup> *Eucalyptus marginata* (jarrah) and *E. diversicolor* (karri) first and second grade sawlogs, and 80 000 m<sup>3</sup> y<sup>-1</sup> *Corymbia calophylla* (marri) sawlogs and excludes the effect of recent changes in Government policy

ownership. CRAs were undertaken for four regions: Upper North East (UNE) and Lower North East (LNE) which were combined into one RFA; Eden; and Southern; and covered about 40% of the NSW private forest estate.

### Data and analysis for private forests

The following information was collected for private native forests in NSW CRAs.

1. New forest type mapping was undertaken for all regions using a combination of aerial photograph interpretation, computer modelling and expert analysis. The result was the distribution of different vegetation types mapped as Ecological Vegetation Classes at 1:100 000 scale (Commonwealth and NSW Regional Forest Agreement Steering Committee 1999a,b; Thomas *et al.* 2000). This mapping was used to identify rare and endangered ecosystems for conservation planning and contributed to updated assessments of sustainable yield from publicly managed forests (SFNSW 1999).
2. The extent of forest ecosystems before European settlement (pre-1750) was mapped using a technique that related the probability of occurrence of forest ecosystems to environmental and geographical variables (Commonwealth and NSW Regional Forest Agreement Steering Committee 1999a,b; Thomas *et al.* 2000).
3. Historical timber harvest volumes from public and private forests (NSW CRA/RFA Steering Committee 1998a, 1999a,b) were assessed, using records from State Forests New South Wales (SFNSW), and from Harris-Daishowa Pty Ltd in Eden.

4. In northern NSW an assessment of potential future timber production from private forests was partially completed. This involved an assessment of historical production and a management intent survey of private native forest owners (Northern NSW Forestry Services and Bureau of Rural Sciences 1999). Survey forms were mailed to 2128 landowners from a target population of 10 160 with properties larger than 100 ha in 35 local government areas within the two regions. A response rate of 11.9% (254 responses) yielded data on harvesting history, intention to undertake harvesting, management for conservation or timber production and interest in commercial timber plantation establishment.

## Results

### Forest type, area and tenure

Private forests are significant for timber production and biodiversity conservation across the State, although relatively little wood is obtained from private land in the Eden region (Table 3). This region, however, has some important forest types under private ownership that are not represented on public land and seven forest ecosystems in that region were identified as priorities for voluntary protection on private land.

The CRA process highlighted deficiencies in understanding of the private forest resource, including its levels of utilisation and management practices (NSW CRA/RFA Steering Committee 1998b). Consequently the North East RFA and Southern RFA included commitments to improve knowledge of these forests

through the formation of a private forest management unit within State Forests NSW and through the parties using their best endeavours to promote a private forest inventory in these regions (Commonwealth and NSW Government 2000, 2001).

In the Eden region 23% (125 000 ha of 533 000 ha) of the forest area was on private land (Table 2), but one forest association (black sallee/snow gum) had 68% (8244 ha of 12 111 ha) of its distribution on private land. Seven forest ecosystems and three non-forest ecosystems were identified as priorities for voluntary conservation.

In the Upper and Lower North East regions about 43% of the forested area was under private ownership, including 56% of the dry spotted gum/blackbutt, 50% of the dry sclerophyll and 46% of the dry tableland associations. Fifty-six forest ecosystems on private land in the Upper North East region were identified as priorities for conservation, and seven non-forest ecosystems. For the Lower North East, 85 forest ecosystems and 64 non-forest ecosystems on private land were identified as priorities for conservation.

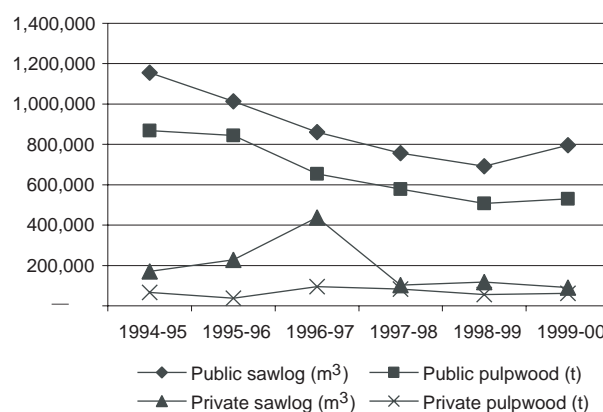
In the Southern region, around one third of the forest area was under private ownership, including major representations of non-eucalypt forest (81%) and western box/red gum (50%).

#### **Forest management: timber utilisation, silviculture and conservation**

In Eden region, private forests make a relatively minor contribution to the industry wood supply (about 10%) (NSW CRA/RFA Steering Committee 1998a). In the Upper and Lower North East regions, an average of 285 000 m<sup>3</sup> of sawlog were harvested annually from private land between 1990/91 and 1996/1997 (Table 3), compared with 466 000 m<sup>3</sup> from public land over 1995/96 and 1996/97 (NSW CRA/RFA Steering Committee 1999a). The NSW CRA/RFA Steering Committee (1999b) report on forest wood resources for Southern NSW indicates that 19 000 m<sup>3</sup> of wood were supplied from private native forest in 1996/97, 25% of the total sawlog harvest in that region.

The introduction of the State Environmental Planning Policy (SEPP) 46 in 1996 had a substantial impact on volumes of timber harvested from private property (Fig. 3). In the Eden region, pulpwood removed from private native forest fell from about 50 000 m<sup>3</sup> y<sup>-1</sup> prior to SEPP 46 to less than 2000 m<sup>3</sup> y<sup>-1</sup> (NSW CRA/RFA Steering Committee 1998a) after its introduction. In Northern NSW, private property timber removals gradually declined from about 500 000 m<sup>3</sup> y<sup>-1</sup> in 1974/75 to the current levels of just below 300 000 m<sup>3</sup> y<sup>-1</sup>. It is not clear how much of this timber was harvested from managed native forests compared with land clearing operations.

Silvicultural systems used in NSW private forests closely reflect those used in State forests, but the practices are driven largely by market factors rather than stand management or regeneration requirements. In Southern NSW, these systems range from heavy selection to seed tree operations where there is access to a pulpwood market, through to gap selection and light selective harvesting operations, whereas in northern NSW the system is predominantly 'gap' selection. Historically, management practices



**Figure 3.** Timber harvested from New South Wales native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

in most private forests have been driven largely by the desire to sell timber to produce supplementary income for landowners. Therefore owners commonly sell timber when they require additional income or when the industry demand rises. Resultant stands are dominated by young to semi-mature regrowth, but a fairly consistent pattern of late winter and spring burning to control undergrowth and promote native pasture for cattle grazing has resulted in there being more open stands than in similar forests in public ownership (Northern NSW Forestry Services 1994, 1996).

Moist forests such as flooded gum (*Eucalyptus grandis*), moist hardwoods, and moist blackbutt (*E. pilularis*) have the greatest potential for timber production which encourages managers to be more selective in harvesting these forests (Northern NSW Forestry Services 1994, 1996). The drier spotted gum (*Corymbia maculata*) forests have a history of more intensive utilisation in the form of either heavy selective harvesting or partial clearing to provide pasture. The combination of high costs for regrowth control and pasture improvement, together with poor soils, have resulted in significant areas of these drier forests returning to regrowth and open woodland. These may have limited future timber-production potential unless markets can be found for thinnings that would enable implementation of silvicultural management to improve stand quality (Northern NSW Forestry Services 1994, 1996).

## **South East Queensland**

### **Status of CRA**

A CRA was undertaken for the South East Queensland region, but no RFA between the State and Commonwealth Governments has been signed. The Queensland Government has entered into an alternative agreement, the South East Queensland (SEQ) Forests Agreement, with a number of key stakeholders; and this provides the basis for timber production and future management of public native forest.

Forty-four percent (1.2 M ha of 2.2 M ha) of native forest in the CRA region is privately owned (Table 2). Private forests are significant for the supply of timber to local industries and for regional biodiversity conservation.

### Data and analysis for private forests

- Vegetation across all tenures in the whole region was mapped at 1:100000 scale using a minimum polygon size of 20 ha, yielding maps of existing remnant native vegetation and pre-1750 vegetation (Queensland CRA/RFA Steering Committee 1998). The vegetation was classified into regional ecosystems (REs), based on biotic and physical landscape components. Pre-European or pre-1750 vegetation types were determined using aerial photographs (1962–1986) and expert knowledge of the association of vegetation with landform, soils and geology. The distribution of remnant vegetation was based on 1995 Landsat imagery interpreted through the State landcover and tree study (Queensland Department of Natural Resources 1999).
- An assessment of old growth was undertaken across about 45% of the forested private land in SEQ.
- Standing volume and sustainable sawlog yield from private forests were estimated by a simple survey and modelling.

### Results

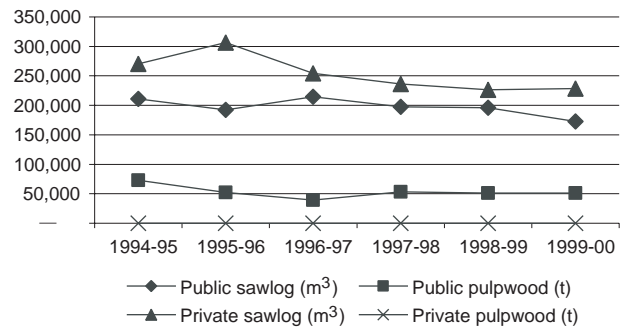
#### Forest types, tenure and area

Broad forest types are generally evenly distributed across public and private land tenures (Table 2), with a larger proportion (80% or 38000 ha) of moist spotted gum forest on private land. A significant proportion (nearly 70% or 45000 ha) of blackbutt forest types and most rainforest (183000 ha of 252000 ha) are on public tenures.

#### Forest management: timber harvesting, silviculture and conservation

Queensland has diverse native forests ranging from coastal rainforest to dry cypress, eucalypt and inland acacia forests. The more intensive silviculture regimes used in southern Australia are not applied in Queensland because of differing ecological requirements of the commercial species, the mix of commercial and non-commercial species and lack of markets for residual timber. The management approach to public forests generally involves selection systems based on specification of a minimum diameter limit for cutting that varies with species group. In some cases, silviculture on private forests mimics practices in State forests; but there is a wide variation in management, from complete protection to permanent clearing for agriculture (Department of Primary Industry 1998). In public forests, cutting rules generally aim to harvest mature and over-mature stems. In some cases, these diameter-limit cutting systems result in 'high grading' of the forest, because sub-dominant, defective, suppressed and non-commercial species are retained (Taylor and Annandale 2000), although these can provide habitat important for conservation purposes.

Over 60% of the total volume of timber harvested in SEQ comes from private native forests and this figure is reflected more broadly across Queensland (Table 3, Fig. 4). Sawmillers surveyed in the SEQ region estimated that about 62% of their timber was derived from forest managed for ongoing timber production, 16% from thinning for grazing, and 15% from clearing (Queensland CRA/RFA Steering Committee 1999). Using a roadside visual

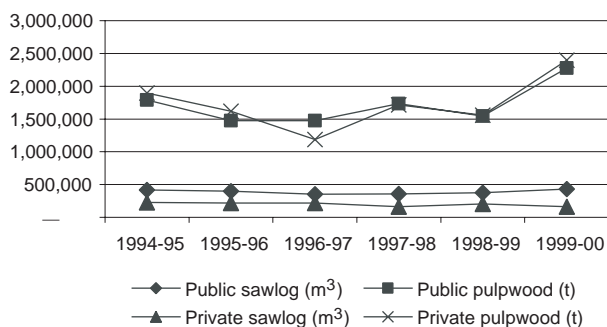


**Figure 4.** Timber harvested from Queensland native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

assessment and limited ground sampling, standing volume of the extensive private resource was estimated to be 2.7 M m<sup>3</sup>. The accuracy and precision of this estimate was considered low; in particular there was a poor relationship between visual assessments and volumes estimated from actual measurements: measured volumes were about 60% more than the visual estimates. In addition, State sawlog standards were used: these make no allowance for potential small sawlogs or recruitment of trees currently less than 40 cm in diameter, and exclude low-volume sites from volume considerations (Queensland CRA/RFA Steering Committee 1999).

The potential annual yield of timber from private forests was estimated to be 215000 m<sup>3</sup>, but if future harvesting is restricted to only those areas currently containing saleable timber, then future yields might amount to as little as 45000 m<sup>3</sup> y<sup>-1</sup>. This latter estimate, however, also has serious limitations because of the modelling approach used and the discounting of potential future yields from areas carrying less than 2 m<sup>3</sup> of sawlogs per hectare. Nevertheless, it was suggested that the current rate of harvesting in private forests is unsustainable and that a reduction is essential to avoid exhausting this resource (Queensland CRA/RFA Steering Committee 1999).

The Private Lands Working Group (1999) for the Queensland CRA/RFA process recommended a range of institutional changes to support sustainable forest management, such as establishment of codes of practice for private lands and mechanisms to ensure their adoption, linkages with tree clearing controls, and co-ordination with local government planning processes. These changes are currently being pursued within the development framework of the proposed Queensland Forest Practices System (QFPS). Key features of the QFPS include incorporation of a forest practices code; self-regulation with government oversight; a private forest registration system to demonstrate harvest security; and being complementary to existing local government planning mechanisms under the *Integrated Planning Act 1997* (Herd *et al.* 2000). The Private Lands Working Group also recommended that consideration be given to establishing a clear lead agency for private forestry (Commonwealth and Queensland RFA Steering Committee 1999). This agency would have responsibility for undertaking or coordinating policy, regulation, research and development together with training and advisory services, including the promulgation of planning policies, codes and



**Figure 5.** Timber harvested from Tasmanian native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

guidelines. Currently the Departments of Primary Industry, and Natural Resources and Mines, the State Development Authority, the Environmental Protection Agency, Regional Plantation Committees, Greening Australia and local governments all have some involvement with private land regulation and/or provision of management advice.

## Tasmania

### Status of CRA and RFA

Tasmania supports an extensive and varied forest estate. Native forest and plantations cover about 3.1 M ha or 47% of the total land area. About 30% of these forests are available for wood production, and about 40% of them are privately owned by farmers or large publicly listed companies (Commonwealth and Tasmanian Government 1996b). Consequently, private forests represent a significant resource for current and future long-term wood supply, providing 40% of the total annual cut of sawlog (250 000 m<sup>3</sup> of 551 000 m<sup>3</sup>) and almost 2 M t of pulpwood per year (Fig. 5, Table 3).

Management of private forests has been a major consideration in Tasmania for over 20 years. For example, the Everett Gentle Inquiry of 1977 resulted in the appointment within the Forestry Commission of a Private Forests Commissioner and the establishment of a Private Forestry Division (Tasmanian Public Land Use Commission 1996). Subsequently this became Private Forests Tasmania, a statutory authority under the Private Forests Act, which facilitates management of forests on private land. It provides advice to private forest managers on sustainable management of their forests and marketing and sale of products, and advice and assistance to the Forest Practices Board on matters relating to implementation of the Private Forests Act. This is the only statewide organisation providing such advice for private land in Australia. Resource-level inventories of Tasmania's private forests were conducted in the 1980s and 1990s. Thus, there has been a greater focus on the management of private forest than in most other States, due in part to the higher proportion of private forests (Herd *et al.* 2000) and the continued development of timber and woodchip processing as major industries reliant upon both the public and private resource.

### Data and analysis for private forests

Three projects on private forests were initiated as part of the CRA: a survey of private forest owners addressing a range of social and economic issues, a review of inventory information requirements, and a review of modelling techniques to quantify the public and private resource (Commonwealth and Tasmanian Government 1996a).

The distribution of 50 forest communities was mapped at a scale of 1:100 000 using a minimum polygon size of 25 ha. The forest ecosystem assessment included 1:100 000 digital coverages of both current and pre-1750 vegetation, the current reservation status and the identification of rare and endangered ecosystems (Commonwealth and Tasmanian Government 1996b). Pre-1750 forest ecosystem assessment was based upon environmental modelling, remnant site data and expert knowledge. Forest ecosystem assessment was undertaken using a combination of existing mapping, expert analysis and field validation.

Forestry Tasmania and Private Forests Tasmania used the same mapping convention and assessment procedure for their forest assessment and modelling of long-term timber production. This is based on forest type mapping using a commercially-oriented forest type classification system. The inventory system for private forests allocates the PI forest types to similar forest classes which are allocated yields by product type. Based upon these forest classes, a stratification system was developed to survey landowners in each of these forest classes to assess their management intent. On the basis of responses to these surveys, in addition to information from large industrial private forest owners and assumed intent for private timber reserves, potential scenarios are modelled for timber yields on a statewide basis. Private Forests Tasmania undertook its 5-yearly resource update in late 2001, including the owner-intent survey, to determine landowners' interest in long-term timber production.

## Results

### Forest type and area

A number of forest types occur mainly on private land; for example 96% (109 000 ha) of *E. viminalis* grassy forest, 89% (15 600 ha) of other eucalypt, and over 60% (22 100 ha) of *E. pauciflora* forest, dry sclerophyll forest (103 900 ha), *E. viminalis* wet forest (2900 ha) and *E. tenuiramis* forest (47 700 ha).

An estimated 115 183 ha of private native forest ecosystems were required for protection to meet the general JANIS criteria (JANIS 1997) for forest communities and old growth, and they cover 23 of the 50 identified forest communities (Tasmanian Public Land Use Commission 1997). An area of 114 100 ha exists on private land but would not necessarily be available. The RFA contains a commitment to spend \$30 M for actions to implement a program to protect conservation values on private land (Department of Primary Industries, Water and Environment 1998).

### **Forest management: timber utilisation, silviculture and conservation**

Private forests represent a significant resource for current and future long-term sawlog and pulpwood supply. Silviculture in Tasmania's native forests is generally more intensive than in other States, partially associated with access to markets for utilisation of both sawlogs and pulpwood but also because wet forest types are more successfully regenerated through clearfell or seed tree type systems. The silviculture can generally be described in four broad areas.

1. Clearfelling or seed-tree systems are generally practised in the wetter forests and some of the dry forests, with regeneration established through artificial sowing or from retained seed trees following either mechanical disturbance or regeneration burning to create receptive seed bed.
2. Shelterwood systems are used on more uniform forests at high altitude and exposed sites where a two-stage harvest occurs, with the initial harvest retaining a basal area of 12–14 m<sup>2</sup> ha<sup>-1</sup> on wetter sites and 9–14 m<sup>2</sup> ha<sup>-1</sup> on dry sites. Shelterwood is removed following attainment of a satisfactory distribution of seedlings taller than 1.5 m.
3. Selection harvesting systems are used in either multi-aged stands or on higher or drier sites.
4. Regrowth or potential sawlog retention is used where stocking of at least 200 well distributed, potentially commercial stems per hectare or 100 such stems greater than 25 cm diameter are retained following harvesting (Peter Taylor, Private Forests Tasmania, *pers. comm.*).

The management strategy adopted by Tasmania has been to maintain a permanent private native forest resource whereby each hectare clearfelled has to be replaced by either one hectare of native forest or a minimum of half a hectare of new plantation. Each hectare selectively harvested has to be replaced by a hectare of regenerated native forest. This regeneration need not occur on the area that has been harvested (Commonwealth and Tasmanian Government 1997, Attachment 9).

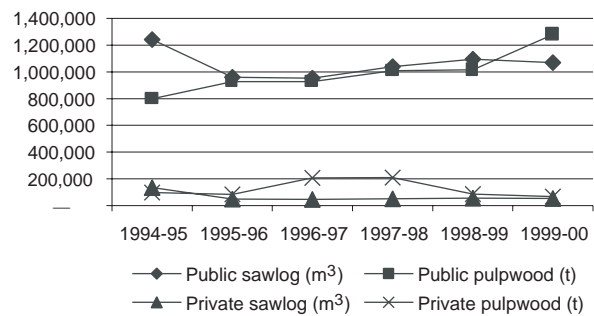
## **Victoria**

### **Status of CRAs and RFAs**

CRAs were undertaken in five regions in Victoria: East Gippsland, Central Highlands, North East, Gippsland and West. The proportion of native forest under private ownership is considerably lower than for most other States at only 14% or 768 000 ha of the total forested estate of 5.3 M ha (Table 2).

### **Data and analysis for private forests**

In each Victorian RFA a set of similar methods was used to assess and map ecological vegetation classes (EVCs) across all tenures. Although the original mapping was at a variety of scales, from 1:25000 to 1:250000 depending on the purpose, the mapping for RFAs used a consistent presentation scale of 1:100000. The EVCs were derived from floristic forest type mapping. The pre-1750 extent of each EVC was derived from distributions of remnant vegetation and extrapolation based on a variety of physical and environmental variables. There was heavy reliance



**Figure 6.** Timber harvested from Victorian native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

on assessments by experts with extensive field knowledge of the areas surveyed.

No assessments were made of potential timber resources on private land, and limited information was provided on volumes harvested from private land.

## **Results**

### **Forest types, area and tenure**

The Victorian RFA regions contain smaller areas of private forest than do those in NSW, Queensland and Tasmania. For example, only 15% of the forest in the Central Highlands is on private land, 6% in East Gippsland, 26% in the Western region, 13% in Gippsland and 14% in the North East. However, more than half the area of a number of woodland vegetation classes in North East Victoria, grassy forest classes in West Victoria, and the 'wet forest' vegetation class (36500 ha of 68500 ha) in Gippsland occur on private land.

### **Forest management: timber utilisation, silviculture and conservation**

Comparatively small volumes of timber are harvested from Victorian private native forests, with about 40 000 m<sup>3</sup> harvested in 1996/97 (Table 3) (Commonwealth and Victorian Regional Forest Agreement Steering Committee 1996, 1997b, 1998b, 1999b, 2000c). On average, 65 000 m<sup>3</sup>y<sup>-1</sup> was harvested from 1994/95 to 1999/2000 (Fig. 6). No central agency is responsible for keeping records on private timber harvesting, although local governments regulate activity to some extent and the Department of Natural Resources and Environment has a private forest section, but this primarily concentrates on plantation-related issues. An accurate assessment would require consultation with industry in each local government area where harvesting occurs. Local governments generally approve harvesting operations after seeking guidance from the Department of Natural Resources and Environment regarding any specific management issues related to rare and endangered species.

Current Natural Heritage Trust projects in East Gippsland, West Gippsland and the West regions provide some guidance for private land managers who seek management advice. Because the same contractors generally operate in both forest tenures, silvicultural

practices in privately managed forests are generally similar to those used in public native forest and range from selective harvesting through to seed tree operations, depending on forest characteristics and the availability of pulpwood markets.

CRA documents note the importance of private land, where a number of vegetation classes predominantly occur. As a result all RFAs, except in the West region, identify EVCs that are largely represented on private land as priorities for conservation. Each of these RFAs has similar wording for voluntary strategies to protect CAR values on private land, including options for land purchase, covenants on freehold land, and co-operative agreements. All aim to achieve conservation objectives with the voluntary consent of affected landowners. Victoria is committed to review private land in the RFA regions of Gippsland, West Victoria, North East Victoria and the Central Highlands in consultation with landowners for their possible incorporation in regional vegetation plans by 2001 (Commonwealth and Victorian Regional Forest Agreement Steering Committee 1997a, 1998a, 1999a, 2000a,b).

## Western Australia

### Status of CRA and RFA

Although the Western Australian CRA provided base data on private forests for the calculation of reservation targets, private forest lands were generally not considered in the development of options for the RFA Directions Report. A notable exception was the \$9.5 M purchase of 3175 ha of land owned by the Worsley timber company around the Wellington dam to protect the North West Jarrah ecosystem through its inclusion in the Wellington National Park. However, the CRA did not consider the timber values of private native forests in the region (Media Statement, Minister Edwards 1999).

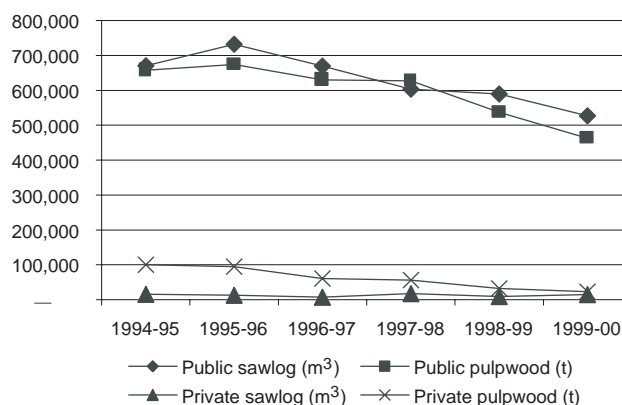
### Data and analysis for private forests

The CRA included a project aimed at mapping remnant native forest and woodland vegetation on private and public land using remote sensing and modelling (Matiske Consulting 1997). Subsequent analysis removed plantations and public land from the database to derive a total of 350649 ha of remnant native vegetation on private land (forest and non-forest). These remnant patches were attributed to forest types using a statistical relationship between forest ecosystems and vegetation complexes (Commonwealth and Western Australian Government 1999). The final maps show ecological vegetation classes at 1:100000 scale, with detailed mapping of vegetation complexes at 1:50000 scale.

## Results

### Forest type, tenure and area

About 1.8 M ha (44%) of the West Australian RFA region is private land, of which 303000 ha is forest (Table 2), mostly in small, fragmented remnants with 91% of properties being less than 15 ha in area (Parsons 1999). This compares with a public forest estate of 1.9 M ha. Only one forest type (Darling Scarp) had more than 50% of its distribution on private land. Consequently, the RFA for this region primarily provided principles and strategies for



**Figure 7.** Timber harvested from Western Australian native forest 1994/95 to 1999/2000 (ABARE 2001 unpublished data)

protecting conservation values and promoting sustainable management of private forests. However, five ecosystems where achievement of JANIS targets was not possible on public land were targeted for increased protection (Commonwealth and Western Australian Government Regional Forest Agreement Steering Committee 1998).

### Forest management: timber utilisation, silviculture and conservation

Timber harvest from private forests is estimated in RFA documents at 60000 m<sup>3</sup> y<sup>-1</sup> although Figure 7 shows an estimated average of 13000 m<sup>3</sup> y<sup>-1</sup> harvested from private land over the period 1994/95 to 1999/2000 (ABARE 2001). It is considered that production from these forests is likely to remain variable but at a low level compared to production from public forests. There is no legal requirement for forest management planning on private land apart from conditions that are applied to operations in protected catchments. The RFA provided a strategy for implementing ecologically sustainable forest management (ESFM) on private land and private forest owners are encouraged to conduct operations in a manner consistent with the Codes of Practice for State Forest (Commonwealth and Western Australian Government Regional Forest Agreement Steering Committee 1998).

From a management and silvicultural perspective, private native forest harvesting in Western Australia for long-term sustainable production is in its infancy. The basic silvicultural practices fall into two categories. In the more extensive jarrah (*E. marginata*) and wandoo (*E. wandoo*) forests a heavy selection harvesting process is used which retains future crop trees and relies on coppice and the release of lignotubers for regeneration. In the karri (*E. diversicolor*) forests either a seed tree or clearfell system is used, followed by burning to create a suitable site for regeneration using seed from the retained seed trees or planted seedlings (Richard Moore, Department of Conservation and Land Management *pers. comm.*).

A current Natural Heritage Trust project (Western Australia Private Native Forest project) is looking at the administrative, legal, social and marketing constraints for private native forests in addition to reviewing management practices. A report is expected early in 2002.

## Discussion

Overall, the history of private forest management is not well documented (Dargavel 2000). Generally, harvesting interventions have been ad hoc and dependent on the income needs of forest owners and market demand. Attention to silvicultural management has also been limited, resulting in growth rates in much of the private estate that are less than their full potential. Significant areas of private forest that were cleared in the past for cropping or grazing have since been abandoned and are now in various stages of regrowth development and condition. In general, the private forests have not been managed for a sustainable supply of timber, and the nature and extent of disturbances, such as by fire and grazing, are likely to be significantly different to the disturbances that have occurred in similar forest types on public land.

In comparison to the public forested estate, the private forested estate is poorly documented in terms of its commercial and conservation significance. The accumulated data from various sources used in this report show inconsistencies in various reporting mechanisms. For example, comparison of the RFA reports (Table 3) with the ABARE forest product statistics (Figs 2–7) shows considerable differences between reported private forest harvested timber volumes. Part of this difference appears to be due to a lack of institutional mechanisms for monitoring: for instance in Victoria, for private forests, this task is the responsibility of local governments and there is no statewide recording of areas and timber volumes harvested.

In many States the conservation and timber values of this private estate are currently not adequately protected through planning and regulatory mechanisms (Private Lands Working Group 1999; Herd *et al.* 2000). In NSW, Queensland and Tasmania there is substantial reliance on private native forests for commercial timber production. Whilst Tasmania has developed a leading approach for managing these forests through Private Forests Tasmania, the other States have less well-developed approaches to government agency involvement in private land management. Consequently, Tasmania is well ahead of other States in terms of their systems and knowledge on basic inventory and the provision of advice for planning and managing private native forest to meet commercial and conservation objectives.

Aside from Tasmania, institutional structures for providing advice on private land management and planning are limited. They include small units within current government agencies such as the Private Forests Unit within the Department of Natural Resources and Environment in Victoria, and the Department of Conservation and Land Management and Agriculture WA jointly-operated Farm Forestry Advisory Service. In NSW, the newly formed Office of Private Forestry has a facilitation, policy advice and referral role but lacks capacity for broad delivery of management advice. Queensland private forest management issues fall under the Department of Natural Resources and Mines, the Department of Primary Industry and the State Development Authority but again these agencies are not resourced to provide on-ground planning and management advice.

In South East Queensland (SEQ), there is only limited understanding of the proportion of timber supplied to the region from private forests actively managed for timber production, and State

efforts to date to promote sustainable forest management have largely been redirected towards controlling tree clearing (Herd *et al.* 2000). In efforts to redress this with respect to biodiversity, there is currently strategic regional planning for the majority of SEQ through the Wide Bay 2020 and SEQ 2021 planning processes (Wide Bay RPAC 1998; Department of Local Government and Planning 2001); integration of nature conservation needs into new local government planning schemes (required under the *Integrated Planning Act 1997* before 2003); recently introduced tree clearing control through the *Vegetation Management Act 1999*; and State and Local Government extension and management services for nature conservation (i.e. Nature Refuges, Land for Wildlife, Bushcare). However, there is limited targeting of specific conservation values, and no mechanisms are in place to monitor the suitability and performance of these off-reserve conservation strategies.

Regional Plantation Committees have been established with support from the Commonwealth (Agriculture, Fisheries and Forestry – Australia) to facilitate plantation establishment and advise on private native forest management. They provide an important mechanism for facilitating private native forest networks for information dissemination and communication. Through the Natural Heritage Trust, the Commonwealth Government has also provided support for a wide range of local, regional and national initiatives contributing to the management and understanding of the private native forest resource.

Each RFA provided some guidance for private native forest management and initiatives, but there is a requirement for longer-term funding of a lead agency, or unit within an existing agency, to deal with private native forest management and planning issues in each State. This agency could coordinate activities such as long-term inventory for timber production and assessment of other environmental values, assess the management intent of private landowners, and coordinate ongoing monitoring responsibilities.

Landowner intent was assessed in the Tasmanian and Northern NSW RFA regions. The Tasmanian landowner intent survey is used as part of the regular forest inventory and updated every 5 y whereas the Northern NSW assessment was specific to the RFA (Northern NSW Forestry Services and Bureau of Rural Sciences 1999). Assessment of management intent becomes an important part of the planning program for understanding of long-term timber potential levels and should be an integral component of any private native forest inventory undertaken post RFAs.

Issues that limit sustainable utilisation of the private forest resource in many States include lack of forest management standards through codes of practice; lack of information on the resource, growth rates, silviculture, economics and marketing; plus uncertainty regarding government decisions on harvesting rights (Alexandra and Hall 1998; Parsons 1999).

The RFAs will affect management of private native forest in most States. Reduced harvesting from State-managed forests to meet CAR reserve objectives is likely to result in greater pressure to harvest private forests, particularly in NSW and Queensland. For example, the NSW Government is currently purchasing private land specifically for timber production in both the Northern (planned expenditure of \$18 M between 1999 and 2004) and

Southern (planned expenditure of \$4.76 M) RFA regions. Other States have also made various provisions for acquiring private native forest: for example the \$9.5 M private land purchase in Western Australia and the \$30 million commitment in Tasmania to implement a program to protect conservation values on private land. New South Wales and Victoria have identified forest types on private land that are required to improve the conservation status of certain ecosystems but have no specified funding commitment. The collective implications of these actions for the private native forest industry are currently unclear. While uncertainty over allowed use exists, and requirements of statutory authorities increase, landholders may be reluctant to engage in forest harvesting. Further, the removal of private land for inclusion into the park system or the State forest estate will necessarily mean a decrease in potentially available forest for long-term timber production.

Privately managed forests have the potential to make a long-term contribution to timber supply for industry in a number of regions in Australia and to meet conservation and other environmental resource management objectives. Despite the government investment in the RFA program, there is currently a significant lack of information about the potential of timber production from the private forest estate and the range of other values that private forests provide. In light of these uncertainties and the generally limited information on private native forests, there is a need to develop a comprehensive strategy to address inventory, planning and management issues for private native forests. These need to be based on:

- identified knowledge gaps for private native forests;
- information requirements for national and international reporting;
- assessments required to adequately define regional sustainability of timber and other values;
- planning requirements and administrative structures to implement sustainable management; and
- appropriate incentives, assisting owners to realise economic value from private native forests while more effectively protecting and enhancing the range of other ecosystem goods and services that private forests provide.

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